

Declaration of Scott Andrews

U.S. Patent No. 11,258,107

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.

Petitioner

v.

CHARGELOGIC LLC

Patent Owner

Inter Partes Review Case No. IPR2026-00378

U.S. Patent No. 11,258,107

DECLARATION OF SCOTT ANDREWS

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Claim Designation	Claim Language
Claim 1[Pre]	1. A system for charging a battery of a vehicle, the system comprising:
Claim 1[a]	a battery charger having:
Claim 1[b]	an electrical power cord releasably attachable to at least one at least one of the vehicle and a source of power;
Claim 1[c]	a transmitter;
Claim 1[d]	a controller electrically coupled to the electrical power cord and to the transmitter, the controller configured to:
Claim 1[e][i]	receive, via a user-manipulatable control, data indicative of a predetermined threshold level of charge
Claim 1[e][ii]	by which the controller sends an alert, the predetermined threshold level of charge being less than a full charge of the battery,
Claim 1[e][iii]	compare, during charging of the battery with the battery charger, a level of charge of the battery to the predetermined threshold level of charge, and
Claim 1[e][iv]	responsive to the level of charge of the battery reaching the predetermined threshold level of charge of the battery, send, before the charging of the battery is complete, at least one signal as the alert via the transmitter, the at least one signal indicative of the predetermined threshold level of charge of the battery; and
Claim 1[f]	a portable controller remote from the vehicle and battery charger, the portable controller configured to wirelessly communicate with the controller of the battery charger via the transmitter;
Claim 1[g]	wherein the portable controller generates a notification to a user indicating the predetermined threshold level of charge of the battery following and as the result of receiving the at least one signal indicative of the predetermined threshold level of charge of the battery.
Claim 2	2. The system of claim 1, wherein the notification is an indicator on a display viewable by the user.
Claim 3	3. The system of claim 2, wherein the display is electrically coupled to the portable controller.

Claim Designation	Claim Language
Claim 4	4. The system of claim 1, wherein the notification is at least one of a group consisting of a text and an e-mail automatically generated to the user.
Claim 5	5. The system of claim 1, wherein the portable controller is configured to send signals to the controller of the battery charger to start and stop charging of the battery.
Claim 6[Pre]	6. A method of charging a battery of a vehicle, the method comprising:
Claim 6[a]	establishing wireless communication between a controller of the vehicular battery charger and a portable controller of a user remote from the vehicle and the vehicular battery charger;
Claim 6[b]	receiving, via a user-manipulatable control, data indicative of a predetermined threshold level of charge by which the controller sends an alert, the predetermined threshold level of charge being less than a full charge of the battery;
Claim 6[c]	supplying power to the battery of the vehicle via the vehicular battery charger;
Claim 6[d]	comparing, during charging of the battery with the vehicular battery charger, a level of charge of the battery to the predetermined threshold level of charge; and
Claim 6[e]	generating and wirelessly transmitting, during the charging of the battery and before the charging of the battery is complete, a signal to the portable controller responsive to detecting the level of charge of the battery reaching the predetermined level of charge of the battery.
Claim 7	7. The method of claim 6, wherein the signal includes data indicative of the level of charge of the battery.
Claim 8	8. The method of claim 6, wherein wirelessly transmitting the signal comprises wirelessly transmitting the signal from the controller of the vehicular battery charger.
Claim 9	9. The method of claim 6, wherein alerting the user comprises alerting the user via at least one of a group consisting of an e-mail and a text.
Claim 10[Pre]	10. A system for charging a battery of a vehicle and for wireless communication with a phone having a controller, the system comprising:

Claim Designation	Claim Language
Claim 10[a]	a battery charger having: an electrical power cord releasably attachable to at least one of the vehicle and a source of power;
Claim 10[b]	a transmitter;
Claim 10[c]	a battery charger controller electrically coupled to the electrical power cord and to the transmitter, the battery charger controller configured to:
Claim 10[d]	wirelessly communicate with the controller of the phone by sending signals via the transmitter,
Claim 10[e]	control supply of power to the battery in the course of a charging session as the level of charge of the battery is increased,
Claim 10[f]	receive, via a user-manipulatable control, data indicative of a predetermined threshold level of charge by which the battery charger controller sends an alert, the predetermined threshold level of charge being less than a full charge of the battery;
Claim 10[g]	compare, during charging of the battery with the vehicular battery charger, a level of charge of the battery to the predetermined threshold level of charge; and
Claim 10[h]	responsive to detection of the level of charge of the battery reaching the predetermined threshold level of charge during the charging session and before charging of the battery is complete, send a signal indicative of the level of charge being reached via the transmitter to the controller of the phone as the alert.
Claim 11	11. The system of claim 10, wherein the signal indicative of the level of charge being reached is at least one of a group consisting of a text and an e-mail automatically generated to the user.
Claim 12	12. The system of claim 10, wherein the battery charger controller is further responsive to signals from the phone to start and stop charging of the battery.
Claim 13	13. The system of claim 10, wherein the battery charger is releasably attachable to the vehicle and the source of power, and is portable as a single unit.
Claim 14	14. The system of claim 10, wherein the battery charger controller is further responsive to detection of interruption of power to the battery by sending another signal indicative of the interruption via the at least one of the group consisting of the transmitter and the receiver to the controller of the phone.

I, Scott Andrews, declare as follows:

I. INTRODUCTION

1. I have been retained by counsel for Petitioner as a technical expert in the above-captioned case. Specifically, I have been asked to render certain opinions regarding the IPR petition with respect to U.S. Patent No. 11,258,107 (“the ’107 Patent”). I understand that the Challenged Claims are 1-14, and my opinions are limited to those claims. A true and correct copy of my Curriculum Vitae, which provides further details about my background and experience, is appended to this Declaration.

A. Educational Background and Professional Experience

2. My current curriculum vitae is attached as Exhibit A, which includes a detailed listing of my education, work experience, honors, awards, professional associations, publications, and a list of my expert consulting activities during the past five years in which I have testified as an expert at deposition or trial.

3. I have over 30 years of professional experience in the field of electronics, mobile information technology, and communication systems. Further, I have authored numerous published technical papers and am a named inventor on 13 U.S. and foreign patents.

4. I received a Bachelor of Science degree in Electrical Engineering from University of California, Irvine in 1977 and a Master of Science degree in Electronic Engineering from Stanford University in 1982.

5. From 1977 to 1979, I worked at Ford Aerospace where I designed, tested and delivered microwave radar receiver systems. From 1979 to 1983, I worked at Teledyne Microwave, where I developed high reliability microwave components and developed CAD tools. From 1983 to 1996, I worked at TRW, Inc., having held various positions. From 1983 to 1985, I was a Member of the technical staff and a Department Manager in the Space Electronics sector. Between 1985 and 1990 I was a project manager working on various communications systems projects including the US DoD Advanced Research Projects Administration (ARPA) MIMIC Program. Between 1990 and 1993 I was the Manager of MMIC (monolithic-microwave-integrated-circuit) Products Organization. In this role, I developed business strategy and managed customer and R&D programs. During this time, I also developed the first single chip 94 GHz Radar, used for automotive cruise control and anti-collision systems. In 1993, I transferred to the TRW Automotive Electronics Group, and managed about 30 engineers in the Systems Engineering and Advanced Product Development organization. In this role, I managed advanced development programs such as electronic and electrohydraulic steering systems, automotive radar, adaptive

cruise control, occupant sensing, automatic crash notification systems, in-vehicle information systems, vehicle user interfaces, and other emerging transportation products.

6. I was employed as a Project General Manager in the Electronics Division of Toyota Motor Corporation at Toyota headquarters in Toyota City, Japan from April 1996 to around April 2000. In this position, I was responsible for leading the development of vehicle telematics systems, infotainment systems, including onboard and off-board navigation systems, traffic information systems, vehicle communications systems, safety applications, and automated vehicle control systems. This work also included advanced parking management systems wherein parking lot sensors would be used to identify open parking places that could then be communicated to drivers via the connected vehicle information system.

7. I am currently a consultant for Cogenia Partners, LLC, focusing on systems engineering, business development and technical strategy supporting automotive and information technology. I have been in this position since 2001. In one of my active engagements, I serve as the technical lead on a project funded by the National Highway Traffic Safety Administration (NHTSA) to develop requirements for connected vehicle safety systems in preparation for NHTSA regulations governing such systems. I also serve as a technical consultant on multiple

projects sponsored by the Federal Highway Administration (FHWA) related to connected vehicle technology research. One project on which I was the chief systems engineer was a truck parking information and reservation system. In this system, truck drivers were provided information on available parking at truck stops along the road ahead of their current location. The system would identify their hours of service, and recommend where they should stop to rest based on parking availability. The system included various techniques for sensing open truck parking places (including ultrasonic (sonar), infrared, and camera sensors), and allowed the driver to also potentially reserve a space. This project also explored mechanisms for truck electrification which is a technique for providing electric power to parked trucks to minimize the use of diesel fuel while parked and idling.

8. In 2003, working with two colleagues, I designed a prototype electric vehicle with the aim of providing a high-performance vehicle with extensive electronic features such as electronically controlled steering, suspension, in vehicle information systems and such. As part of this development effort, I also developed a patent related to how information in a highly integrated vehicle would be shared among the various electronic control units. This invention is described, in, among various other patents, U.S. Patent 7,802,263. Many of the features envisioned for this vehicle are now found in commercially available electric vehicles. As a result

of this activity, I have a deep understanding of the architecture of electric vehicles, the limitations and characteristics of the powertrain and energy sources, and the various considerations associated with charging these vehicles.

9. I also worked on a user interface for a Ford EV concept car called the EVent. In this system I used a laptop computer screen in place of the instrument cluster of the car, and used a small touch pad located on the center console. The screens for the display included four soft button areas that corresponded to the four corners of the touch pad. Touching a corner of the touch pad then activated that button on the screen. This allowed the driver to activate different features, such as the audio system, the navigation system, the charge status, the HVAC systems, etc. without taking eyes off the road. I was subsequently awarded U.S. Patent number 5,864,105, titled Method and Apparatus for Controlling an Adjustable Device, based on the concept of the touch pad being used as a physical (shape) metaphor for the thing being controlled.

10. In various positions mentioned above, I was responsible for research and development projects relating to numerous mobile and vehicle information systems, hybrid vehicles systems, vehicle networks, user interface systems, sensory systems, communications systems, control systems and safety systems, and had the opportunity to collaborate with numerous researchers and suppliers that are involved

in the field of automotive control systems. I therefore believe that I have a detailed understanding of the state of the art during the relevant period, as well as a sound basis for opining how persons of skill in the art at that time would understand the technical issues in this case.

II. MATERIALS CONSIDERED

11. In forming my opinions, I have relied on my own knowledge and experience, including my education, training, and work experience in the field of electrical engineering, my experience in working with others in this field, and my experience in the design, development, and operation of relevant systems.

12. In developing my opinions, I have considered the following materials:

Exhibit	Description
1001	U.S. Patent No. 11,258,107 (the “’107 Patent”)
1002	File History of the ’107 Patent (the “’107 File History”)
1004	U.S. Patent Publication No. 2008/0136371 to Sutardja (“Sutardja”)
1005	U.S. Patent No. 7,698,078 to Kelty-078 et al. (“Kelty-078”)
1006	U.S. Patent Application Publication No. 2006/0028178 to Hobbs et al. (“Hobbs”)
1007	U.S. Patent Application Publication No. 2007/0300183 to Anttila et al. (“Anttila”)
1008	U.S. Patent Application Publication No. 2003/0193405 to Hunt et al. (“Hunt”)
1009	U.S. Patent Application Publication No. 2007/0200433 to Kelty et al. (“Kelty-433”)
1010	Japanese Patent Application No. 2000-4542 to Kuromame et al. (“Kuromame”)
1011	K. Shuaib et al., <i>Co-existence of Zigbee and WLAN, A Performance Study</i> , IEEE Xplore (2006) (“Shuaib”)

1012	U.S. Patent Application Publication No. 2006/0009697 to Banet et al. (“Banet”)
1013	U.S. Patent Application Publication No. 2008/0312782 to Berdichevsky et al. (“Berdichevsky”)
1014	<i>Specification of the Bluetooth System Master Table of Contents & Compliance Requirements: Covered Core Package version: 2.0 + EDR. 4</i> , November 2004. (“Bluetooth”)
1015	C. C. Chan, <i>The State of the Art of Electric and Hybrid Vehicles</i> , Proceedings of the IEEE, Vol. 90, No. 2, February 2002. (“Chan”)
1016	U.S. Patent Application No. 2003/0230443 to Cramer et al. (“Cramer”)
1017	U.S. Patent No. 5,487,002 to Diller et al. (“Diller”)
1018	U.S. Patent No. 2,309,941 to Drummond (“Drummond”)
1019	U.S. Patent No. 5,367,558 to Gillig et al. (“Gillig”)
1020	U.S. Patent Application Publication No. 2010/0106351 to Hanssen et al. (“Hanssen”)
1021	Elena Malykhina, <i>Palm Treo 700p: A PDA For Work And Play</i> , Information Week, May 19, 2006, https://www.informationweek.com/it-leadership/palm-treo-700p-a-pda-for-work-and-play . (“InformationWeek”)
1022	Information Week, Hardware Articles Listings, May 26, 2006, https://web.archive.org/web/20060526214055/http://www.informationweek.com/hardware/reviews/?subSection=Reviews . (“InformationWeekArchived”)
1023	U.S. Patent Application Publication No. 2009/0021218 to Kelty et al. (“Kelty-218”)
1024	Willett Kempton and Jasna Tomić. <i>Vehicle-to-grid power fundamentals: Calculating capacity and net revenue</i> . Journal of Power Sources. 2005. 144. pp. 268-279 (“Kempton”)
1025	U.S. Patent No. 7,693,609 to Kressner et al. (“Kressner”)
1026	William C.Y. Lee, <i>Wireless & Cellular Telecommunications</i> , McGraw-Hill (3rd Ed.) (“Lee”)
1027	U.S. Patent Application No. 2010/0211340 to Lowenthal et al. (“Lowenthal-340”)
1028	U.S. Patent No. 7,956,570 to Lowenthal et al. (“Lowenthal-570”)
1029	Lisa Gade, <i>Palm Treo 700wx for Sprint</i> , MobileTechReview, September 3, 2006, archived October 23, 2006,

	https://web.archive.org/web/20061023145632/https://www.mobiletechreview.com/treo-700wx.htm (“MobileTechReviewArchived”)
1030	<i>Your Palm© Treo™ 700p Smartphone User Guide</i> , © 2006 Palm, Inc. (“PalmTreo700p”)
1031	U.S. Patent Publication No. 2008/0039980 to Pollack et al. (“Pollack”)
1032	U.S. Patent No. 7,084,859 to Pryor (“Pryor”)
1033	U.S. Patent Appl. Publication No. 2007/0248089 to Redi et al. (“Redi”)
1034	U.S. Patent No. 7,764,932 to Rofougaran et al. (“Rofougaran”)
1035	U.S. Patent No. 5,573,090 to Ross (“Ross”)
1036	<i>Electric Vehicle Battery Systems</i> , Sandeep Dhameja, Newnes, 2002 (“Sandeep”)
1037	Jin-Shyan Lee, Yu-Wei Su, and Chung-Chou Shen, <i>A Comparative Study of Wireless Protocols: Bluetooth, UWB, ZigBee, and Wi-Fi</i> , The 33rd Annual Conference of the IEEE Industrial Electronics Society (IECON) (Nov. 5-8, 2007, Taipei, Taiwan) (“Su”)
1038	U.S. Patent Appl. Publication No. 2010/0102776 to Uchida (“Uchida”)
1039	U.S. Patent Appl. Publication No. 2004/0119445 to Wakeman (“Wakeman”)
1040	U.S. Patent Appl. Publication No. 2007/0173805 to Weinberg et al. (“Weinberg”)
1041	U.S. Patent Publication No. 2008/0039989 A1 to Pollack et al. (“Pollack’89”)

13. I have considered these materials from the viewpoint of a POSITA as of the priority date of the ’107 Patent. For the purposes of this declaration, the priority date of the ’107 Patent is August 18, 2008, as I discuss below. *See* Section IV below. I note that my opinions provided in this Declaration are made from the perspective of a POSITA as of this priority date of the ’107 Patent unless expressly stated otherwise. To the extent that I use any verb tense in this Declaration that is

present tense (e.g., “a POSITA would understand” instead of “a POSITA would have understood”), such verb tense should be understood to be my opinion as of the ’107 Patent’s priority date (again, unless expressly stated otherwise). I merely use the present verb tense for ease of reading.

III. OVERVIEW AND LEGAL STANDARDS

14. In formulation my opinions, I have been instructed to apply certain legal standards. I am not a lawyer. I do not offer any testimony regarding what the law is. Instead, the following sections summarize the law as I have been instructed to apply it in formulating and rendering my opinions found later in this declaration. I understand that, in an inter partes review (“IPR”) proceeding, patent claims may be deemed unpatentable if it is shown that they are anticipated or rendered obvious in view of the prior art. I understand that prior art in an IPR review is limited to patents or printed publications that predate the priority date of the patent at issue. I understand that questions of claim clarity (definiteness) and enablement cannot be considered as a ground for considering the patentability of a claim in these proceedings.

A. Person of Ordinary Skill in the Art

15. I understand that the ’107 Patent, the record of the proceedings at the Patent Office (which I understand is called the “File History” or “Prosecution

History”), and the teachings of the prior art are evaluated from the perspective of a person of ordinary skill in the art (“POSITA”). I understand that the factors considered in determining the ordinary level of skill in the art may include: (i) the levels of education of the inventor; (ii) the types of problems encountered in the art; (iii) prior art solutions to those problems; (iv) the rapidity with which innovations are made; (v) the sophistication of the technology; and (vi) the educational level of persons working in the field.

16. I understand that a person of ordinary skill in the art is not a specific real individual, but rather a hypothetical individual having the qualities reflected by the factors above. The hypothetical person is presumed to have the same level of skill as the typical practitioner of the art and is presumed to have knowledge of all prior art in the relevant field. I understand that the inventor’s actual knowledge or lack of knowledge of prior art reference is irrelevant to the obviousness determination.

B. Obviousness

17. I understand that a claim may be invalid under 35 U.S.C. § 103(a) if the subject matter described by the claim as a whole would have been “obvious” to a POSITA in view of a single or combination of prior art references at the time the claimed invention was made. I further understand that a POSITA is assumed to know

and to have all relevant prior art in the field of endeavor covered by the patent-in-suit and all analogous prior art. I understand that obviousness in an IPR review proceeding is evaluated using a preponderance of the evidence standard, which means that the claims must be more likely obvious than nonobvious.

18. I also understand that an obviousness determination includes the consideration of various factors including: (1) the scope and content of the prior art, (2) the differences between the prior art and the claim at issue, and (3) the level of ordinary skill in the pertinent art. I understand that secondary considerations of non-obviousness such as commercial success, long-felt but unresolved needs, failure of others, and so forth may be assessed as well. I have been informed that an obviousness analysis must consider the full scope of the claims to avoid impermissibly using hindsight to invalidate a patent.

19. In considering whether certain prior art renders a particular patent claim obvious, I have been informed that I can consider the scope and content of the prior art, including the fact that a POSITA would regularly look to the disclosures in patents, trade publications, journal articles, conference papers, industry standards, product literature and documentation, texts describing competitive technologies, requests for comment published by standard setting organizations, and materials from industry conferences, as examples.

20. I have been informed that for a prior art reference to be proper for use in an obviousness analysis, the reference must be “analogous art” to the claimed invention. A reference is analogous art if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). For a reference to be “reasonably pertinent” to the problem, it must logically have commended itself to an inventor’s attention in considering the problem. In determining whether a reference is reasonably pertinent, one should consider the problem faced by the inventor, as reflected either explicitly or implicitly, in the specification. I believe that the documents I considered in forming my opinions in this IPR are well within the range of documents a POSITA would have consulted to address the type of problems described in the Challenged Claims.

21. I have been informed that to establish that a claimed invention was obvious based on a combination of prior art elements, an articulation of the reason(s) why a claimed invention would have been obvious must be provided. Specifically, I have been informed that the prior art, either as a single reference or a combination of multiple items of prior art, renders a patent claim obvious when there was an apparent reason for a POSITA, at the time of the invention, to combine or modify

the prior art. Rationales for combining or modifying the prior art include, but are not limited to, any of the following: (A) combining prior art methods according to known methods to yield predictable results; (B) substituting one known element for another to obtain predictable results; (C) using a known technique to improve a similar device in the same way; (D) applying a known technique to a known device ready for improvement to yield predictable results; (E) trying a finite number of identified, predictable potential solutions, with a reasonable expectation of success; (F) identifying that known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; or (G) identifying an explicit 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 the prior art references to arrive at the claimed invention.

22. I have also been informed that where there is a motivation to combine, claims may be rejected as obvious provided a POSITA would have had a reasonable expectation of success regarding the proposed combination. I have also been informed that common sense may be considered. Common sense teaches that familiar items may have obvious uses beyond their primary purposes. I have been informed that if the combination was obvious to try (regardless of whether it was

actually tried) or leads to anticipated success, then it is likely the result of ordinary skill and common sense rather than non-obvious innovation.

23. I have been informed that the existence of an explicit teaching, suggestion, or motivation to combine known elements of the prior art is a sufficient, but not a necessary, condition to a finding of obviousness. In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose described in the patent-in-suit controls. I have been further informed that the obviousness analysis may consider the effects of demands known to the technological community or present in the marketplace and the background knowledge possessed by a POSITA. These issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent.

24. I have been informed that it is improper to combine references where the references teach away from their combination. A reference may be said to teach away when a POSITA, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the patent applicant. I have also been informed that a reference does not teach away if it merely expresses a general preference for an

alternative invention but does not criticize, discredit, or otherwise discourage investigation into the invention claimed.

25. I am informed that even if a case of obviousness is established, the final determination of obviousness must also consider “secondary considerations” if presented. Secondary considerations include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unsatisfied need for the invention; (c) failure of others to find the solution provided by the claimed invention; (d) deliberate copying of the invention by others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) lack of independent simultaneous invention within a comparatively short space of time; and (h) teaching away from the invention in the prior art.

26. I have been further informed that secondary considerations evidence is only relevant if the offering party establishes a connection, or nexus, between the evidence and the claimed invention. The nexus cannot be based on prior art features. The establishment of a nexus is a question of fact. While I understand that Patent Owner here has not offered any secondary considerations at this time, I will supplement my opinions should Patent Owner raise secondary considerations during the course of this proceeding.

C. Claim Construction

27. I understand that the claim terms in an IPR proceeding not expressly construed otherwise, are interpreted according to their plain and ordinary meaning as understood in light of the claim language, the patent's description, and the prosecution history viewed from the perspective of a POSITA. I further understand that where a patent defines claim language, the definition of the patent controls, even if there are other definitions that might be understood by those working in the art.

1. "threshold level of charge"

28. I have been instructed by counsel to apply the claim construction for "*threshold level of charge*" as "a level of charge that is less than the charge level at which charging stops."

IV. LEVEL OF A PERSON OF ORDINARY SKILL

29. Based on my review and analysis of the '107 Patent, the cited prior art, and the ordinary skill factors described in this section, a POSITA at the time of the '107 Patent would have had at least a bachelor's degree in electrical or mechanical engineering (or an equivalent field) and at least two years of work experience involving automotive systems, including electric vehicle battery charging systems. Additional industry experience or technical training may offset less formal education, while advanced degrees or additional formal education may offset lesser

levels of industry experience. When I refer to the understanding of a POSITA, I am referring to the understanding of such a person as of August 18, 2008.

30. As of August 18, 2008, I had more than ordinary skill in the art. I am, however, familiar with the skills and knowledge possessed by those I would have considered to be of ordinary skill in the art as of that date. For example, I worked at Toyota Motor Corporation from 1996 to 2000, where I conceptualized and developed new technology products and services for Toyota's future passenger vehicles. Such technology products included a heavy emphasis on vehicle electronic systems, vehicle information systems and vehicle and mobile device based user interface systems. I also designed a novel hybrid electric vehicle that used a dynamically charged electric powertrain system in conjunction with a conventional internal combustion engine to create a very high performance vehicle.

31. My opinions provided in this declaration would not change in view of minor modifications to this level of ordinary skill.

V. OVERVIEW OF THE '107 PATENT

A. Summary

32. The '107 Patent is directed to a vehicle battery charging system in which a controller enables user-defined charging schedules and communicates with

remote controllers to control charging based on factors such as time of day, electricity cost, or other factors. EX1001, Abstract, 1:64-2:8.

1. Field of Endeavour

33. I have been informed that the field of endeavor of the claimed invention can be determined by reference to explanations of the invention's subject matter in the patent application, including the embodiments, function, and structure of the claimed invention.

34. The '107 Patent relates to electric vehicle battery charging systems. EX1001, Title Abstract, 1:64-2:8.

35. For these reasons, a POSITA would have understood that the field of endeavor of the '107 Patent includes systems for charging batteries and communicating information relevant thereto to users.

2. Problem Solved by the Inventor

36. I have been informed that a prior art reference is "reasonably pertinent" if a POSITA would have consulted it and applied its teachings when faced with the problems that the inventor was trying to solve. As such, I have been asked to analyze the '107 Patent and determine the problems that the inventors were trying to solve.

37. The '107 is directed to problems such as controlling and managing electric vehicle charging. EX1001, 1:54-60, 16:9-19.

38. The '107 is directed to problems such as implementing user interfaces and notifications. EX1001, 8:54-63, 22:27-59, 28:11-23.

39. The '107 is directed to problems such as battery power management. EX1001, 16:9-19, 22:5-12, Fig. 27.

VI. OVERVIEW OF THE TECHNOLOGY

40. I was asked briefly to summarize the background of the prior art from the standpoint

A. Electric Vehicles

41. Electric vehicles (EV) “use an electric motor to provide all or part of the mechanical drive power.” EX1024-Kempton, 269, Section 3. “EVs may include battery electric vehicles (BEVs), hybrid electric vehicles (HEVs), and fuel-cell electric vehicles (FCEVs).” EX1015-Chan, 247, Section I. The “EV was invented in 1834” and “[b]y the mid-1970s, oil shortages led to aggressive development of EV programs[,]” with EVs being leased and sold in the USA starting in 1996. EX1015-Chan, 248, Section III.A; EX1036-Sandeep, 4; *see also*, EX1015-Chan, 255 at Table 2. Thus, electric vehicles, such as hybrid vehicles and fully electric vehicles, were readily available and well-known prior to the '107 Patent.

1. Chargers

42. Electric vehicles were known to require some form of charging to maintain the electric power source. EX1035-Ross, 2:10-15. For this reason, electric vehicles included chargers for charging the batteries on the vehicles. *See, e.g.*, EX1017-Diller, 3:30-31, 4:15-19 (generally describing the energy management system (EMS) on-board the vehicle that contains a “micro-controller” controlling the “charger 60 for the battery in the vehicle”); EX1035-Ross, 7:57-67 (describing an electric vehicle that includes an “onboard power receiving module 20” that “receives electrical power”).

2. Vehicle Displays

43. Displays and interfaces, including GUIs (graphical user interfaces) provided on displays, were known, and their inclusion in vehicles was also known prior to the '107 Patent. For example, vehicles were known to have “a basic vehicle dashboard” comprising “tactile displays/and or touch screens 10-14” which “can be used for the basic control functions of the vehicle.” EX1032-Pryor, 2:38, 13:19-21.

44. Instrument panels to display vehicle-related information to the user have been employed in vehicles well before the '107 Patent. *See, e.g.*, EX1018-Drummond, 2:26-30 (describing “instrument panel 10” found “on the dashboard of the automobile immediately in front of the driver so that it will attract his attention without any effort on his part” in 1943). An on-board vehicle display was

known to be beneficial “for displaying information for the driver[,]” as vehicle displays “improve[d] occupant safety, environmental friendliness, ergonomics, and compatibility to modify, add, or upgrade vehicle features.” EX1016-Cramer, [0307].

3. Controllers

45. Managing EV charging within the vehicle itself was known, as EVs were known to include controllers for controlling charging of the vehicle. For example, EV systems had a controller on-board the vehicle for controlling charging of the batteries among other vehicle functions; for instance, Diller’s EV includes a micro-controller 12 as a calculation engine and means for controlling the various systems of the electric vehicle.” EX1017-Diller, 3:29-33. Ross also describes the EV including a “microprocessor controller 56, which is realized using a conventional processor-based system” as part of an on-board “power control unit 32.” EX1035-Ross, 8:14-20 (describing the power control unit 32 on-board the vehicle directing charge to the “energy storage system”), 11:37-51, 16:47-50. The microprocessor controller 56 controls charging by “directing the power to and from the energy storage system,” among other vehicle functions (e.g., “monitoring onboard vehicle sensors 60” and “receiving appropriate commands from the operator control devices 38”). *Id.*, 11:58-67 (describing many “tasks” carried out by the microprocessor “are the same as carried out with the operation of any EV”).

46. Thus, the use of controllers in electric vehicles to monitor and control the charging process was well-known prior to the '107 Patent.

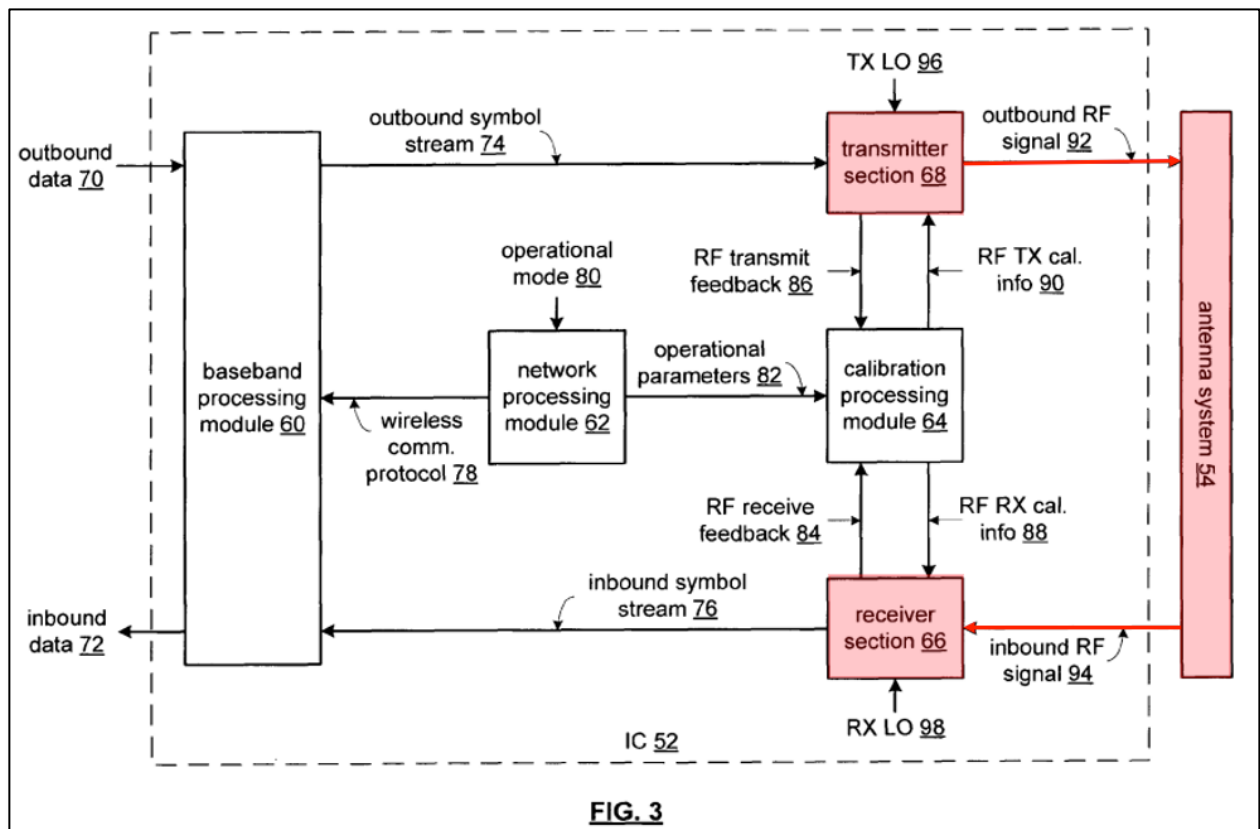
4. User Controls

47. Devices and methods for user-controllable input values and thresholds related to electric vehicle (EV) charging were well known prior to the '107 patent. User interfaces “associated with an electric resource such as an electric vehicle that includes an energy storage system... may be displayed on a device associated with the owner of the electric resource, such as a cell phone or portable computer.” These user interfaces enabled the input of “power aggregation preferences and constraints,” allowing a user to “control a degree of participation of the electric resource in a power aggregation scenario via the user interface.” EX1031-Pollack, [0228]. Thus, user-controllable input values and thresholds were well known before the '107 patent.

B. Transmitter, Receivers, and Transceivers

48. It was well known prior to the '107 patent that transmitters, receivers, and transceivers were commonplace components of wireless communication systems and devices. For example, Rofougaran describes a wireless communication device that utilizes cellular telephone systems and that “[f]or each wireless communication device to participate in wireless communications, it includes a built-

in **radio transceiver (i.e., receiver and transmitter)** or is coupled to an associated radio transceiver” EX1034-Rofougaran, 1:34-37, 2:6-9. More specifically, Rofougaran teaches a “wireless communication device that includes an integrated circuit and an antenna system”, the integrated circuit including “a receiver section 66, and a transmitter section 68.” EX1034-Rofougaran, 5:14-17, 5:56-65, Fig. 3.



EX1034-Rofougaran, Fig. 3. The antenna system includes “an antenna 290,” where the antenna system “provides inbound RF signal 94 to the receiver section 66 and receives the outbound RF signal 92 from the transmitter section 68...then transmits the outbound RF signal 92.” EX1034-Rofougaran, 9:5-10, 27:5-13, Fig. 13. Fig. 18.

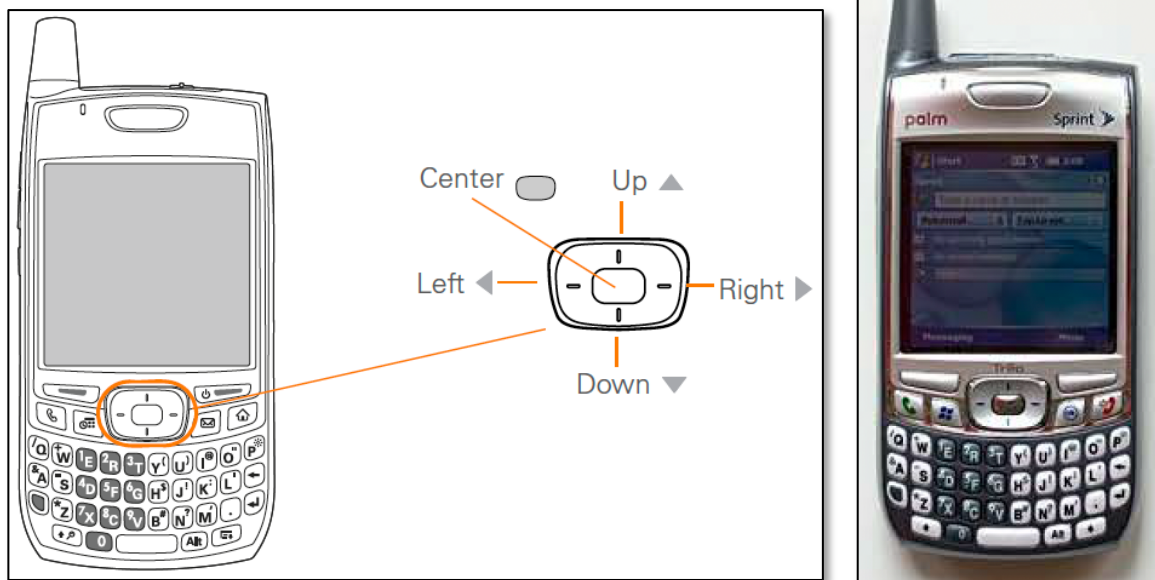
Rofougaran teaches that transmitter section 68 “converts the outbound symbol stream 74 into an outbound RF signal 92,” where the conversion is dependent on the wireless communication protocol. EX1034-Rofougaran, 8:54-9:4.

C. PDA-Phone Devices

49. Wireless PDA-phone devices that transmit and receive information were well known before the priority date of the '107 Patent. One example being the Treo device, taught by Kelty-078 to be a user interface device that wirelessly communicates with an electric vehicle. EX1005-Kelty-078, Abstract, Fig. 1-2, 1:28-2:11.

50. Treo devices were known to include user interactable displays, processors, and transmitters. Palm Treo devices, such as 700p and 700wx, included display that users can interact with using the devices keyboard and/or a touchscreen stylus. EX1030-PalmTreo700p, 29 (“To move around the Treo 700p smartphone Screen, you can use the 5 way navigator for one-handed navigation, or you can tap items on the screen with the stylus.”), 248 (“Display. Touch-sensitive LCD screen (includes stylus)”); EX1029-MobileTechReviewArchived, 2 (“Palm kept the square screen used on their Palm OS Treos, but at a lower 240 x 240 pixel resolution”), 4 (“Display: Transflective TFT color LCD. 64K colors, screen size diag: 2.5". Resolution: 240 x 240. Supports portrait and landscape orientations.”). Palm Treo

devices (700p and 700wx), included an Intel Xscale processor. EX1030-PalmTreo700p, 247 (“**Processor** technology. Intel Xscale® **processor**, 312MHz.”); EX1029-MobileTechReviewArchived, 1 (“It runs Windows Mobile 5.1 Pocket PC Phone Edition on a 312MHz Intel XScale processor”), 3 (“The 700wx runs on the same 312 MHz Intel XScale PXA272 processor as the Treo 700w and Treo 700p”).



EX1030-PalmTreo700p, 29; EX1029-MobileTechReviewArchived, 2. Palm Treo devices included transmitters. For example, the Palm Treo 650 “include long-range wireless transmitters (e.g., a CDMA modem) that allow them to wirelessly transmit and receive information and ultimately and communicate wirelessly[.]” EX1012-Banet, [0002].

51. Treo devices were also known to have cellular telephony capabilities, including texts. EX1030-PalmTreo700p, 94 (“You can use the Messaging application to exchange brief text messages (SMS) with other devices and email addresses that support this form of messaging.”), 247 (“CDMA 800MHz (digital cellular), 1900MHz (PCS), and 1400MHz (GPS)”); EX1029-MobileTechReviewArchived, 2 (“The Treo 700wx is a Sprint phone which runs on their CDMA network supporting 800 and 1900 MHz bands.... Call quality is excellent”).

52. Treo devices were also known to have wireless connectivity capabilities, such as Bluetooth. EX1030-PalmTreo700p, 112 (“With your smartphone’s built-in Bluetooth wireless technology, you can connect to a number of Bluetooth devices, such as a headset, car kit, printer, or GPS receiver, as well as to other smartphones and handhelds that are equipped with Bluetooth wireless technology. If your computer is enabled with Bluetooth wireless technology, you can also synchronize wirelessly or use your phone as a wireless modem.”), 247 (“Bluetooth[®] wireless technology (1.2 compliant)”); EX1029-MobileTechReviewArchived, 2 (“The Treo 700wx has a class 2 Bluetooth 1.2 radio”).

53. It was common prior to the '107 patent to refer to a wireless PDA/phone hybrid device as a phone. For example, throughout the user manual for the Palm Treo 700p, the Treo is described as an “advanced **mobile smartphone**” and a “**mobile phone**”. EX1030-PalmTreo700p, 7, 16. Information Week’s 2006 article titled “Palm Treo 700p: A PDA For Work And Play” discusses that the Treo 700p could be stiff competition to other products favorited among “PDA toters,” and that the Treo 700p combines professional with personal , “eliminating the need for people to carry multiple devices[.]” EX1021-InformationWeek, 1; *see also* EX1022-InformationWeekArchived, 1 (archived webpage showing listing of article title “Palm Treo 700p: A PDA For Work And Play” being publicly available as early as May 26, 2006). In another example, Lisa Gade’s 2006 review of the Treo 900w refers to the Palm Treo OS line devices as “nearly defin[ing] the PDA phone market,” and that the Treo 700wx “is both a PDA and a phone.” EX1029-MobileTechReviewArchived, 1; *see also* EX1029-MobileTechReviewArchived, 3 (“PDA phones and smartphones”). Another example, Redi teaches example “**combination PDA/telephone device[s]** such as the Treo 180, Treo 270, Treo 600, Treo 650, Treo 700, or the Treo 700w”. EX1033-Redi, [0024].

D. Wireless Communications

1. Managing EV Charging via Wireless Communications

54. Managing EV charging via wireless communication protocols was known prior to the '107 patent. For example, Lowenthal taught and claimed "A method of transferring charge between a local power grid and an electric vehicle", comprising: "(1) assembling a user profile, the user profile containing payment information, the user profile being stored on a server; (2) providing an electrical receptacle for transferring charge, the receptacle being connected to the local power grid by an electric power line, charge transfer along the electric power line being controlled by a controller configured to operate a control device on the electric power line; (3) receiving a request to the controller for charge transfer, the request being made from a mobile wireless communication device by an operator of the electric vehicle, the controller being connected to a communication device for communication with the mobile wireless communication device; (4) relaying the request from the controller to the server, the controller being connected to a local area network for communication to the server via a wide area network; (5) validating a payment source for the operator of the electric vehicle based on the user profile corresponding to the operator, (6) enabling charge transfer by communicating from the server to the controller to activate the control device; (7) monitoring the charge transfer using a current measuring device on the electric power line, the controller being configured to monitor the output from the current measuring device and to

maintain a running total of charge transferred; (8) detecting completion of the charge transfer, and (9) on detecting completion, sending an invoice to the payment source and disabling charge transfer.” EX1028-Lowenthal-570, 4:15-43, Claim 55.

55. Lowenthal also taught sending “one or more notifications messages to a user of an electric vehicle (E.G., Electric vehicle is fully charged)” EX1027-Lowenthal-340, [0052], Fig. 4. This notification may be in the form of an email, SMS message, or other types of electronic messaging, and “may be sent to the user if the electric vehicle is fully charged or almost charged, or not charging, or periodic updates providing the amount of energy transferred thus far.” EX1027-Lowenthal-340, [0052], Fig. 4.

56. Wireless communication capabilities prior to the ’107 patent were also known to enable charge management in response to power costs and time windows. As taught by Pollack, “In one implementation, the system 100 also uses cost as a temporal variable. For example, if the system 100 schedules a discharged pack to charge during an upcoming time window, the system 100 can predict its look-ahead cost profile as it charges, allowing the system 100 to further optimize, adaptively.” EX1031-Pollack, [0103]. Berdichevsky describes an electric vehicle communication interface that allows “the user to pre-register with local utility companies and energy providers to control the timing of charging of the vehicle such that charging occurs

during low power consumption times at a lower cost to the vehicle user.” EX1013-Berdichevsky, [0010]. Kressner taught a system which “arranges the schedule to minimize the demand loading on the local distribution network to more efficiently operate powerplants providing electrical power to the distribution networks.” EX1025-Kressner, Abstract. “The system includes a meter having a power connection configured to electrically couple to the hybrid vehicle. A local electrical distribution network is electrically coupled to the meter. A controller associated with the local electrical distribution network and disposed in communication with the utility distribution network and the meter, said controller including a processor responsive to executable computer instructions for providing a signal to said meter to allow electrical power to flow to said battery.” EX1025-Kressner, 2:4-12. “The meter includes a communications device 64 that provides a means for the meter to communicate with external devices such as controller 66” EX1025-Kressner, 5:65-67. “The communications device 64 may incorporate any type of communications protocol capable of allowing the meter 60 to receive, transmit and exchange information with one or more external devices. Communications device 64 may use communication systems, methodologies and protocols such as, but is not limited to, TCP/IP, IEEE 802.11, RS-232, RS-485, Modbus, IrDA, infrared, radio frequency, electromagnetic radiation, microwave, Bluetooth, power line, telephone, local area

networks, wide area networks, Ethernet, cellular, fiber-optics, barcode, and laser.”

EX1025-Kressner, 6:1-10.

57. Thus, managing EV charging via wireless communications, receiving notifications regarding EV charging, and wireless control of charging parameters based upon time and power costs were each known prior to the '107 patent.

2. Wireless Protocols

58. Communication systems using cellular telephony were well known prior to the '107 patent. Cellular telephony was known to use radio waves to wirelessly enable computerized equipment, such as personal digital assistants (PDAs), phones, and other devices, to send information in digital form. In a third edition textbook, Lee described a wide range of wireless and cellular telecommunications systems. EX1026-Lee, 113, 33-34. More specifically, cellular systems including CDMA, TDMA, and GSM, as well as wireless data networks using 802.11, Bluetooth, and ZigBee. EX1026-Lee, 113, 33-34. As another example, Shuaib describes Zigbee, Bluetooth, and Wi-Fi products as wireless area network (WAN) technologies that enable communication across distances and devices, allowing wireless access to networks and services. EX1011-Shuaib, 1. Su discloses that Bluetooth, ZigBee, and Wi-Fi (IEEE 802.11) were well known “protocol standards for short-range wireless communications with low power consumption.”

EX1037-Su, 1, Abstract. Su further discloses that wireless communications is a technology to provide flexibility and mobility with benefits including reducing cable restrictions of cabled devices, low cost, and easy deployment. EX1037-Su, 1, Introduction.

59. Further, Rofougaran's wireless communication device "supports one of more of wireless local area network (WLAN) communications 55, wireless personal area network (WPAN) communications 56, and wireless wide area network (WWAN) communications 58. The WLAN communications 55 may be in accordance with past, present, or future versions of IEEE 802.11 (e.g., 802.11a, b, g, n, etc.).... The WPAN communications 56 may be in accordance with past, present, or future versions of Bluetooth, ZigBee, and/or IEEE 802.15x (e.g., IEEE 802.15.1, 2, 3, and 4).... The WWAN communications 58 may be in accordance with past, present, or future versions of cellular voice standards (e.g., global system for mobile communications (GSM), wide bandwidth code division multiplexing (WCDMA), CDMA), cellular data standards (e.g., high speed downlink packet access (HSDPA), high-speed uplink packet access (HSUPA), Enhanced Data rates for GSM Evolution (EDGE), General Packet Radio Service (GPRS))[.]” EX1034-Rofougaran, 5:20-55. Prior to Rofougaran, Gillig teaches a cellular cordless telephone that includes a “cellular transceiver, antenna, keyboard, a display, handset,

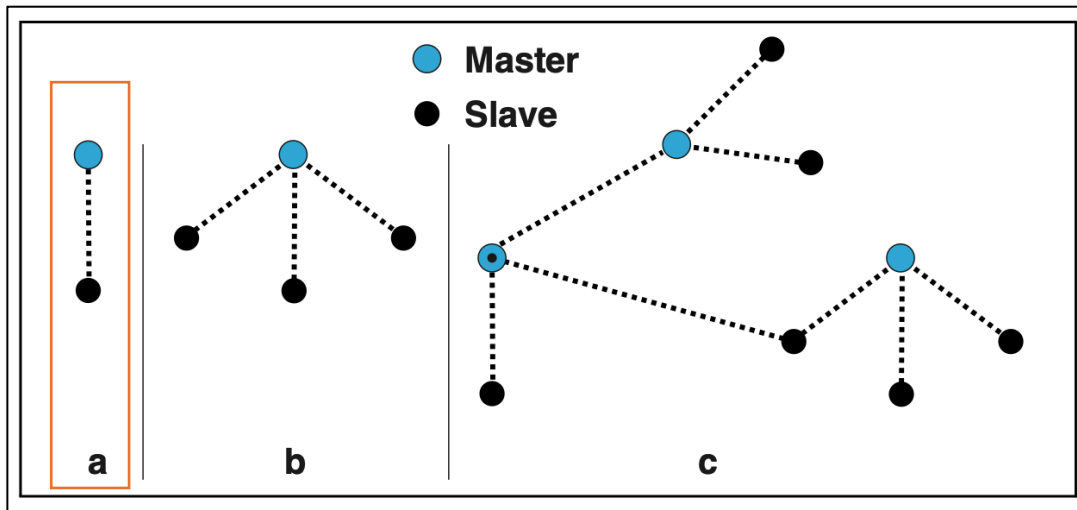
and microcomputer... in a single housing,” where “[c]ordless base stations 180 and 188 communicate with the cellular cordless telephone (CCT) 10 through antennas[.]” EX1019-Gillig, Abstract, 2:25-27. Thus, it was well known prior to the ’107 patent that wireless communication devices and, more specifically, transceivers would include a transmitter, receiver, and antenna

a) Bluetooth

60. It was well known prior to the ’107 Patent that Bluetooth was a communication protocol that establishes wireless communication between devices. The Bluetooth Specification teaches that “**Bluetooth wireless technology** is a short range **communications system** intended to replace the cable(s) connection portable and/or fixed electronic devices.” EX1014-Bluetooth, 13. “The Bluetooth core system consists of an RF [radio frequency] transceiver, baseband, and protocol stack. The system offers services that **enable the connection of devices** and the exchange of a variety of classes of data between these devices.” EX1014-Bluetooth, 13. Further, the radio frequency is wireless. EX1014-Bluetooth, 13 (“The Bluetooth RF (physical layer) operates in the unlicensed ISM band at 2.4 GHz.”).

61. “The Bluetooth system provides a point-to-point connection” wherein “the physical channel is shared between two Bluetooth devices.” EX1014-Bluetooth, 63, FIG. 1.1(a). “Two Bluetooth devices use a shared physical channel for

communication. To achieve this their transceivers need to be tuned to the same RF frequency at the same time, and they need to be within a nominal range of each other.” EX1014-Bluetooth, 34.

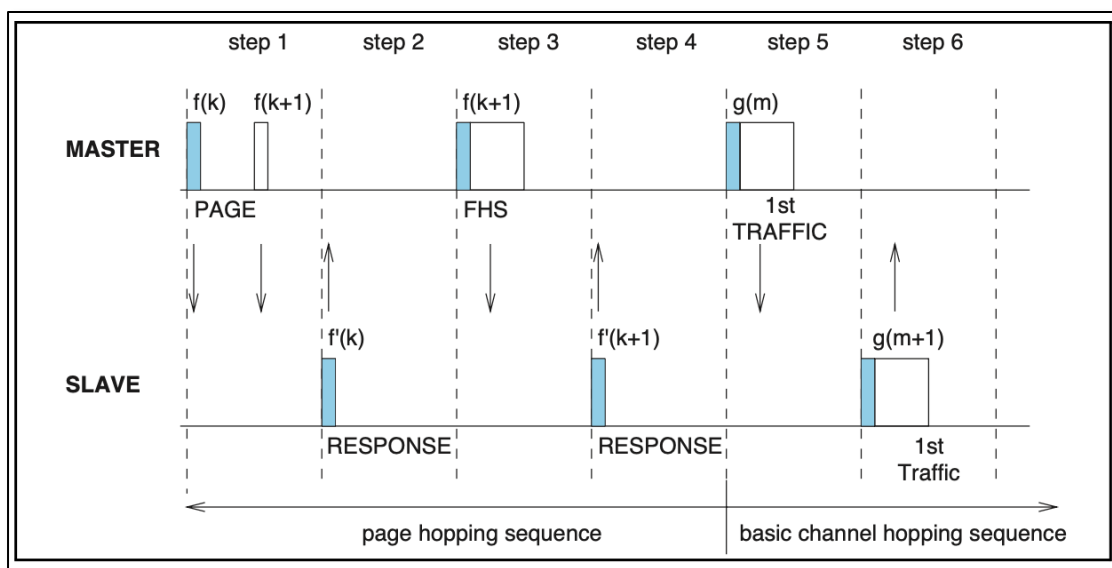


EX1014-Bluetooth, FIG. 1.1. “Figure 1.1:Piconets with a single slave operation (a)... .” EX1014-Bluetooth, 63. The Bluetooth Specification describes four “defined” physical channels: the basic and adapted piconet channels (“used for communication between connected devices”), an inquiry scan channel (“used for discovering Bluetooth devices”), and a page scan channel (used “for connecting Bluetooth devices”). EX1014-Bluetooth, 34, 63, Fig. 1.1.

62. “In order to establish new connections the paging procedure is used.” EX1014-Bluetooth, 154. In the Kelty-078 system using Bluetooth communications, the paging procedure establish[es] wireless communication between a master (“the paging device,” Kelty-078’s communication chip 14 under the control of VMS 32)

and slave (“the page scanning device,” similar Bluetooth functionality connected to the processor of Kelty-078’s portable device 24) devices. EX1014-Bluetooth, 76. Steps of the paging procedure including both devices for pairing entering a “CONNECTION” state and sending packets between the two devices. EX1014-Bluetooth, 159-162, FIGs. 8.1, 8.3, Table 8.3.

63. Specifically, steps of the paging procedure are provided discussed below and shown in FIG. 8.3 and Table 8.3. EX1014-Bluetooth, 159 (“The initial messaging between master and slave is shown in Table 8.3...and in Figure 8.3....”).



EX1014-Bluetooth, FIG. 8.3. “Messaging at initial connection when slave responds to first page message.” EX1014-Bluetooth, 160; *see also id.*, FIG. 8.1.

64. In Step 1, the master device is paging (in the “page substate”) and the slave device is page scanning (in the “page scan substate”). EX1014-Bluetooth, 156,

159. The slave device replies to the “page message” sent by the master device (Step 2). EX1014-Bluetooth, 159-160. “The master shall then transmit an FHS [(Frequency Hop Synchronization)] packet in step 3” to synchronize both devices “to a common clock and frequency hopping pattern” which is fundamental to Bluetooth communication. EX1014-Bluetooth, 13 (“One device provides the synchronization reference and is known as the master.”), 63, 162. Then, “the slave shall return a slave page response message in step 4 to acknowledge reception of the FHS packet” and be synchronized to the master device. EX1014-Bluetooth, 161. Both devices “enter[] the CONNECTION state in step 5.” EX1014-Bluetooth, 161-162. “The connection mode shall start with a POLL packet transmitted by the master. The slave may respond with any type of packet” in Steps 5-6. EX1014-Bluetooth, 161.

VII. SUMMARY OF THE PRIOR ART REFERENCES

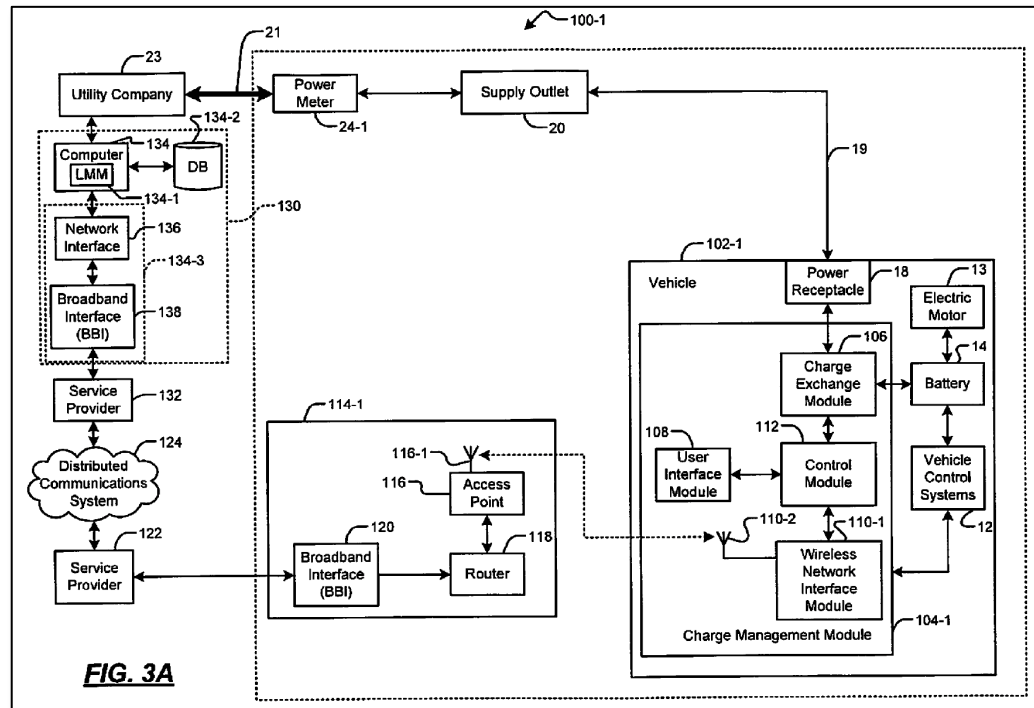
A. Sutardja

65. I have been instructed by counsel that Sutardja is prior art to the challenged patent.

66. Sutardja describes a system for charging an electric vehicle’s battery according to a set of user-defined charging parameters. EX1004-Sutardja, Abstract, [0004], [0008]. Sutardja’s system includes a charge management system (CMS) 100,

having a vehicle 102 that “is charged at a location such as a home or work location.”

EX1004-Sutardja, [0239], FIG. 3A.



EX1004-Sutardja, FIG. 3A.

67. Sutardja teaches that a “user of the vehicle 102-1 may use the user interface module 108 to set charging parameters for charging the battery 14[.]” EX1004-Sutardja, [0243]. Charging parameters include a desired charge level (e.g., full charge) and a requested charge completion time. EX1004-Sutardja, [0119] (“[O]ne or more of the N first sets of charging parameters include charge levels and requested charge completion times for the batteries of corresponding ones of the N vehicles.”), [0270] (“The charge monitoring module 150 may inform the control

module 112 when the battery 14 is charged to a predetermined level (e.g., full charge) that may be indicated in the charging parameters.”).

68. The charging parameters are communicated “to the utility company 23 via the wireless network interface module 110-1.” EX1004-Sutardja, [0244]. “The utility company 23 may receive the charging parameters generated by the user and may respond to requests for charging the battery 14.” EX1004-Sutardja, [0251].

69. Sutardja is analogous to the claimed invention of the ’107 Patent because Sutardja is from a same field of endeavor: electric vehicle battery charging systems. *Compare* EX1004-Sutardja, [0002], [0231]-[0233], *with* EX1001, Title, Abstract, 1:64-2:8.

70. Sutardja is also reasonably pertinent to particular problems with which the inventor of the ’107 Patent was involved: (1) controlling and managing electric vehicle charging; *compare* EX1004-Sutardja, [0116], [0122], [0253], *with* EX1001, 1:54-60, 16:9-19; (2) providing user interfaces and notifications; *compare* EX1004-Sutardja, [0116], [0122], [0253], *with* EX1001, 8:54-63, 22:27-59, 28:11-23; and (3) battery power management; *compare* EX1004-Sutardja, [0116], [0122], [0253], *with* EX1001, 16:9-19, 22:5-12, Fig. 27.

B. Kelty-078

71. I have been instructed by counsel that Kelty-078 is prior art to the challenged patent.

72. Kelty-078 teaches, “[a] method of communicating with an electric vehicle wherein the method includes a step of installing a communication device in the electric vehicle.” EX1007-Kelty-078, Abstract. Kelty-078 includes a vehicle management system (VMS) 32 that “is the onboard computer that monitors, controls and coordinates various systems in the electric vehicle 12[.]” EX1007-Kelty-078, 7:44-51. Kelty-078 further teaches the inclusion of an electric vehicle communication chip 14 that “may communicate with” VMS 32 and further “allow for the vehicle 12 to contact the user 20 via the user interface device 24 by any known mobile device....” EX1007-Kelty-078, 4:43-58. Additionally, Kelty-078 teaches “user 20 will be capable of communicating...directly with the vehicle 12 via any user interface device 24 (step 305). Contemplated user interface devices 24 may include...mobile devices, such as cellphones.” EX1007-Kelty-078, 4:16-21, FIG. 3. Specifically, communication chip 14 uses “standard protocol[s]” such as GPRS (general packet radio service), TCP/IP, Bluetooth, and others to communicate with VMS 32 and user interface 24. EX1007-Kelty-078, 3:62-65, 4:1-4, 7:44-51, FIGS. 1-2. Kelty-078 further discloses that the user may communicate with the vehicle

from their portable device and send specific instructions to the electric vehicle 12 for controlling and monitoring the battery system 26. EX1005-Kelty-078, 4:53-5:9.

73. Kelty-078 is analogous to the claimed invention of the '107 Patent because Kelty-078 is from a same field of endeavor: electric vehicle battery charging systems. EX1005-Kelty-078, Abstract, 1:63-2:14, 2:39-3:4, 4:53-5:57, with EX1001, Title, Abstract, 1:64-2:8.

74. Kelty-078 is also reasonably pertinent to particular problems with which the inventor of the '107 Patent was involved: (1) controlling and managing electric vehicle charging; EX1005-Kelty-078, Abstract, 7:44-14:3, with EX1001, 1:54-60, 16:9-19; (2) providing user interfaces and notifications; EX1005-Kelty-078, Abstract, 3:47-5:57, with EX1001, 8:54-63, 22:27-59, 28:11-23; (3) battery power management; EX1005-Kelty-078, 6:32-7:43, with EX1001, 16:9-19, 22:5-12, Fig. 27.

C. Hobbs

75. I have been instructed by counsel that Hobbs is prior art to the challenged patent.

76. Hobbs describes an electric-vehicle charger 100 “configured to charge batteries (e.g., batteries 152) that are located on electric or hybrid electric vehicles (e.g., vehicle 150).” EX1006-Hobbs, [0029]. Charger 100 includes “screen 107 and

key pad 104” configured to “provide diagnostics and manual control.” EX1006-Hobbs, [0037], Fig. 1.

77. Hobbs is analogous to the claimed invention of the ’107 Patent because Hobbs is from a same field of endeavor: electric vehicle battery charging systems. EX1006-Hobbs, Abstract, [0109], with EX1001, Title, Abstract, 1:64-2:8.

78. Hobbs is also reasonably pertinent to a particular problem with which the inventor of the ’107 Patent was involved: (1) controlling and managing electric vehicle charging; EX1006-Hobbs, [0037], [0084], [0109], with EX1001, 1:54-60, 16:9-19; (2) providing user interfaces and notifications; EX1006-Hobbs, [0037], [0084], [0109], with EX1001, 8:54-63, 22:27-59, 28:11-23; (3) battery power management; EX1006-Hobbs, [0049]-[0050], [0086], [0103], [0109], Fig. 4, with EX1001, 16:9-19, 22:5-12, Fig. 27.

D. Anttila

79. I have been instructed by counsel that Anttila is prior art to the challenged patent.

80. Anttila describes a mobile communications device 10 configured to generate customizable pop-up notifications responsive to received messages, including SMS and MMS. EX1007-Anttila, Abstract, Figs. 1-4, [0001]-[0005]. Anttila further describes that communications interface 16 receives incoming

messages and processor 12 processes the incoming messages to generate corresponding notifications presented to the user on display 14. EX1007-Anttila, [0011]-[0014].

81. Anttila is analogous to the claimed invention of the '107 Patent because Anttila is reasonably pertinent to a particular problem with which the inventor of the '107 Patent was involved: providing user interfaces and notifications; EX1007-Anttila, [0012], [0021], Fig. 4, with EX1001, 8:54-63, 22:27-59, 28:11-23.

E. Hunt

82. U.S. Patent Appl. No. 2003/0193405 to Hunt et al. ("Hunt") (EX1008) was filed on April 15, 2002, and published on October 16, 2003. I have been instructed by counsel that Hunt is prior art to the challenged patent.

83. Hunt describes generating and displaying notification alerts to a user responsive to received power-usage and status information communicated from a remotely located system. EX1008-Hunt, Abstract, [0019], [0026], [0073]-[0075], [0084], Fig. 10.

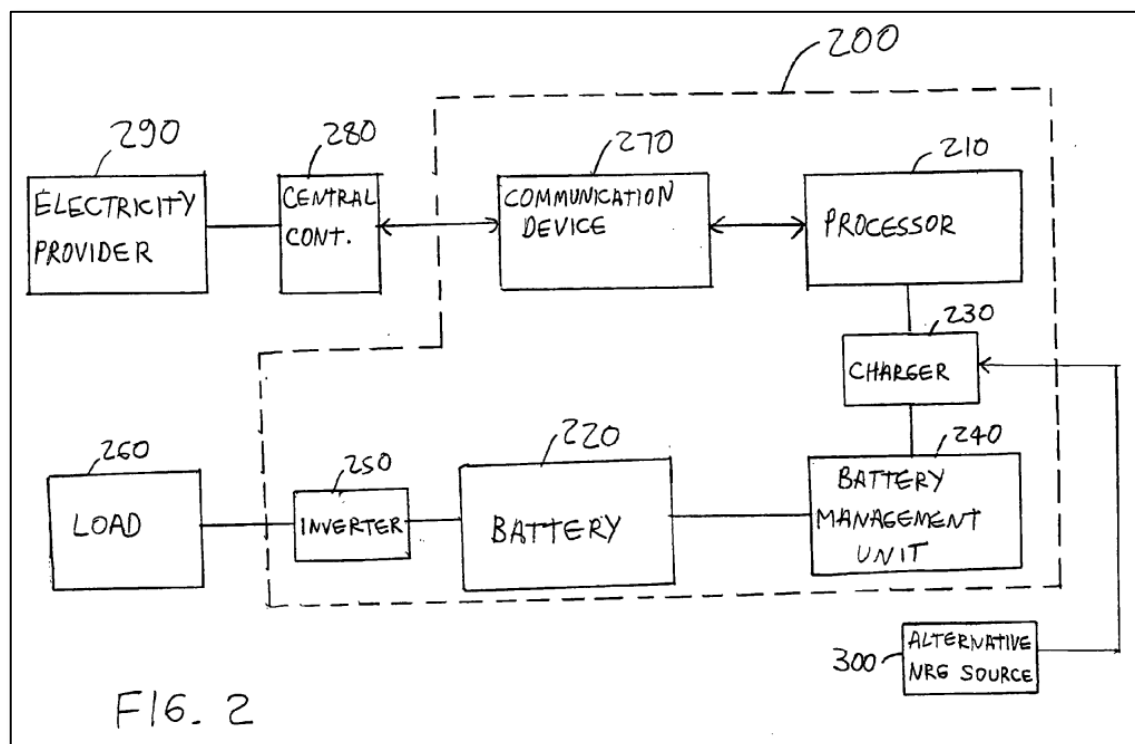
84. Hunt is analogous to the claimed invention of the '107 Patent because Hunt is reasonably pertinent to a particular problem with which the inventor of the '107 Patent was involved: (1) battery power management; EX1008-Hunt, Abstract, [0072], with EX1001, 16:9-19, 22:5-12, Fig. 27; (2) providing user interfaces and

notifications; EX1008-Hunt, Abstract, [0066], [0068], [0072], [0075], with EX1001, 8:54-63, 22:27-59, 28:11-23.

F. Kelty-433

85. I have been instructed by counsel that Kelty is prior art to the challenged patent.

86. Kelty describes portable and remotely located controllers configured to wirelessly communicate with charging and battery-management systems. Kelty discloses a “central controller 280,” that can be a hand-held or laptop device, in two-way communication with a remotely located power-management device through communication device 270. EX1009-Kelty-433, [0009], [0022], Fig. 2.



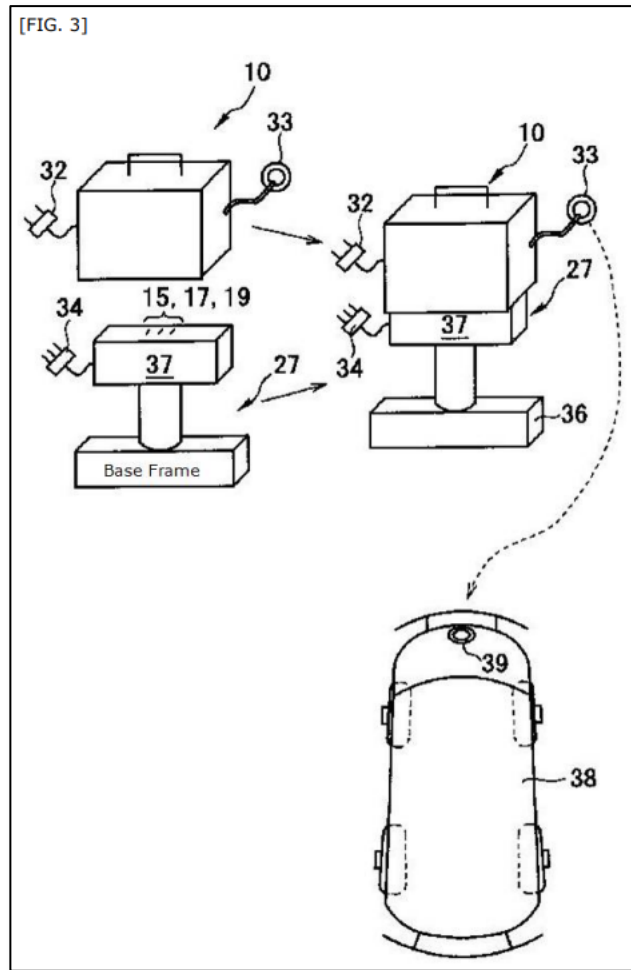
EX1009-Kelty-433, Fig. 2.

87. Kelty-433 is analogous to the claimed invention of the '107 Patent because Kelty-433 is reasonably pertinent to a particular problem with which the inventor of the '107 Patent was involved: battery power management. EX1009-Kelty-433, Abstract, [0017]-[0019], Fig. 1, with EX1001, 16:9-19, 22:5-12, Fig. 27.

G. Kuromame

88. Japanese Patent Appl. No. 2000-4542 to Kuromame et al. ("Kuromame") (EX1010) was filed on June 11, 1998, and published on January 7, 2000. I have been instructed by counsel that Kuromame is prior art to the challenged patent.

89. Kuromame describes a "portable charging device 10 constituting the charging system for electric vehicles[.]" EX1010-Kuromame, [0011]-[0012]. Kuromame further discloses that portable charging device 10 has a plug for a commercial AC 100V power supply and an output paddle 33, where the drive retrieves the portable charging device 10 from the trunk and connects it to the stationary power and the charging port of the electric vehicle. EX1010-Kuromame, [0027], [0023], [0025], Fig. 3.



EX1010-Kuromame, Fig. 3.

90. Kuromame is analogous to the claimed invention of the '107 Patent because Kuromame is from the same field of endeavor: electric vehicle battery charging systems. EX1010-Kuromame, Abstract, [0003]-[0007], with EX1001, Title, Abstract, 1:64-2:8.

91. Kuromame is also reasonably pertinent to a particular problem with which the inventor of the '107 Patent was involved: (1) controlling and managing electric vehicle charging; EX1010-Kuromame, Abstract, [0006]-[0008], with

EX1001, 1:54-60, 16:9-19; (2) battery power management; EX1010-Kuromame, Abstract, [0038], [0040], Fig. 2, with EX1001, 16:9-19, 22:5-12, Fig. 27.

VIII. GROUNDS OF UNPATENTABILITY

Proposed Grounds of Unpatentability of the '107 Patent	Exhibits
<u>Ground 1:</u> Claims 1-5 are obvious under §103 over Sutardja, Hobbs, Kelty-078, and Anttila.	1004-1007
<u>Ground 2:</u> Claims 6-9 are obvious under §103 over Sutardja, Hobbs, and Kelty-078.	1004-1006
<u>Ground 3:</u> Claims 1 is obvious under §103 over Sutardja, Hobbs, Hunt, and Kelty-433.	1004, 1006, 1008-1009
<u>Ground 4:</u> Claim 4 is obvious under §103 over Sutardja, Hobbs, Hunt, Kelty-433, and Kelty-078.	1004-1006, 1008-1009
<u>Ground 5:</u> Claims 10-12 and 14 are obvious under §103 over Hobbs, Sutardja, and Kelty-078.	1004-1006
<u>Ground 6:</u> Claim 13 is obvious under §103 over Hobbs, Sutardja, Kelty-078, and Kuromame.	1004-1006, 1010

IX. OPINIONS REGARDING GROUND 1: OBVIOUSNESS OF CLAIMS 1-5

A. Claim 1

1. Claim 1[Pre]: *“A system for charging a battery of a vehicle, the system comprising:”*

92. To the extent the preamble is limiting, Sutardja teaches *a system for charging a battery of a vehicle*¹ (CMS 100), the system comprising a **battery charger (CMM 104-1²)**. See Claim 1[a].

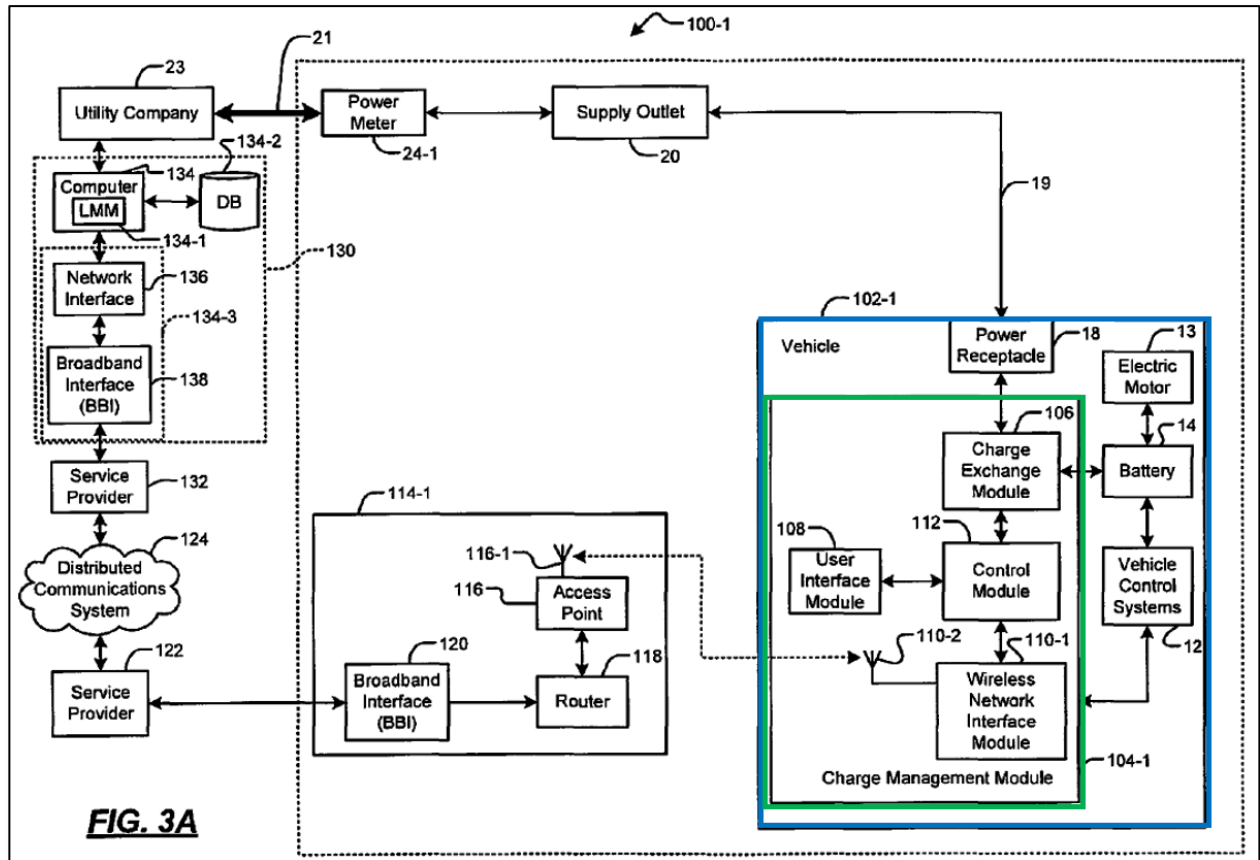
¹ Claim language provided in italics. All drawing annotations and emphases added unless otherwise noted. Citations to a claim limitation (e.g., Claim 1[a]) and/or section number are to the limitations mapping such claim limitation in this Petition and are incorporated by reference, including the motivations to combine and showing of reasonable expectation of success provided in the cross-referenced section. All reasonable expectation of success include the benefits described for the respective motivations to combine.

² Sutardja initially describes components and functionalities of the CMS with reference to Fig. 3A which includes CMM 104-1. Sutardja then explains that, aside from the location of the user interface module 108, Fig. 3B is “substantially similar.” *Id.*, [0247]. Sutardja further describes features of Sutardja’s system by “collectively refer[ing] to” all CMMS as “CMM 104.” EX1004-Sutardja, [0261], [0267], [0275]-[0278], [0282]-[0283]. Therefore, Sutardja teaches and a POSITA would have understood that Sutardja’s description of CMM 104-1 applies to CMM 104-2, and vice versa. See also, Ground 1, Claim 1[f].

93. Sutardja's charge management module CMM 104-1 is a *battery charger* for charging a battery of a vehicle because it "may communicate with the battery 14 and the power receptacle 18 and may **manage the amount of charge** in the battery 14." EX1004-Sutardja, [0239].

94. CMM 104-1 is in a vehicle, and is part of broader *system for charging a battery of a vehicle*, "a charge management system (CMS) to coordinate charging of batteries in vehicles at multiple locations." EX1004-Sutardja, [0231].

95. As depicted in Fig. 3A, Sutardja's CMS 100-1 includes, a **vehicle 102-1** having a **charge management module (CMM) 104-1:**



EX1004-Sutardja, Fig. 3A. CMM 104-1 “may communicate with the battery 14 and the power receptacle 18 and may **manage the amount of charge** in the battery 14.” *Id.*, [0239]. CMM 104-1 “**charges the battery 14 using the power supplied by the utility company 23 to the supply outlet 20.**” *Id.*

2. Claim 1[a]: “a battery charger having:”

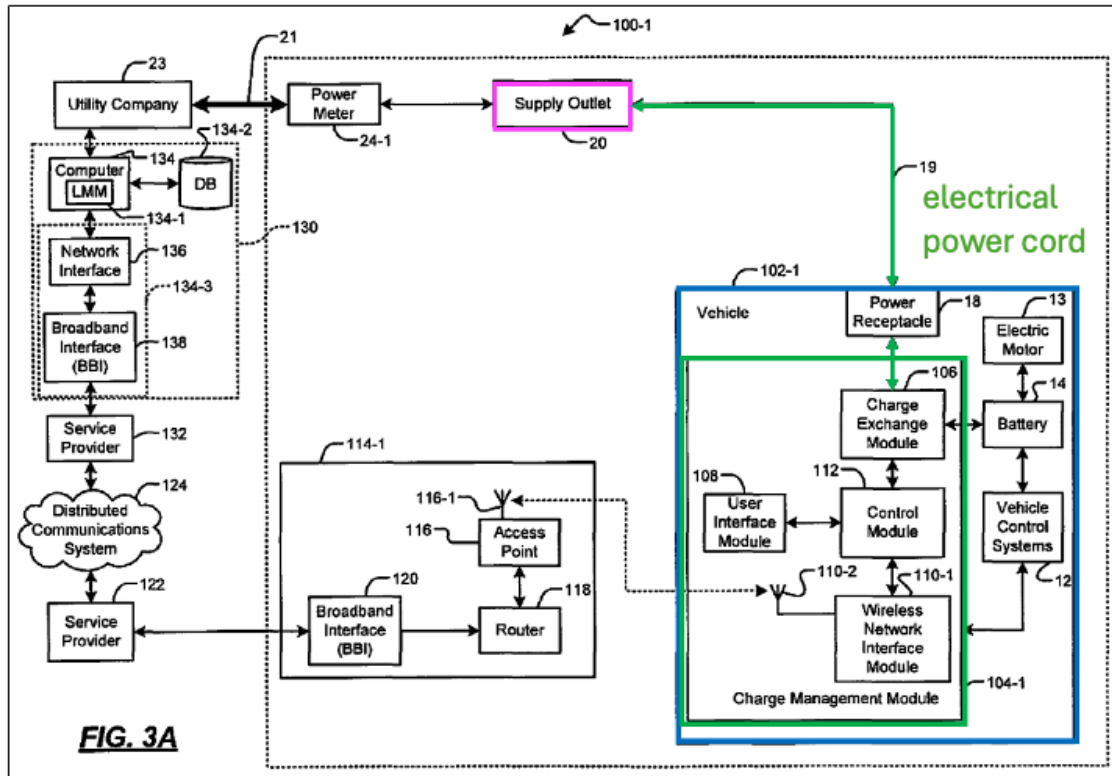
96. Sutardja's *battery charger* (CMM 104-1 together with connector/cable 19) "charges the battery 14 using the power supplied by the utility company 23 to the supply outlet 20." EX1004-Sutardja, [0241], [0239]. *See* Claim 1[Pre].

3. Claim 1[b]: “an electrical power cord releasably attachable to at least one of the vehicle and a source of power;”

97. Sutardja teaches a *battery charger* (i.e., CMM 104-1 together with connector/cable 19) comprising an *electrical power cord* (cable/connector 19³) releasably attachable to at least one of the *vehicle* (vehicle 102) and a *source of power* (supply outlet 20).

98. As depicted in Fig. 3A below, Sutardja discloses that CMS 100-1 includes an *electrical power cord* (connector/cable 19) that connects the *electric vehicle 102-1* with a *supply outlet 20*:

³ Hereinafter, “battery charger (CMM 104-1)” may be used for simplicity where the connector/cable 19 is not relevant to the mapping.



EX1004-Sutardja, Fig. 3A, [0239]-[0240]. Sutardja teaches “cable and connector 19 may connect the supply outlet 20 to the power receptacle 18 of the vehicle 102-1,” and a POSITA would have understood that Sutardja’s cable/connector 19 is an *electrical power cord* connecting vehicle 102 and supply outlet 20. EX1004-Sutardja, [0240]. Cable and connector 19 supplies power to the vehicle from an external power source (supply outlet 20), in the same way as the ’107 Patent’s *electrical power cord*. EX1001, 4:56-58; EX1004-Sutardja, [0240]. Sutardja’s vehicle draws “power from the supply outlet 20 to charge the battery 14[.]” EX1004-Sutardja, [0240].

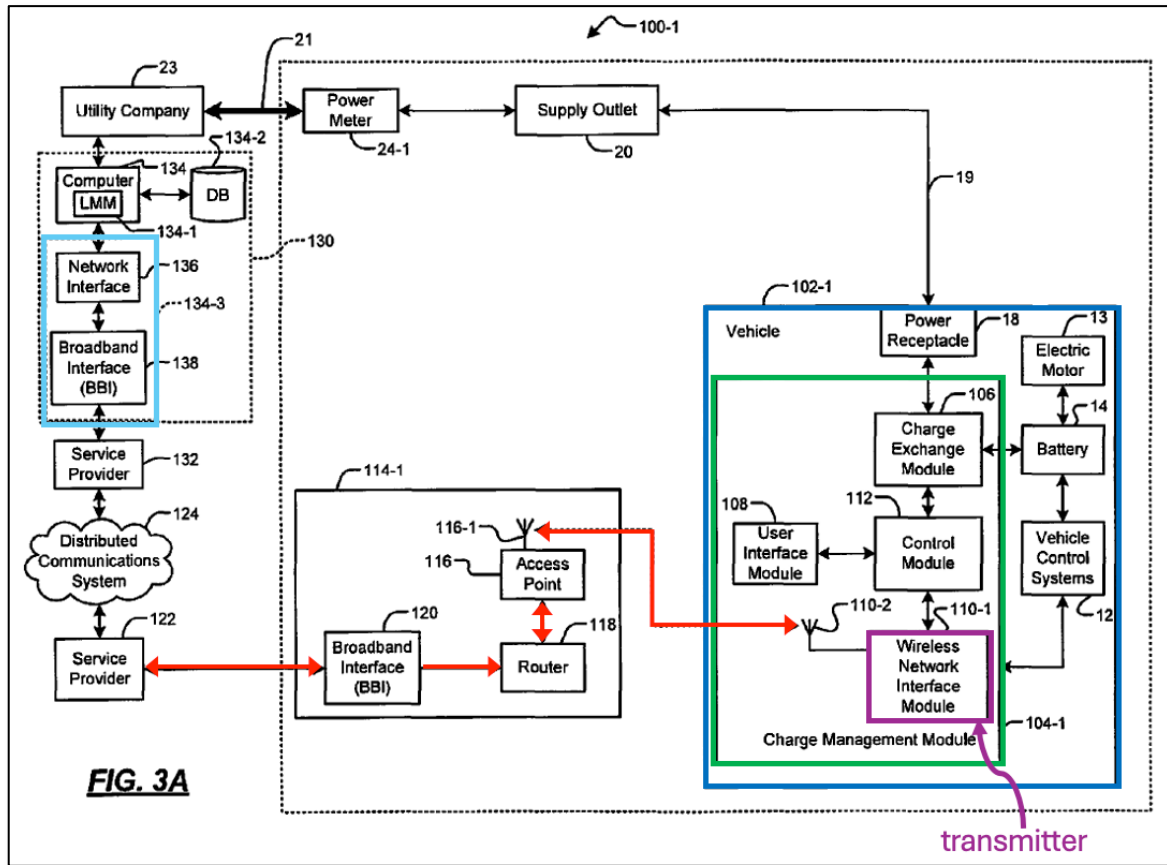
99. Sutardja's **cable and connector 19** (*electrical power cord*) is *releasably attachable* to **supply outlet 20**. EX1004-Sutardja, [0262] (“the **user plugs** the vehicle 102 into the supply outlet 20 at the end of the day...”), [0006] (“the vehicle 10 may include a **power receptacle (a plug) 18** to receive power from the supply outlet 20 via a cable and connector 19.”). Such “plug-in” connections are detachable and re-attachable, and therefore *releasably attachable*. A POSITA would have understood that a connector of **cable and connector 19** that has to plug into the vehicle for the vehicle to receive power, as taught by Sutardja, is a connector that can be plugged in and unplugged from the vehicle, and is thus *releasably attachable to the vehicle*. Sutardja further teaches the user action of plugging into the vehicle, and a POSITA would have understood that action to be performed using **cable and connector 19** in order to supply power from supply outlet 20 to the vehicle. EX1004-Sutardja, [0006], [0281], [0283] (“The user may plug the vehicle 102 into the supply outlet 20 in step 303.”). A POSITA would have also understood that by “plugging in” the cable using the connector the user is “attaching” the cable to the vehicle, and as connectors are intended to be attached and detached, the cable (power cord) would also be detached, thus it is *releasably attachable*, as claimed. *See also* EX1004-Sutardja, Figs. 9A-9B (“Plug vehicle into supply outlet”). Sutardja's methods

include a step determining whether the vehicle is plugged in, indicating that the plug is not permanently attached. FIG. 8B (“Vehicle plugged in[?]”).

4. Claim 1[c]: “[a battery charger having] a transmitter;”

100. Sutardja teaches *a battery charger (CMM 104-1) having a transmitter (wireless network interface module 110-1 which includes a transmitter).*

101. Sutardja teaches transmitting and receiving data via wireless network interface module (WNIM) 110-1. EX1004-Sutardja, [0244] (“CMM 104-1 may **transmit the data received by the control module 112** to the utility company 23 via the **wireless network interface module 110-1.**”); [0037] (“the network interface means comprises one of wireline, **wireless**, and powerline carrier (PLC) interface **means for transmitting and receiving data.**”). Further, Sutardja explains that CMM 104-1 communicates with wireless LAN 114-1 “via the wireless network interface module 110-1, which may include an antenna 110-2.” *Id.*, [0245]. Thus, Sutardja’s wireless network interface means is expressly configured to transmit data and includes transmission circuitry, i.e., *a transmitter*. Sutardja’s wireless data transmission path is annotated in red in Figure 3A below.



EX1004-Sutardja, Fig. 3A.

102. Transmitters were well known components in wireless communication systems. For example, US Patent No. 7,764,932 (“Rofougaran”) teaches that wireless communication devices included a built-in transceiver (i.e., receiver and transmitter) in order to participate in wireless communications. EX1034-Rofougaran, 1:34-37, 2:6-9; *see* Section VI.D. Another example, US Patent No. 5,367,558 (“Gillig”) describes a cordless cellular telephone including a transceiver and an antenna, capable of wirelessly communicating with a base station. EX1019-

Gillig, Abstract, 2:25-27; *see* Section VI.D. A POSITA further would have understood that an antenna, such as Sutardja's antenna 110-2 is a physical transducer that converts electrical signals into radio waves for transmission and converts received radio waves into electrical signals for reception, and that a transmitter and receiver are electronic circuits connected to the antenna. As shown by Rofougaran's wireless communication device, consisting of an antenna system and receiver and transmitter, where the antenna system provides RF signals to the receiver and transmits RF signals from the transmitter. EX1034-Rofougaran, 9:5-10; *see* Section VI.D. The transmitter generates and modulates the electrical signals supplied to the antenna. Rofougaran teaches the transmitter of a wireless communication device converting an outbound symbol stream into an outbound RF signal that is then supplied to the antenna. EX1034-Rofougaran, 8:54-9:4, 9:5-10; *see* Section VI.D. Therefore, to the extent not expressly described by Sutardja, a POSITA would have understood that Sutardja's wireless network interface modules include a transmitter.

5. Claim 1[d]: “a controller electrically coupled to the electrical power cord and to the transmitter, the controller configured to:”

103. Sutardja teaches *a battery charger* (CMM 104-1) *having a controller* comprising one or more processors, namely the collective controller **control module**

112 and charge exchange module 106 (“modules 112/106”), *electrically coupled to the electrical power cord (cable/connector 19) and to the transmitter.*

a) Sutardja teaches a controller (modules 112/106).

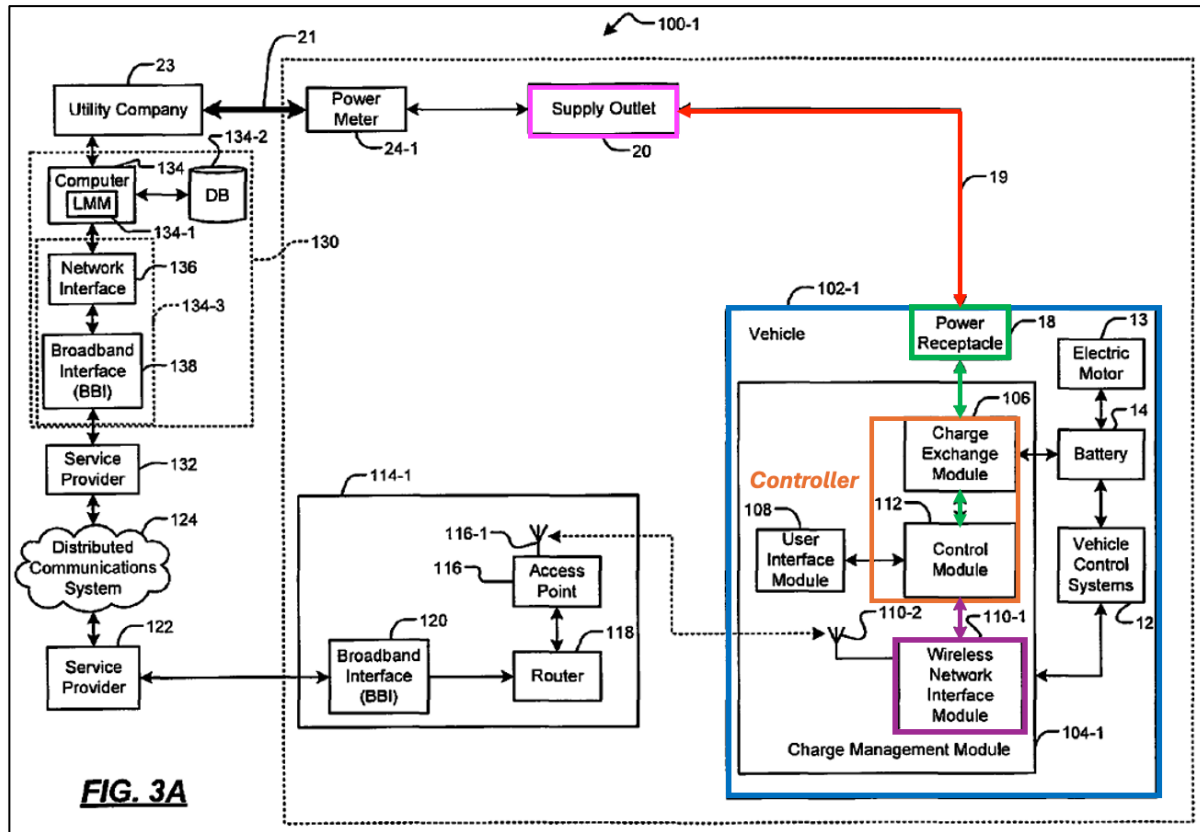
104. Per Sutardja, the term “**module...refers to...a processor (shared, dedicated, or group) and memory that execute one or more software or firmware programs, a combinational logic circuit, and/or other suitable components** that provide the described functionality.” EX1004-Sutardja, [0228]. Sutardja’s **controller (modules 112/106)** (1) is housed within the **battery charger (CMM 104-1)**, and (2) controls charging of the vehicle battery and operation of CMM 104-1. EX1004-Sutardja, [0267] (“control module 112 in the CMM 104 may control the charging of the battery 14”), [0242] (“The charge exchange module 106 may monitor the amount of charge in the battery 14”), [0243] (“The control module 112 may communicate with the charge exchange module 106”), [0244] (“the control module 112 may receive data relating to the amount of charge present in the battery 14 (i.e., a charge level of the battery 14) from the charge exchange module 106.. Additionally, the control module 112 may receive data input by the user for charging the battery 14... The CMM 104-1 may transmit the data received by the control module 112 to the utility company 23 via the wireless network interface module 110-1.”), Fig. 3A. Accordingly, Sutardja’s **controller (modules**

112/106) perform I/O and data processing tasks typically performed by processors executing software or firmware programs. Thus, Sutardja teaches a controller (modules 112/106).

b) Sutardja's controller is electrically coupled to the electrical power cord and to the transmitter.

105. The '107 Patent explains that the terms “mounted,” “connected,” “supported,” and “coupled,” and variations thereof, are used broadly and encompass both direct and indirect connections. EX1001, 6:29-35. (“Further, ‘connected’ and ‘coupled’ are not restricted to physical or mechanical connections or couplings.”).

106. Fig. 3A shows Sutardja's controller (modules 112/106) electrically coupled to the cable/connector 19 and wireless network interface module 110-1 (which includes a transmitter, see Claim 1[c]) via intervening charging circuitry:



EX1004-Sutardja, Fig. 3A. Sutardja's **electrical power cord (cable/connector 19)** “connect[s] the **supply outlet 20** to the **power receptacle 18** of the vehicle 102-1,” to draw power from supply outlet 20 to charge the battery 14. *Id.*, [0240]. The **charge exchange module 106** charges the battery 114 using the power supplied via the supply outlet 20. *Id.*, [0242]. The **charge exchange module 106** “communicate[s] **data** regarding the amount of charge in the battery 14 to the **control module 112**, and may exchange charge between the battery 14 and the **power receptacle 18**.” *Id.*

6. Claim 1[e][i]: “receive, via a user-manipulatable control, data indicative of a predetermined threshold level of charge”

107. Sutardja teaches *a controller (modules 112/106) configured to receive, via a user-manipulatable control (user interface module 108), data indicative of a predetermined threshold level of charge (charge level).*

108. As explained above, I have been instructed by counsel to apply the claim construction for “*threshold level of charge*” as “a level of charge that is less than the charge level at which charging stops.” See Section III.C.1.

109. The '107 Patent describes “user-manipulatable controls” broadly as controls that a user may physically operate to interact with the charging system, including buttons, switches, and similar input mechanisms. EX1001, 8:33-46. Sutardja’s user interface module (UIM) 108 “comprise[s] a keypad, a display, a microphone, and/or a speaker[,]” and is configured to allow a user to input charging parameters and interact with the utility company 23, Sutardja teaches that *control module 122* is configured to receive charging parameters via *a user-manipulatable control*. EX1004-Sutardja, [0243], [0265]. A POSITA would have understood a keypad allowing a user to set charging parameters for charging a battery, as taught by Sutardja, to be *a user-manipulatable control*. Controls allowing a user to input vehicle charging data were well-known before the priority of the '107 Patent. For example, Pollack teaches that user interfaces enabled the input of “power aggregation preferences and constraints,” allowing a user to “control a degree of

participation of the electric resource in a power aggregation scenario via the user interface.” EX1031-Pollack at [0228]; *see* Section VI.A.4.

110. Sutardja’s **control module 112** “receive[s] data input by the user for charging the battery 14 ... **from the user interface module 108.**” EX1004-Sutardja, [0244]. Sutardja’s UIM 108 includes a display and user input components (e.g., a keypad), which allows a user “to set charging parameters for charging the battery 14[.]” EX1004-Sutardja, [0243]. Charging parameters include “**charge levels** of the batteries”, “a time of the day to charge the batteries, a charge completion time, a priority at which the batteries may be charged, and an expected time when the vehicles will be used next...” and “custom charging parameters” such as “pre-determined additional costs” and “alternate charging parameters” that users may create “by interactively negotiating costs and/or alternate times for charging the batteries” with utility companies. EX1004-Sutardja, [0180], [0191], [0235]-[0236], [0270].

111. **Control module 112** further “receive[s] data relating to the amount of charge present in the battery 14 (i.e., **a charge level of the battery 14**) from the charge exchange module 106.” EX1004-Sutardja, [0244]. More specifically, **charge monitoring module 150 in charge exchange module 106** “inform[s] the **control module 112** when the amount of **charge in the battery 14 is less than or equal to**

a **predetermined threshold** and that the battery may need to be recharged.” *Id.*, [0268]. This charge level threshold is a *predetermined* threshold level of charge because, as part of the charging parameters, it is supplied by the user before charging begins. *See, e.g., Id.*, FIG 8A (showing step 204, “receive charging parameters from ...user of a vehicle” before step 222 “supply charge to vehicle”).

112. **Control module 112** “generate[s] a charge control signal based on the charging parameters based on which the charging module 152 may charge the battery 14.” EX1004-Sutardja, [0269]. Further, “when the battery 14 is being charged, the charge monitoring module 150 may activate a converter 156 and the charging module 152 based on the charging parameters received from the control module 112.” *Id.*

7. Claim 1[e][ii]: “[predetermined threshold level of charge] by which the controller sends an alert, the predetermined threshold level of charge being less than a full charge of the battery,”

113. The ’107 Patent provides “percentage of full charge” and “kWh” as examples of threshold levels. EX1001, 12:47-51, 12:54-60, 23:50-54, 13:19-22, 13:46-56.

114. Sutardja teaches that the user can input the desired charge amount (predetermined levels of charge) in terms of charge percentages via a user-manipulatable control (Sutardja’s keypad in UIM 108). EX1004-Sutardja, [0126],

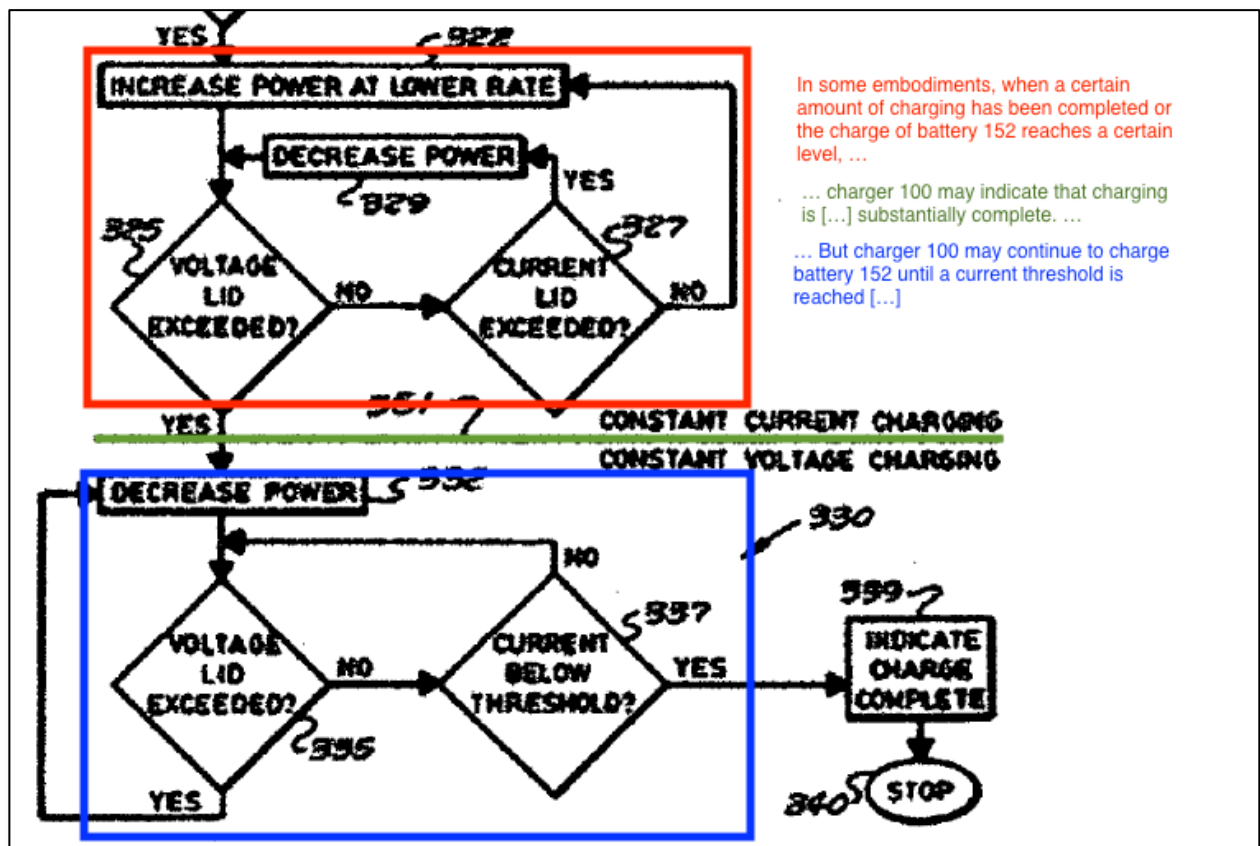
[0243], [0270]. Sutardja teaches the user inputting charging parameters include “charge levels of the batteries” and determining that a battery is charged to “predetermined level... that may be indicated in the charging parameters.” EX1004-Sutardja, [0126], [0243], [0270]. Sutardja provides an example of a charge level as a percentage of charge level. EX1004-Sutardja, [0231] (“Batteries in these vehicles may have charge remaining (for example, 50%, 60% or higher charge remaining”), [0237]. Thus, Hobbs-Sutardja teaches *data indicative of a predetermined threshold level of charge*.

a) Hobbs’s Teachings

115. Complimenting Sutardja’s desired charge amount thresholds, Hobbs teaches a second charge threshold, less than a full charge, at which the controller sends an alert. In this mapping, Hobbs’s additional threshold is referred to as the “notification threshold.” In particular, Hobbs teaches that **“fast or opportunity charging may take place for a particular amount of time or energy, for example, entered by the user into key pad 104 ... when a certain amount of charging has been completed or the charge of battery 152 reaches a certain level, charger 100 may indicate that charging is ... substantially complete.”** EX1006-Hobbs, [0111], [0109]. Even after this indication point (*alert*) is reached, charger 100 “continue[s] to charge battery 152 until a **current threshold** is reached...” EX1006-Hobbs,

[0111]. Hobbs's current threshold is "stored in look-up table 272 for...battery 152."

EX1006-Hobbs, [0107]. Hobbs performs fast charging until the battery level reaches the notification threshold using a first charging rate which corresponds to a particular amount of energy, sends an indication (*alert*) when this particular amount of energy is met, and then slows down the charging rate to the second current threshold and charging **continues** at this second, slower rate. EX1006-Hobbs, [0107]-[0111]. Thus, Hobbs's notification threshold is less than a full charge of the battery.



EX1006-Hobbs, Fig. 3 (excerpt), [0111].

116. Hobbs's indication of reaching the notification threshold in [0111] is done "in real time" via "indicator lights 108, screen 107, or both." EX1006-Hobbs, [0109], [0112], [0113] ("[w]hile charging is taking place (e.g., steps 313 through 339), **controller...may provide a signal** to...network 275 indicating the amount of energy used ...").

b) Motivation to Combine Sutardja and Hobbs

117. A POSITA would have been motivated to modify Sutardja's **controller (module 112/106)** to implement Hobbs's threshold-based charging alert functionality, including sending an alert to the user when the battery reaches the predetermined threshold level of charge before the battery is fully charged. Sutardja already teaches the user inputting predetermined levels of charge. EX1004-Sutardja, [0126], [0243], [0270]. Furthermore, Sutardja's controller 150, part of module 112/106, is configured to "monitor the amount of charge in the battery 14 when the battery 14 is being charged and may inform the control module 112 when the charging is completed." EX1004-Sutardja, [0268]. [0242], Figs. 3A-5B, 7.

118. A POSITA would have appreciated this modification would have allowed users to receive a notification once the battery reached the specified predetermined level of charge. As discussed, Hobbs teaches indication of reaching the notification threshold. EX1006-Hobbs, [0111]. Hobbs describes the threshold-

based charging alert functionality to “facilitate minimizing the charging time if the user is waiting for the charge to be completed, but maximizing the amount of charging that take place if the user is not ready to use...[the] vehicle.” EX1006-Hobbs, [0111]. This combination would improve user convenience by notifying users that the vehicle is ready for use once a desired threshold charging condition had been reached (for example, if the charge level was high enough to make a planned trip) while still permitting continued charging to a higher charging endpoint (for example, to provide additional driving range) if additional charging time was available. A POSITA would have appreciated the benefit of this improvement provided by the Sutardja-Hobbs combination, as knowing if the charge level was high enough to make a planned trip and having additional driving range were known user needs in the art. For example, Kelty-078 describes methodologies contemplated allowing the user to determine if the battery is capable of driving the distance the user must travel, and if the battery is capable of a maximum mileage trip. EX1005-Kelty-078, 4:53-5:57.

119. Modifying Sutardja according to Hobbs’s teachings would have involved use of a known technique (Hobbs’s threshold-notification technique) to improve similar devices (EV charging-management systems, Hobbs’s system having a current threshold, and Sutardja’s system having a user set charge level) in

the same way by allowing users to receive a notification once the battery reached the specified predetermined level of charge.

120. A POSITA would have had a reasonable expectation of success in incorporating Hobbs's threshold-notification functionality into Sutardja's charging-management system. Sutardja already teaches **charge monitoring module 150** informs control module 112 of the charge level in a battery, and incorporating Hobbs's threshold-based charging alert functionality into Sutardja would have involved only routine implementation of known charging-monitoring and notification functionality, and the inclusion of a second threshold, a charge level lower than a full charge level, using existing system components performing their established functions. EX1004-Sutardja, [0239], [0243]-[0247], [0262]-[0270], [0286]. Namely, Sutardja's charge monitoring module 150 may monitor the amount of charge in the battery 14 when the battery 14 is being charged and may **inform** the control module 112 when the charging reaches a predetermined threshold and/or is completed. EX1004-Sutardja, [0268]. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

8. Claim 1[e][iii]: “compare, during charging of the battery with the battery charger, a level of charge of the battery to the predetermined threshold level of charge, and”

121. Sutardja’s **controller (modules 112/106)** is configured to *compare, during charging of the battery with the battery charger (CMM 104-1), a level of charge of the battery to the predetermined threshold level of charge*, per Hobbs. See Claim 1[e][i]-[ii].

a) Sutardja’s Teachings

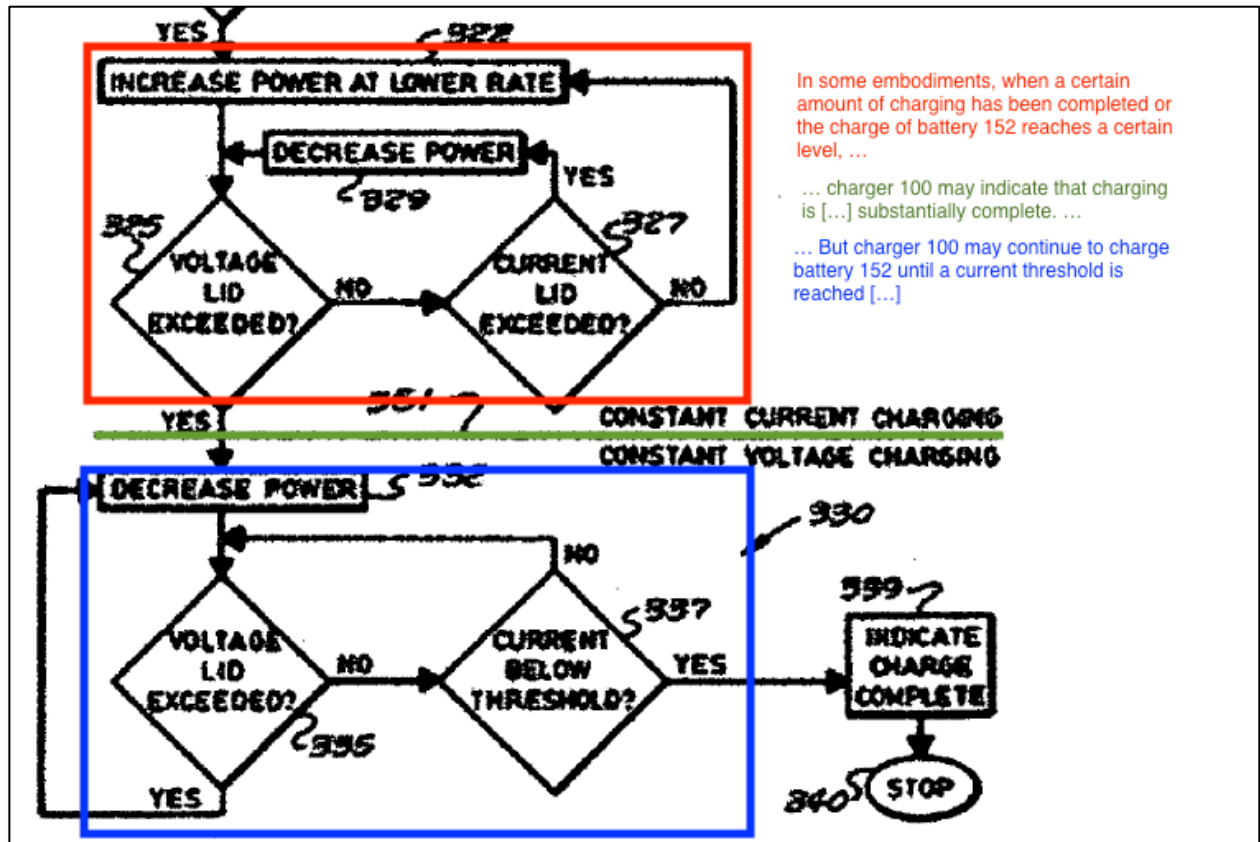
122. Sutardja’s **charge exchange module 106 (part of controller)** in **CMM 104-1** includes a charge monitoring module 150, a charging module 152, and a charge retrieval module 154. EX1004-Sutardja, [0242], [0268], Figs. 3A-5B, 7. Sutardja’s “charge monitoring module 150 may monitor the amount of charge in the battery 14 when the battery 14 is being charged and may inform the control module 112 when the charging is completed.” EX1004-Sutardja, [0268].

b) Hobbs’s Teachings

123. Hobbs’s battery charger’s **controller 270** “control[s] the power level of alternating current 241.” EX1006-Hobbs, [0049]-[0050]. **Controller 270** “may repeatedly check the charging voltage (step 325) and current (step 327) and either increase (step 322) or decrease (step 329) the power level to keep the charging current (e.g., direct current 293) substantially at the current lid.” EX1006-Hobbs,

[0103], [0086]. Hobbs teaches controller 270 of charger 100 “monitor[s] whether the charging current has dipped below a current threshold (step 337).” EX1006-Hobbs, [0107]. Hobbs’s controller 270 compares “the charging voltage with the voltage lid (step 335)” and compares “the charging current with the current threshold (step 337)” until “the rate of charge (e.g., direct current 293) decreases until the charging current drops below the **threshold** (step 337).” EX1006-Hobbs, [0108]. Hobbs teaches that “**fast or opportunity charging may take place for a particular amount of time or energy, for example, entered by the user into key pad 104 ...** when a certain amount of charging has been completed or **the charge of battery 152 reaches a certain level, charger 100 may indicate** that charging is ... **substantially complete.**” EX1006-Hobbs, [0111], [0109]. Even after this indication point (alert) is reached, charger 100 “continue[s] to charge battery 152 until a **current threshold** is reached...” EX1006-Hobbs, [0111]. Hobbs’s current threshold is “stored in look-up table 272 for...battery 152.” EX1006-Hobbs, [0107]. Hobbs teaches monitoring the charge level of the battery during charging for the purpose of reducing the charging rate when a user-specified threshold (of energy or charge level) is reached. EX1006-Hobbs, FIG. 3, [0111]. Hobbs charges fast until the battery level reaches the first current threshold using a first charging rate which corresponds to a particular amount of energy, sends an indication (alert) when this

particular amount of energy is met, and then slows down the charging rate to the second current threshold and charging **continues** at this second, slower rate.
EX1006-Hobbs, [0107]-[0111].



EX1006-Hobbs, Fig. 3 (excerpt), [0111]. Hobbs's indication of substantially charged in [0111] is done "in real time" via "indicator lights 108, screen 107, or both." EX1006-Hobbs, [0109], [0112], [0113] ("[w]hile charging is taking place (e.g., steps 313 through 339), **controller...may provide a signal** to...network 275 indicating the amount of energy used ..."). As shown in Figure 3, during charging of the battery, charging is monitored and controlled. EX1006-Hobbs, [0111], Fig. 3.

c) Motivation to Combine Sutardja and Hobbs

124. Modifying Sutardja's controller (modules 112/106) to compare Sutardja's charge level to Hobbs's notification threshold (in addition to Sutardja's predetermined threshold level of charge) to enable alerting a user when the battery meets the predetermined threshold level of charge would have been obvious to a POSITA based on the express teachings of Hobbs. EX1006-Hobbs, [0111]. As discussed, Hobbs teaches a notification threshold, that is less than a full charge, at which the controller sends an alert. *See* Claim 1[e][ii]. It was well known that to determine whether the charge level has reached the predetermined threshold level of charge, the current charge level would need to be compared against the charge level threshold, and that monitoring a charge level during charging can be done by measuring current flow which Hobbs teaches. EX-1006-Hobbs, [0107]-[0111]; EX1005-Sutardja, [0242], [0268]. Sutardja already teaches being capable of monitoring the amount of charge in battery 14 and informing control modules 112/106 when charge-related conditions are met. EX1004-Sutardja, [0268]. Hobbs's current threshold is "stored in look-up table 272 for...battery 152." EX1006-Hobbs, [0107]. A POSITA would have appreciated once the user inputs Sutardja's desired charge amount (predetermined levels of charge), Hobbs would look up the associated current threshold to that charge amount. Charge level of a battery was

commonly estimated based on battery voltage. EX1039-Wakeman, Abstract. A POSITA would have understood that Sutardja's charge level (predetermined levels of charge), estimated based on voltage, would have a proportional relationship to an associated current threshold, based on Ohm's Law. EX1040-Weinberg, [0060] ("This is basically defined by Ohm's law wherein, $V=IR$ wherein V is the voltage, I is the current[.]").

125. Comparing Sutardja's current charge level to Hobbs's notification threshold would have been the use of a known technique (comparing and alerting a user about battery charge levels) to improve similar devices (Sutardja's CMM 104-1) in the same way. This implementation would have applied Hobbs's known functionality of comparing a battery charge level to a notification threshold and providing a notification upon reaching that threshold to Sutardja's similar battery charging system, which already receives user charging level parameters, monitors battery charge level, and controls charging based on those parameters. EX1004-Sutardja, [0243]-[0244], [0267]-[0270]; EX1006-Hobbs, [0111].

126. A POSITA would have had a reasonable expectation of success modifying Sutardja based on Hobbs's teachings. Such a modification would have required only reprogramming of Sutardja's software, to include the functionality of comparing and alerting a user about battery charge levels, using ordinary skill of a

POSITA and hardware already present. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA. In the combination, Sutardja's charge monitoring module 150 in charge exchange module 106 would monitor the amount of charge in battery 14 during charging and provide charge-level information to control module 112, and control module 112 would use that information to determine whether the monitored charge level had reached Hobbs's notification threshold to then alert the user via Hobbs's indication. EX1004-Sutardja, [0268]-[0270]. A POSITA would have appreciated that such a modification would have allowed the user of Sutardja-Hobbs's system to know when the vehicle battery reached a desired level of charge, such as a level sufficient for the user's expected use, without requiring the user to manually check the vehicle or wait until charging fully stops. This would have improved user convenience and charging flexibility, as the user would be alerted once a useful threshold charge level was reached, while still allowing charging to continue toward a later charging endpoint if additional charging time was available. EX1006-Hobbs, [0111].

- 9. Claim 1[e][iv]: “responsive to the level of charge of the battery reaching the predetermined threshold level of charge of the battery, send, before the charging of the battery is complete, at**

least one signal as the alert via the transmitter, the at least one signal indicative of the predetermined threshold level of charge of the battery; and”

127. The '107 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:37-50 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:18-25 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”) Kelty-078 similarly sends signals (for example, text) using wireless communication (for example, Bluetooth). EX1005-Kelty-078, 4:53-58, 4:58-5:1, 4:24-31. Dependent claim 4, below, limits a notification of this “signal indicative of the predetermined threshold level of charge” to “text or email automatically generated to the user.”

128. Sutardja-Hobbs-Kelty-078 teaches Sutardja's **controller (modules 112/106)** *responsive to the level of charge of the battery reaching the predetermined*

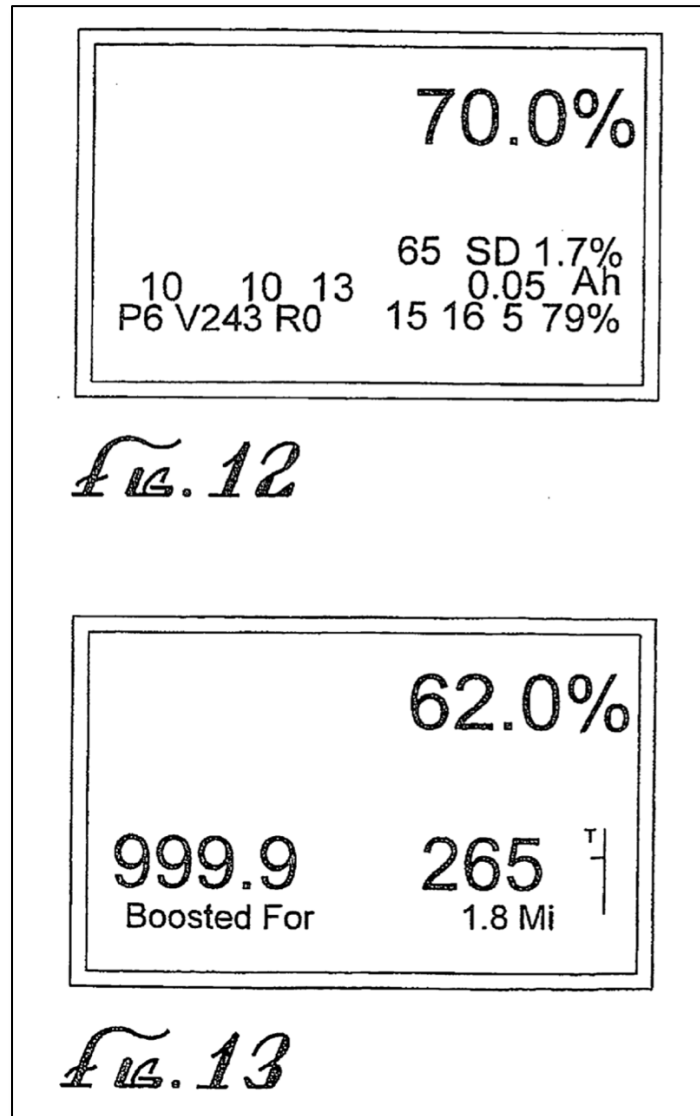
threshold level of charge of the battery (Sutardja's user-set charge level, as measured by Hobbs's current threshold), *send, before the charging of the battery is complete, at least one signal as the alert* (Hobbs's alert via Kelty-078's transmitting a text functionality) *via Sutardja's transmitter* (Claim 1[c]), *the at least one signal indicative of the predetermined threshold level of charge of the battery*. See Claims 1[c]-[e][iii]. The claimed alert is sent to Kelty-078's portable controller, as further discussed in Claim 1[f].

a) Kelty-078's Teachings

129. Hobbs teaches an alert (signal) *indicative of the level of charge being reached* displayed to the user, as discussed above. Complementing this, Kelty-078 provides implementation details as to how *to send a signal (text) indicative of the level of charge being reached*.

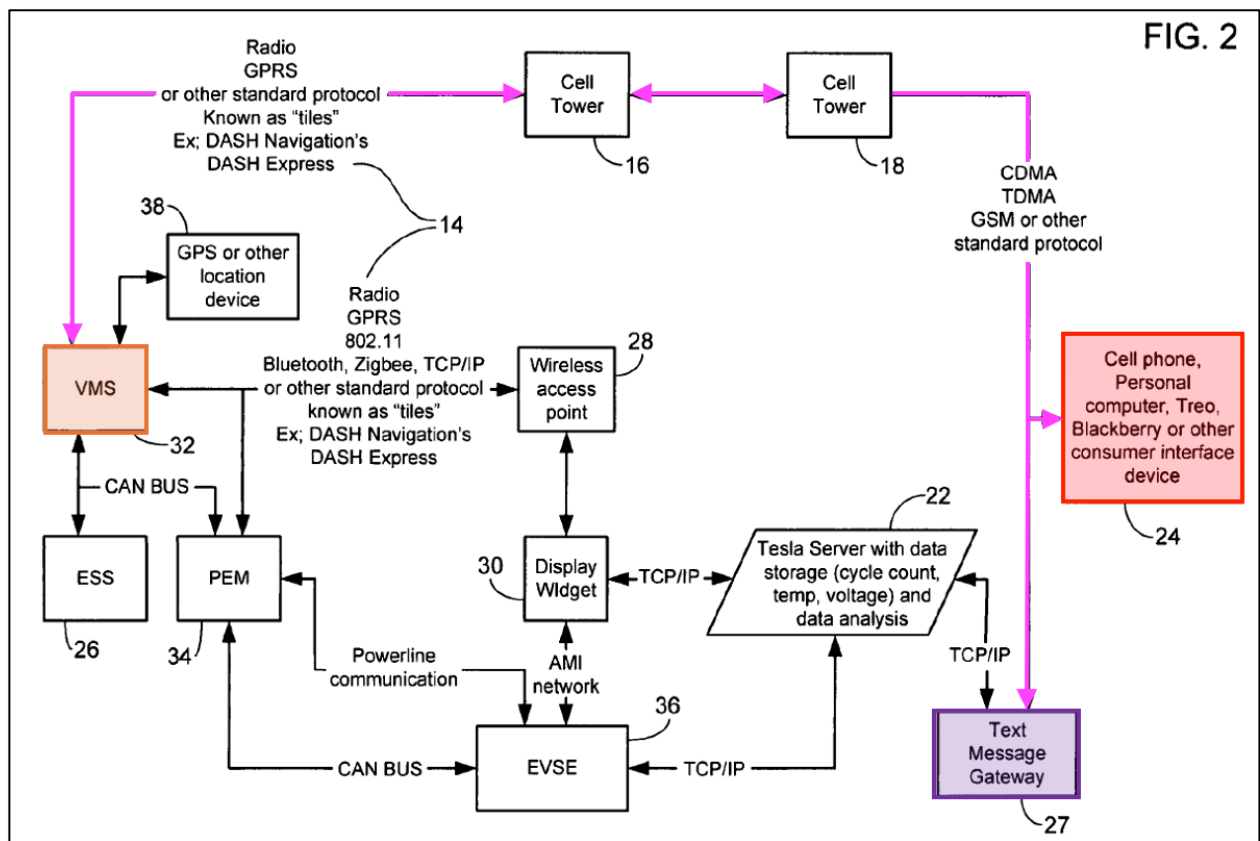
130. Kelty-078 teaches the electric vehicle contacts "user 20 via the user interface device 24 by any known mobile device or desktop, laptop, etc., via either ...instant messaging or any other known communication protocol," to control and monitor the battery charger, including providing notifications of charge level and/or problems. EX1005-Kelty-078, 4:53-58, 5:9-26. Kelty-078 discloses that the user monitors the electric vehicle battery's state of charge to determine if "the battery 26 is charged to the level set by the user and capable of a maximum mileage trip based

on the battery installed therein.” EX1005-Kelty-078, 5:9-21. Kelty-078 also teaches notifying the user that the battery has reached a certain charge level. EX1005-Kelty-078, 5:9-21. A POSITA would understand that Kelty’s “notification” alert signal to the user would include similar relevant information *indicative of the predetermined threshold level of charge (i.e., whether the battery is charged to the level set by the user and capable of traveling the desired mileage)*. It was well known to display to the user information to determine if the battery is charged to the level set by the user. As an example, Hanssen teaches a CDU “mounted on the dashboard of the car, and attached to the vehicle...” “displays information to the user, such as the state of charge (SOC) of the advanced battery (in numeric or graphic form).” EX1020-Hanssen, [0076], [0068].



EX1020-Hanssen, Figs. 12-13. Kelty's alert signal is also *automatically generated* (as required by claim 4) at least because Kelty separately discusses and distinguishes the user manually "querying" the state of charge from the electric vehicle from the electric vehicle "notifying" the user of a reaching a charge level. *Cf.* EX1005-Kelty-078, 5:11-13 *with id.*, 5:18-21.

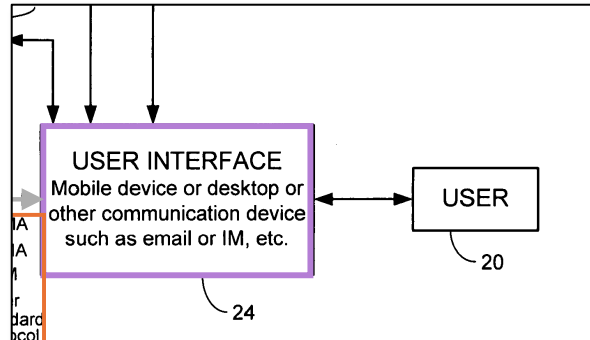
131. Kelty-078's user can communicate with vehicle 12 (including VMS 32) bidirectionally using "any known **text messaging device**..." and via "**text message gateway 27**." EX1005-Kelty-078, 4:58-63, 8:15-17, Fig. 2. Kelty's contacting the user via a "known communication protocol" over a "text message gateway" to a "text messaging device" would teach the claimed "text message," as shown below in Kelty-078 Figure 2.



EX1005-Kelty-078, Fig. 2. It was well-known that devices, such as the "Treo" in above Figure 2, were capable of cellular telephony capabilities including text. EX1030-PalmTreo700p, 94 ("You can use the Messaging application to exchange

brief text messages (SMS) with other devices and email addresses that support this form of messaging.”), 247 (“CDMA 800MHz (digital cellular), 1900MHz (PCS), and 1400MHz (GPS)”); *see* Section VI.C. Furthermore, EV charging related alerts sent to the user as text were common in the art. EX1027-Lowenthal-340, [0052], Fig. 4; *see* Section VI.D.1.

132. Kelty-078 teaches that communications (such as Kelty-078’s user notifications discussed above) between VMS 32 and user device 24 may occur through wireless communication protocols, including “CDMA,” “GSM,” “BlueTooth,” and “ZigBee” using a communication chip like Sutardja’s transmitter as discussed in Claim 1[c]. EX1005-Kelty-078, 4:19-39.



EX1005-Kelty-078, Fig. 1 (excerpt). Therefore, Kelty-078 teaches VMS 32 communicating with the controller of device 24 (*See* Claim 1[f]-[g]) via text to the user about the signal indicative of the level of charge (per Sutardja-Hobbs’s teachings above) being reached. A POSITA would have appreciated that, in the combination, Kelty-078’s signal (text) is sent at Hobbs’s indication point *before the*

charging of the battery is complete, based on Hobbs's teachings of detecting and indicating that charging is substantially complete, and then continuing to charge. Specifically, Hobbs teaches that "fast or opportunity charging may take place for a particular amount of time or energy, for example, entered by the user into key pad 104 ... when a certain amount of charging has been completed or **the charge of battery 152 reaches a certain level, charger 100 may indicate** that charging is ... **substantially complete.**" EX1006-Hobbs, [0111], [0109]. Even after this indication point (alert) is reached, charger 100 "continue[s] to charge battery 152 until a **current threshold** is reached..." EX1006-Hobbs, [0111].

b) Motivation to Combine Sutardja-Hobbs with Kelty-078

133. A POSITA would have been motivated and would have found it obvious to implement Kelty-078's known text messaging alert functionality to transmit Hobbs's alert as a signal (per Kelty-078 teachings) so that the driver of the vehicle advantageously would be notified when the charge was nearing completion so the user would return to their car. This would avoid the user being required to stay with their car during charging, and/or to check back repeatedly until the charging was complete. This modification would have improved the Sutardja-Hobbs system by enhancing user-friendliness and providing beneficial features (e.g., saving a user's time by avoiding repeated checks on charge level). Kelty-078 provides

teachings of text alerts that a POSITA would have the necessary knowledge to implement, as it was well-known to implement text communication on devices with cellular telephony capabilities. EX1030-PalmTreo700p, 94, 247; *see* Section VI.C; EX1027-Lowenthal-340, [0052], Fig. 4; *see* Section VI.D.1. A POSITA would have been motivated and readily able to make all the necessary firmware/software modifications needed to be able to transmit messages to capture these benefits.

134. Modifying Sutardja-Hobbs according to Kelty-078's teachings would have involved the use of a known technique (signals in the form of text message) to improve similar wireless communication and charging-notification devices (Sutardja's battery charger) in the same way (so the user can be alerted regarding charging status when away from their vehicle). Sutardja-Hobbs already teaches the controller sending an alert. *See* Claim 1[e][ii]. A POSITA would have appreciated that such a modification would have allowed the user of Sutardja to implement the well-known concept of text being wirelessly sent as a signal between controllers. EX1030-PalmTreo700p, 94, 247; *see* Section VI.C; EX1027-Lowenthal-340, [0052], Fig. 4; *see* Section VI.D.1.

135. A POSITA would have had a reasonable expectation of success modifying Sutardja-Hobbs according to Kelty-078's teachings. Sutardja already teaches presenting information to the user. EX1004-Sutardja, [0257]. This

combination would have implemented the wireless network transmitter capabilities of Sutardja-Hobbs-Kelty-078 to send a text message as a signal, a feature well within the skill set of a POSITA. Sutardja already teaches being able to bidirectionally communicate wirelessly, and a POSITA would be motivated to look towards text protocols to communicate with a user via the communication protocols with which they were familiar. EX1004-Sutardja, [0037] (“network interface means comprises ...wireless...interface means for transmitting and receiving data.”).A POSITA would have reasonably looked to conventional cellular messaging techniques, including SMS, as predictable options for utilizing Sutardja’s existing wireless transceiver capable of bidirectional communication for remotely notifying the user of charging completion, rather than requiring the user to remain near the vehicle, repeatedly check the vehicle display, or maintain an active data application. Cellular messaging very well-known and a common capability of devices having wireless transceiver capable of bidirectional communication. EX1030-PalmTreo700p, 94, 247; *see* Section VI.C; EX1027-Lowenthal-340, [0052], Fig. 4; *see* Section VI.D.1. Modifying Sutardja’s wireless transceiver to incorporate these techniques would have been a routine software modification of Sutardja’s system and well within the capabilities of a POSITA. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to

programming instructions would have been required, which would have been well-within the skillset of a POSITA.

10.Claim 1[f]: “a portable controller remote from the vehicle and battery charger, the portable controller configured to wirelessly communicate with the controller of the battery charger via the transmitter;”

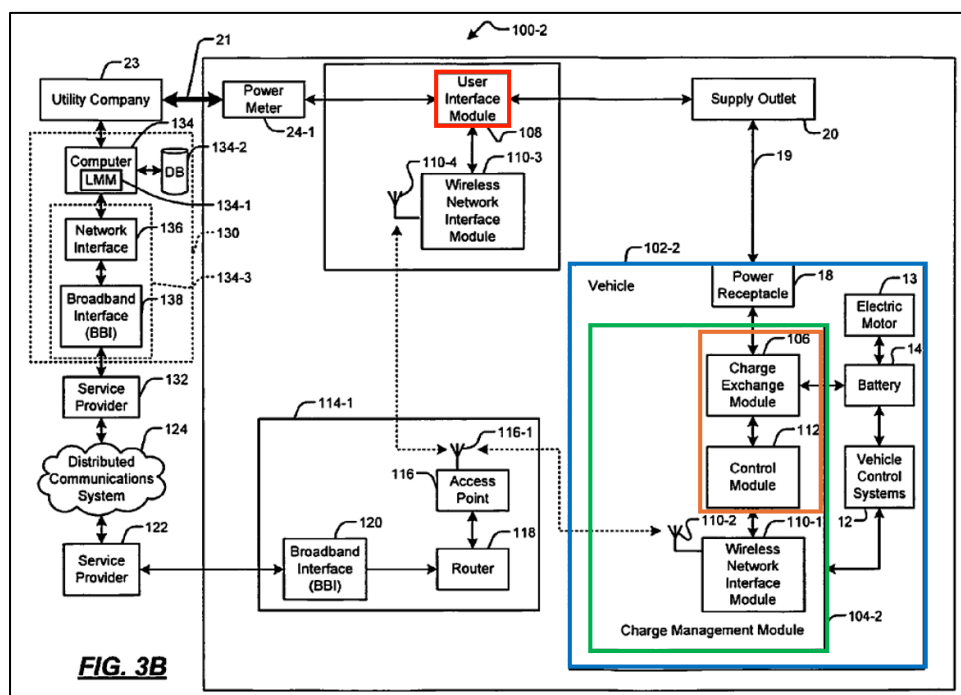
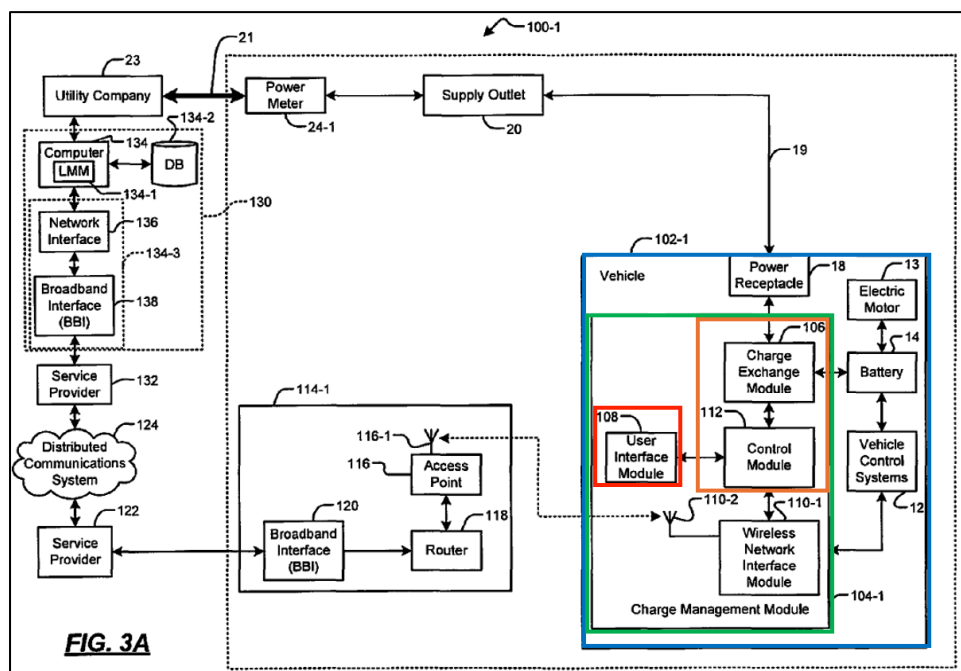
136. Kelty-078 teaches a *portable controller remote from the vehicle* (a smartphone such as a Blackberry or Treo), and Sutardja teaches a *controller outside from the vehicle* (the combined UIM-WNIM⁴). As combined, Sutardja-Kelty-078 teaches a *portable controller* (Kelty-078’s phone implementing Sutardja’s UIM-WNIM) *remote from the vehicle and battery charger, the portable controller configured to wirelessly communicate with the controller (modules 112/106) of the battery charger via Sutardja’s transmitter*. As previously discussed in claim 1[c], Sutardja teaches the *battery charger (CMM 104-1) having a transmitter (wireless network interface module 110-1 which includes a transmitter)*, where data is transmitted and received via wireless network interface module (WNIM) 110-1. See Claim 1[c].

⁴ I will refer to Sutardja’s user interface module 108 and wireless network interface module 110-3 as “UIM-WNIM” throughout the rest of the declaration.

a) Sutardja's Teachings

137. Sutardja teaches *a controller remote from the vehicle (UIM-WNIM) configured to wirelessly communicate with the controller (modules 112/106) of the battery charger via Sutardja's transmitter.*

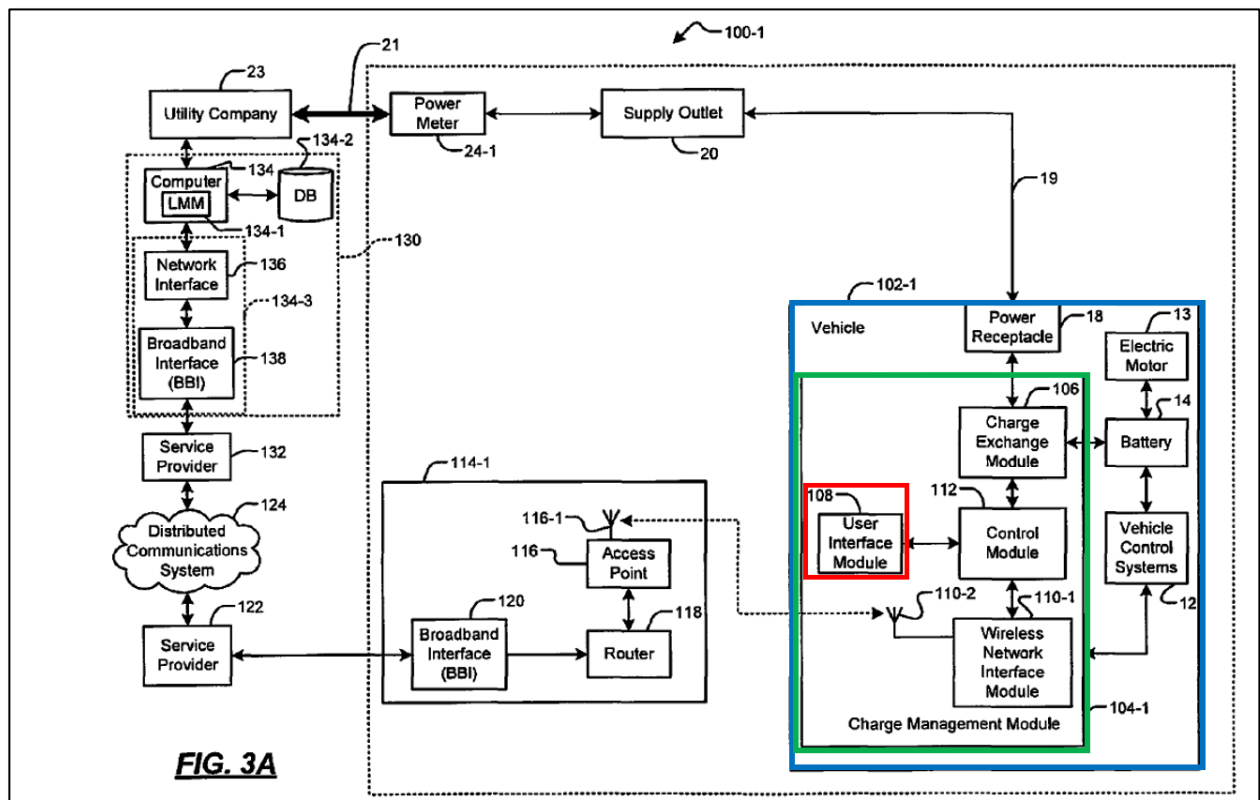
138. Sutardja discloses multiple embodiments of its charge management system (CMS 100), including embodiments depicted in Figs. 3A and 3B. Other than the placement of the user interface module 108 and wireless network interface module, the embodiments in Fig. 3A and 3B are “substantially similar.” EX1004-Sutardja, [0247]. A POSITA would have understood components and functionalities of the CMS 100-1 and 100-2 are “substantially similar,” including vehicle 102-1/102-2, CMM 104-1/104-2, modules 112/106, wireless network interface module 110-1, power receptacle 18, cable and connector 19, supply outlet 20, power meter 24-1, and wireless LAN 114-1. EX1004-Sutardja, Figs. 3A-3B, [0247]. Sutardja refers to each of the said components and functionalities collectively, such as “vehicle 102,” “CMM 104,” “network interface module 110,” and “LAN 114.” EX1004-Sutardja, [0250], [0252].



EX1004-Sutardja, Figs. 3A-3B. A POSITA would have understood the main difference between CMS 100-1 and 100-2 is the placement of user interface module 108. EX1004-Sutarjda, [0234] (“The user interface modules may be arranged inside

vehicles as shown in FIGS. 3A, 4A, and 5A or outside vehicles as shown in FIGS. 3B, 4B, and 5B.”)

139. In the Fig. 3A embodiment, **user interface module 108** is integrated within **CMM 104-1 (battery charger)**, enabling local interaction with the **CMM** system.



EX1004-Sutardja, Fig. 3A.

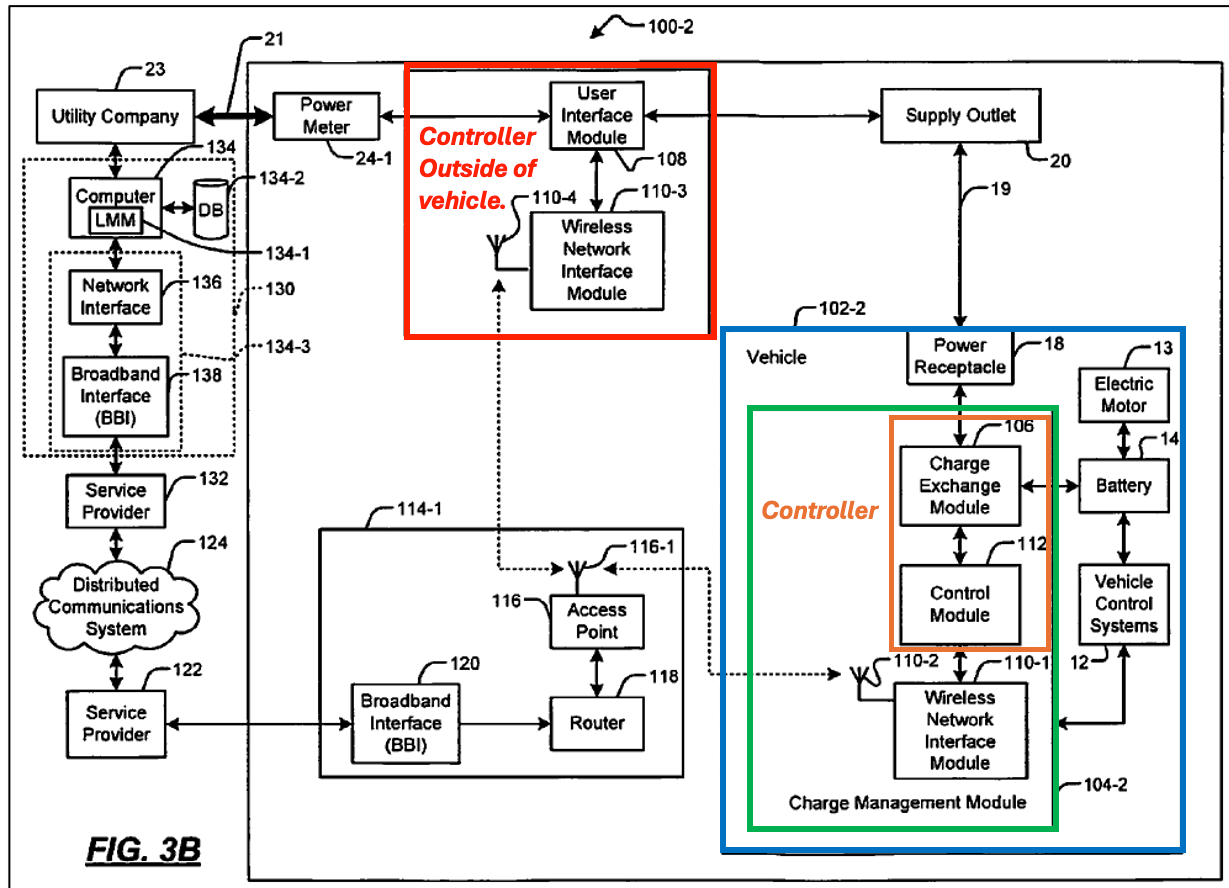
140. In the Fig. 3B embodiment, **user interface module 108** and **wireless network interface module 110-3** (together, the “UIM-WNIM”) are located outside

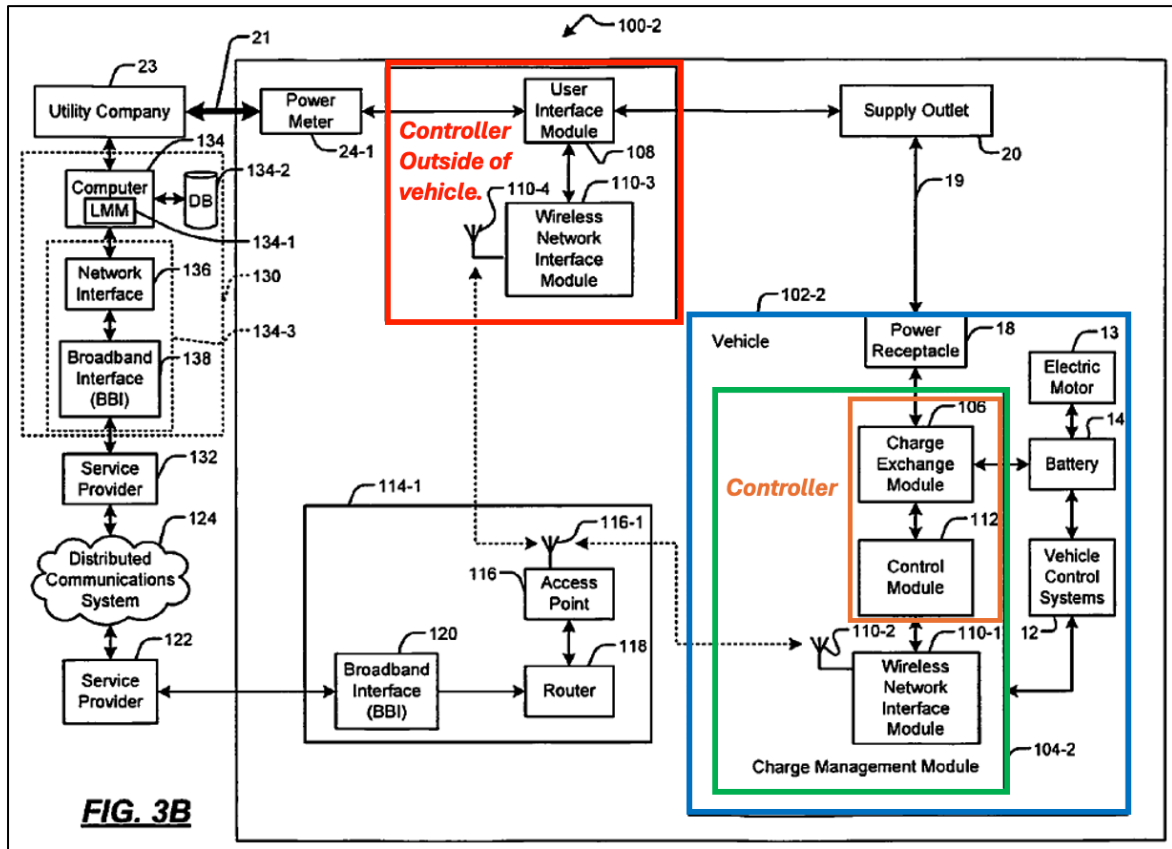
Declaration of Scott Andrews

U.S. Patent No. 11,258,107

the vehicle and controller, vehicle charger, enabling wireless communication with

CMM 104-1:

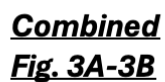


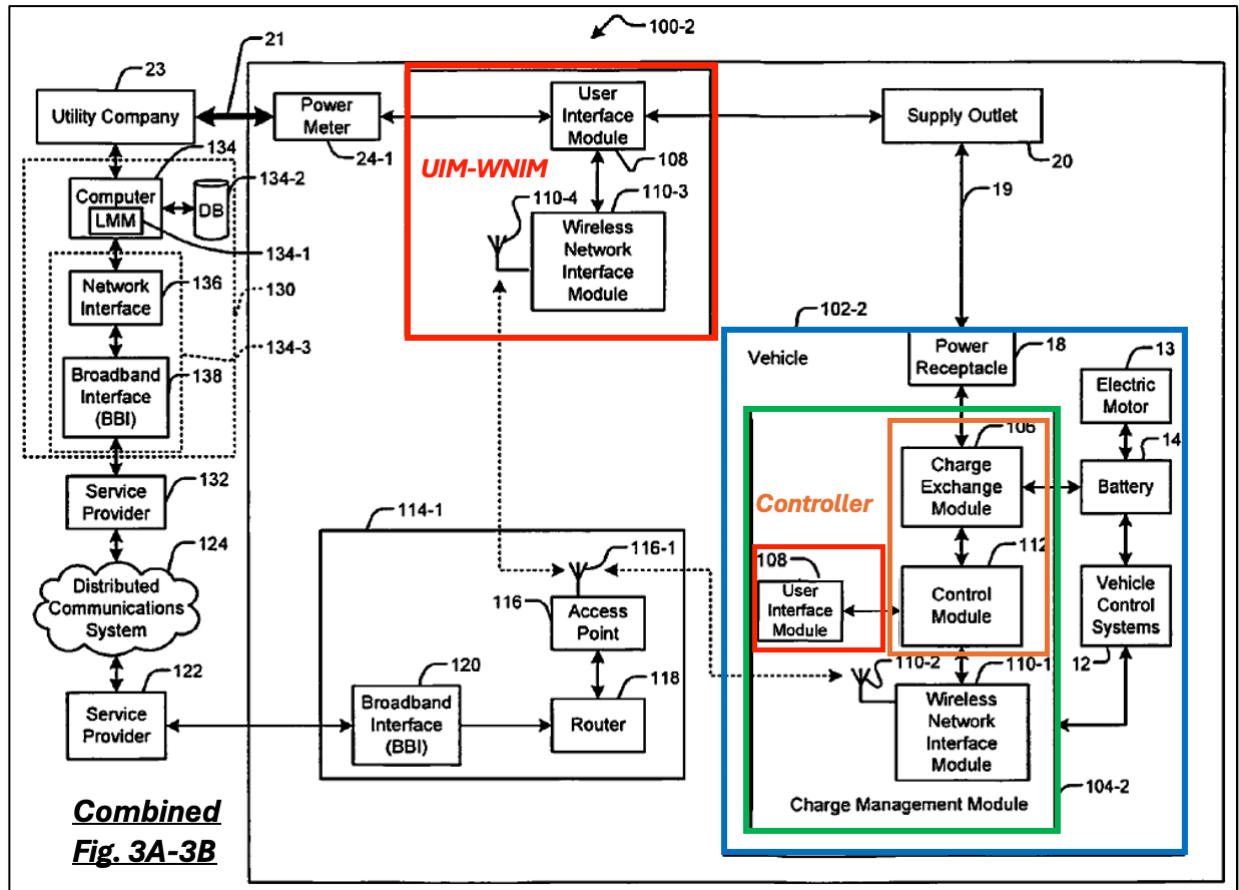


EX1004-Sutardja, Fig. 3B, [0247]. In Fig. 3B, Sutardja teaches that the UIM-WNIM is (1) “arranged outside a vehicle” (EX1004-Sutardja, [0247]) and (2) allows a user to input charging parameters (*id.*, [0243]-[0244]). UIM 108 includes input elements such as a keypad, and output elements, including a display. EX1004-Sutardja, [0243]. Wireless network interface module 110-3 includes an antenna 110-4 to wirelessly communicate with a vehicle charger having an antenna 110-2 and utility company 23. EX1004-Sutardja, [0243], [0247]. Sutardja teaches the vehicle charger is adapted for wireless communication with UIM-WNIM. EX1004-Sutardja, [0243]-

[0244] (“the control module 112 may receive data input by the user for charging the battery 14...from the user interface module 108”); [0241].

141. In the mappings of Claim limitations 1[Pre]-1[e][iv] above, I rely on the embodiment Figure 3A of Sutardja, which includes user interface module 108 integrated within CMM 104-1 (battery charger), enabling local interaction with the CMM system. Henceforth, I rely on a combined embodiment of Figs. 3A and 3B as set forth below. As explained in detail below, a POSITA would have been motivated to implement the local user interface module 108 of Fig. 3A within the system of Fig. 3B, resulting in a combined system that includes both (1) a user interface coupled to the controller within the vehicle charger and (2) a user interface module outside of the vehicle for external interaction with a user. The combined system is hereinafter referred to as “Combined Fig. 3A-3B”:





EX1004-Sutardja, Combined Fig. 3A-3B.

b) Internal Motivation to Include the UIM of Sutardja Fig. 3B in the Vehicle Charging System of Fig. 3A.

142. A POSITA would have been motivated and would have found it obvious to modify the charging system of Sutardja Figure 3B to include a UIM inside the vehicle, as expressly taught in Figure 3A. As discussed above, Sutardja explains that other than the placement of the UIM and WNIM, the embodiments in Fig. 3A and 3B are “substantially similar.” EX1004-Sutardja, [0247], [0250]-[0252

(referring to each component and functionality collectively), [0234] (“The user interface modules may be arranged inside vehicles as shown in FIGS. 3A, 4A, and 5A or outside vehicles as shown in FIGS. 3B, 4B, and 5B.”). Both embodiments perform the same underlying functions, including receiving user-defined charging parameters, communicating with external systems (e.g., utility providers and remote computing devices), and controlling charging of the vehicle battery based on those parameters. EX1004-Sutardja, [0247], [0250]-[0253], [0261]-[0267].

143. A POSITA would have recognized that the user interface module 108 of Fig. 3A (providing a local display and input interface coupled to the charger) and the user interface outside of the vehicle configuration of Fig. 3B are complementary, and that combining them would allow both local and remote interaction with the same charging system. A POSITA would have understood that inclusion of both a UIM 108 outside of the vehicle and a UIM 108 inside of the vehicle would serve separate yet complementary purposes, improving user experience by providing the benefits of both UIM configurations. Such a combination would have been consistent with well-known EV charging system design practices prior to the priority date of the '107 Patent. For example, Hobbs teaches both a battery charger side user interface (Hobbs's key pad 104 and screen 107) and a user interface outside the vehicle (Hobb's diagnostic device 130), that communicate and provide the user both

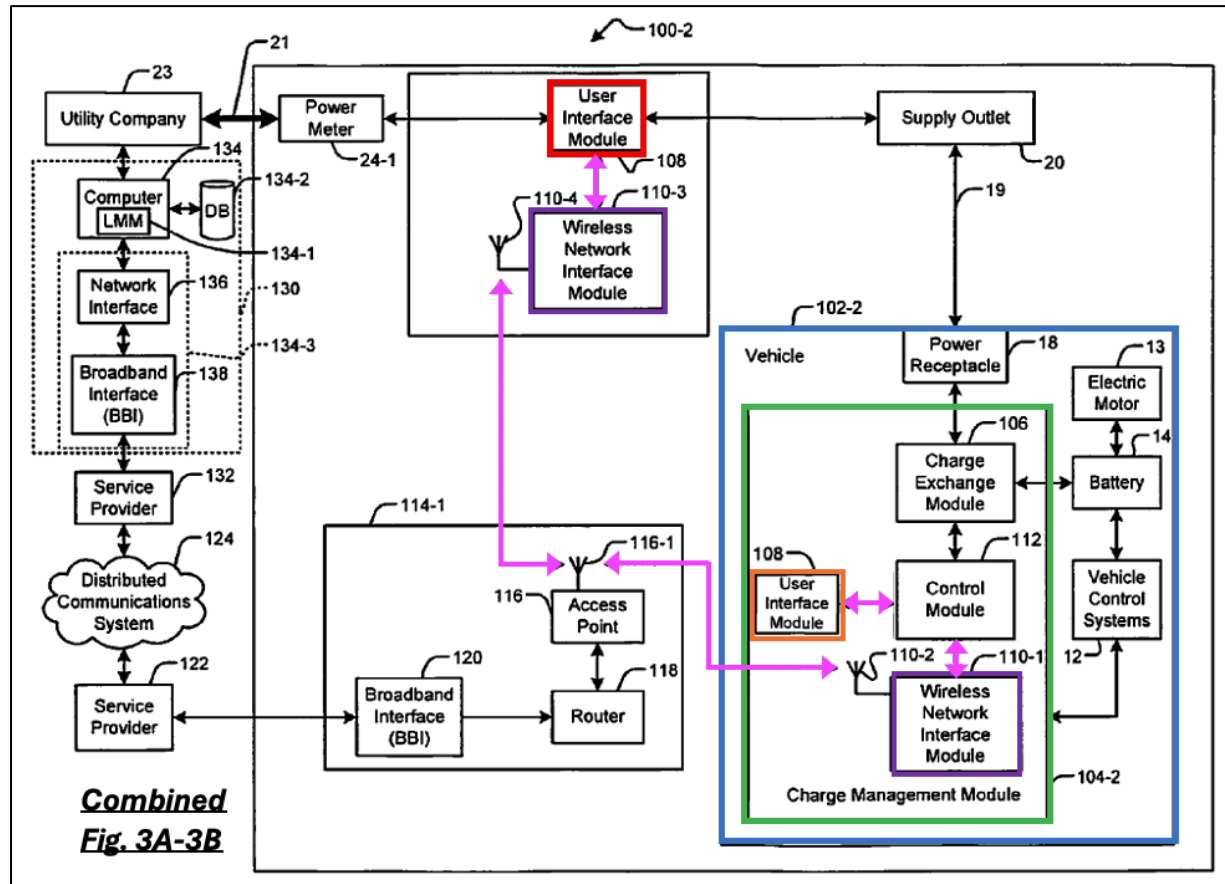
local and remote interaction with the charging system. EX1006-Hobbs, [0036]-[0037], [0049]-[0051], [0054]-[0055].

144. First, it was well known that the user may be charging a vehicle away from home and would wish to sit in their vehicle while it charges; in this scenario, the user would greatly benefit from a user interface inside the vehicle. From within the vehicle, the user inputs charging parameters, as taught by Sutardja. EX1004-Sutardja, [0243], [0265]. Other times, the user may be at home or in an office, and there they would want to be able to control charging parameters while away from the vehicle using an external device, such as a computer. Sutardja's UIM-WNIM, located outside the vehicle, enables the user to input charging parameters to wirelessly communicate with the vehicle charger. EX1004-Sutardja, [0241], [0234]-[0244], [0247]. Providing this flexible functionality would broaden the user's ability to conveniently control the charging parameters regardless of where the charging was taking place and would substantially simplify Sutardja's charge management process. Contemporaneous EV systems commonly provided user interfaces both at the vehicle or charging device and through remote or networked systems to allow users to monitor and control charging. EX1006-Hobbs, [0036]-[0037], [0049]-[0051], [0054]-[0055].

145. Second, it would improve system flexibility by enabling both local control by the user and remote coordination with utility systems, which were known to manage charging based on load and cost considerations. For example, Sutardja describes different charging schedules that the user requests from the utility system resulting in additional costs. EX1004-Sutardja, [0236], [0264]-[0265]. Another example, Kelty-218 describes selectively charging a battery based on charging-cost conditions. EX1023-Kelty-218, Abstract, [0014]. Third, it would facilitate more efficient implementation of user-defined charging preferences—such as scheduling and cost-based charging—which were known to depend on both user input and communication with external systems. *See* EX1004-Sutardja, [0236], [0264]-[0265]; EX1023-Kelty-218, Abstract, [0014].

146. A POSITA would have had a reasonable expectation of success in making this modification because it merely combines known components performing their known functions within the same system architecture. Sutardja's embodiments already disclose the same core system and control logic, and combining their interface configurations would require only routine implementation without altering the underlying operation of the charging system. EX1004-Sutardja, [0234], [0247], [0250], [0252], Figs. 3A-3B. Such a modification would have involved only routine design choices, such as configuring the control module 112 to

communicate with both local and remote interface components, each performing its known function. There would additionally be a reasonable expectation of success because Sutardja expressly discloses each separate embodiment, and the modifications would not conflict with each other. A POSITA would have recognized that the combined system of the local user interface module 108 of Fig. 3A within the system of Fig. 3B, results in a combined system that includes both (1) a user interface coupled to the controller within the vehicle charger and (2) a user interface module outside of the vehicle for external interaction with a user, where there is a compatible signal path.



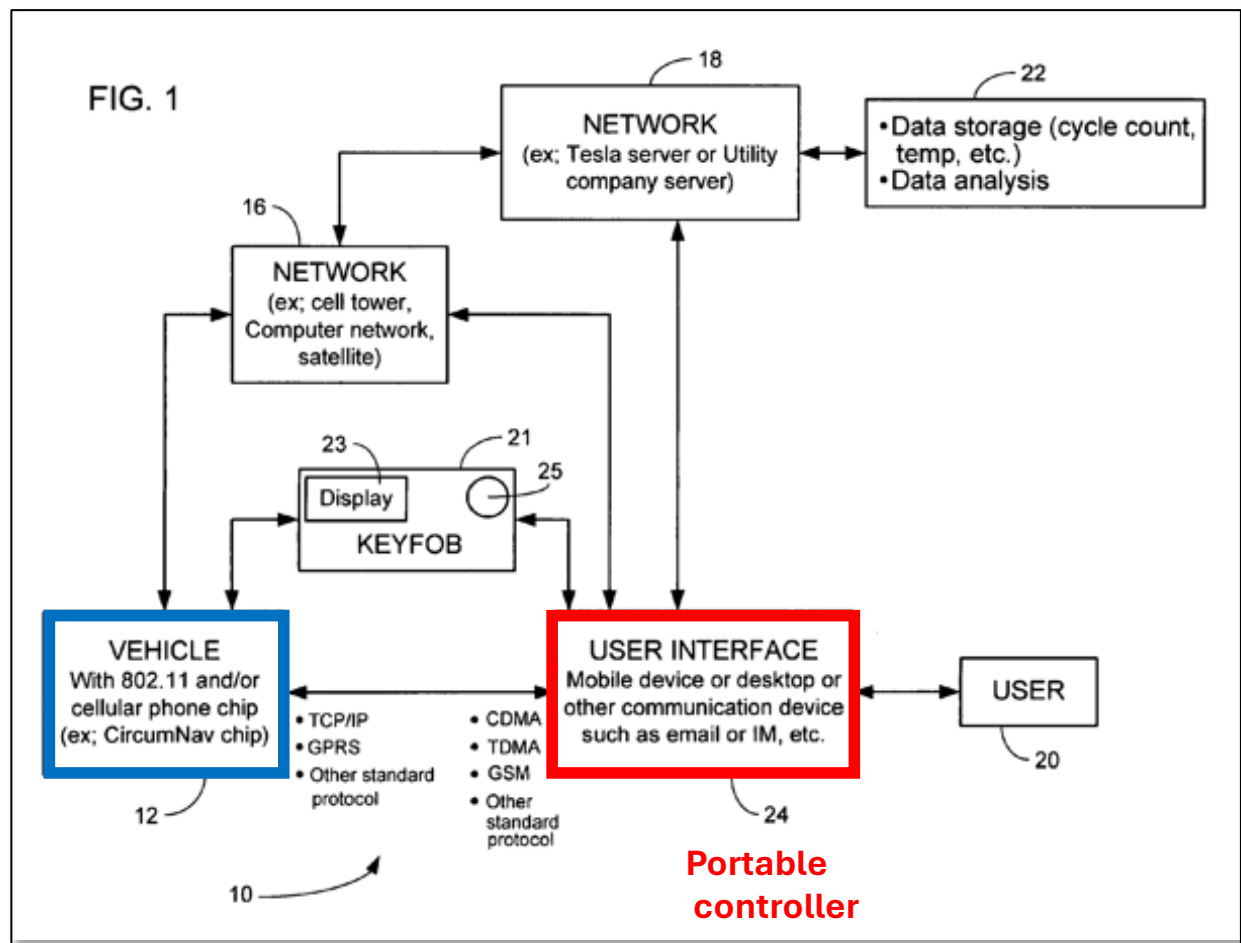
EX1004-Sutardja, Combined Figs. 3A-3B. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

c) Kelty-078's Teachings

147. Complementing Sutardja's teachings of a *controller remote from the vehicle* (UIM-WNIM), Kelty-078 teaches a *portable controller*, namely a processor

in a mobile device...*remote from the vehicle and the vehicle charger*. EX1005-Kelty-078, 3:47-4:39, Fig. 1.

148. Kelty-078 discloses an electric vehicle communication interface 10 that enables wireless communication between electric vehicle 12 and remote portable communication devices such as user interface device 24, for monitoring and controlling vehicle charging operations and battery conditions. EX1005-Kelty-078, Abstract, Fig. 1, 1:28-2:11.



EX1005-Kelty-078, Fig. 1. Kelty-078 explains that user interface device 24 includes “**mobile devices, such as cell phones, PDAs, handheld devices,** desktop computers, **laptop computers** or any other communication device that is capable of producing...IM, or any other communication device that is well known in the art.” EX1005-Kelty-078, 4:19-24. As one specific example of user interface device 24, Kelty-078 gives a “Treo,” a contemporary smartphone that included a processor and transceiver. *Id.*, FIG 2. Treo devices, such as the PalmTreo700, were well known smartphone devices that included a processor and transceiver. EX1030-PalmTreo700p, 7 (describing the PalmTreo700 as an “advanced **mobile smartphone**”), 16 (further describing the PalmTreo700 as a “**mobile phone**”), 247 (“**Processor** technology. Intel Xscale® **processor**, 312MHz.”); *See* Section VI.C. As such, Kelty-078 teaches a mobile phone including one or more processors and, as such, teaches *a portable controller remote from the vehicle and the battery charger*, as disclosed in the ’107 Patent. *See* Section VI.C (describing components and functionality of Treo devices). EX1001, 8:57-9:12 (a “controller” can be “one or more processors of a personal computer, phone, PDA, or other processor-based device associated with a user of the vehicle charging cord 22, and the like.”)

d) Motivation to Combine Sutardja with Kelty-078

149. A POSITA would have been motivated and would have found it obvious to implement Sutardja's UIM-WNIM in Kelty-078's mobile phone so that users would be able to remotely monitor and control vehicle charging operations using portable wireless devices remote from the vehicle. Sutardja already teaches a UIM-WNIM that is "arranged outside of a vehicle" and wirelessly communicates with CMM 104-1 through wireless network interface modules 110-1 and 110-3 to exchange charging-related information and user-entered charging parameters. EX1004-Sutardja, [0243]-[0249], [0267]. Kelty-078 specifically teaches the "Treo." EX1005-Kelty-078, Fig. 2 ("Treo"). Treo devices were well-known mobile phone devices, capable of wireless communications. EX1030-PalmTreo700p, 7 ("advanced mobile smartphone"), 16 ("mobile phone"), 247 ("CDMA 800MHz (digital cellular), 1900MHz (PCS), and 1400MHz (GPS)"), 247 ("Bluetooth[®] wireless technology (1.2 compliant)"); *see also* Section VI.C (describing Treo devices).

150. Modifying Sutardja according to Kelty-078's teachings would have involved applying a known technique (portable wireless communication and remote-monitoring technique) to improve similar devices (Sutardja's and Kelty-078's EV charging-management and communication systems) in the same way. EX1004-Sutardja, [0239], [0231], [0243]-[0252], [0267]. Kelty-078 explains that its

communication interface allows users to remotely “control[] and monitor[] the battery system,” determine the battery “state of charge,” receive notifications about battery status and remotely select charging options through portable devices such as “cell phones[.]” EX1005-Kelty-078, 4:53-7:43. Kelty-078 further explains that its communication interface improves charging flexibility by permitting users to remotely select charging options and monitor charging conditions without requiring physical interaction with the vehicle. *Id.*

151. A POSITA would have had a reasonable expectation of success in making such a modification, at least because Kelty-078 teaches implementing charge management functionality using wireless communication from a mobile phone using wireless communication and Sutardja teaches implementing charge management functionality using wireless communication from a charge management module outside the vehicle. EX1005-Kelty-078, Abstract, Figs. 1-2, 1:28-2:11, 3:47-4:39, 4:19-24. Making the modification would thus be a matter of software implementing the known wireless protocols used by Sutardja’s UIM-WNIM on the mobile phone of Kelty-078. Furthermore, Kelty-078’s Treo mobile would have been a straightforward commercially available, off-the-shelf solution, with no need for a POSITA to make any hardware modifications. EX1029-MobileTechReviewArchive, 1 (describing that the Treo 700w “came out at the

beginning of January 2006” and that the “Palm OS Treo line had nearly defined the PDA phone market[.]”).

11.Claim 1[g]: “wherein the portable controller generates a notification to a user indicating the predetermined threshold level of charge of the battery following and as the result of receiving the at least one signal indicative of the predetermined threshold level of charge of the battery.”

152. The '107 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:37-50 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:18-25 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”) Kelty-078 similarly sends signals (for example, text) using wireless communication (for example, Bluetooth). EX1005-Kelty-078, 4:53-58; 4:58-5:1; 4:24-31.

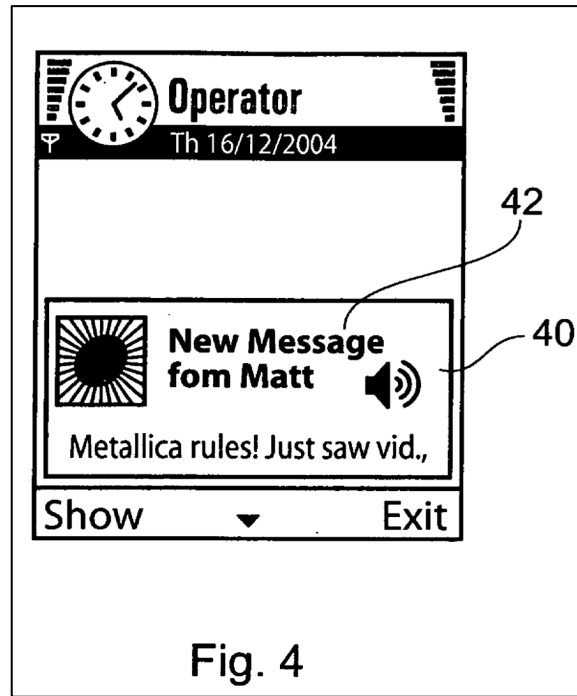
153. Sutardja-Hobbs-Kelty-078-Anttila teaches *the portable controller (Kelty-078's phone implementing Sutardja's UIM-WNIM) generates a notification (Anttila's pop-up of Kelty-078's text) to a user indicating the predetermined threshold level of charge of the battery following and as the result of receiving the at least one signal indicative of the predetermined threshold level of charge of the battery* (per Hobbs-Kelty-078's text alert signal).

a) Sutardja-Hobbs-Kelty-078's Teachings

154. Sutardja-Hobbs-Kelty-078 teaches a controller (modules 112/106) that sends, before the charging of the battery is complete, at least one signal as the alert via the transmitter, the at least one signal indicative of the predetermined threshold level of charge of the battery. *See Claim 1[e]*. Further, Kelty-078's phone implementing Sutardja's UIM-WNIM is a *portable controller* configured to wirelessly communicate with the controller of the battery charger, via the transmitter. *See Claim 1[f]*. Sutardja-Hobbs-Kelty-078 teach that Kelty-078's phone implementing Sutardja's UIM-WNIM receives *the at least one signal indicative of the predetermined threshold level of charge of the battery*, as recited in Claim 1[g]. EX1005-Kelty-078, 3:47-4:39, 4:53-6:31, Abstract, Fig. 1, 1:28-2:6.

b) Anttila's Teachings

155. Complementing Kelty's **communications** of SMS alerts, Anttila discloses a mobile communications device 10 configured to generate **notifications** of received messages, and a POSITA would be motivated to look to Anttila for implementation details of generating notifications of received alert signals. EX1007-Anttila, Abstract, Figs. 1-4, [0001]-[0005]. Anttila discusses notifications of various message types, including SMS and MMS (i.e., text messages as discussed by Kelty-078). EX1007-Anttila, [0002], [0018], [0021]; EX1005-Kelty-078, 4:58-63, 5:9-26, 8:15-17, Fig. 2; *see also* Claim 1[e][iv] (Kelty-078's teachings of text messages); *see also* Section VI.C and VI.D.1 (text messages were well known). Specifically, Anttila teaches a method in which an incoming message is received (step 51), parsed (step 52), and used to "creat[e] a pop-up notification" (step 60). *Id.*, Fig. 3, [0023]-[0032]. Anttila further teaches that the pop-up notification includes information such as "message content." *Id.*, [0020]-[0032]. Figure 4 illustrates exemplary pop-up notification 40 displayed on a mobile communication device after receipt and processing of an incoming message:



Id., Fig. 4. Anttila further explains that the “communications interface 16” receives incoming message data and that “computer program instructions 22 provide the logic and routines” enabling processor 12 to generate and display the corresponding pop-up notification. *Id.*, [0011]-[0014].

c) Motivation to Combine Sutardja-Hobbs-Kelty-078 with Anttila

156. A POSITA would have been motivated and would have found it obvious to implement Anttila’s known mobile-device notification functionality within the Kelty-078’s phone (implementing Sutardja’s UIM-WNIM) to improve user convenience and charging awareness by enabling users to receive notifications of received charging message signals when a predetermined charging threshold

condition was reached, without having to open a text app on the phone. As discussed above, Kelty-078's phone (implementing Sutardja's UIM-WNIM) is already receiving a signal, a POSITA would have understood that Anttila's notification functionality would further complement in presenting the information corresponding to the signal to the user.

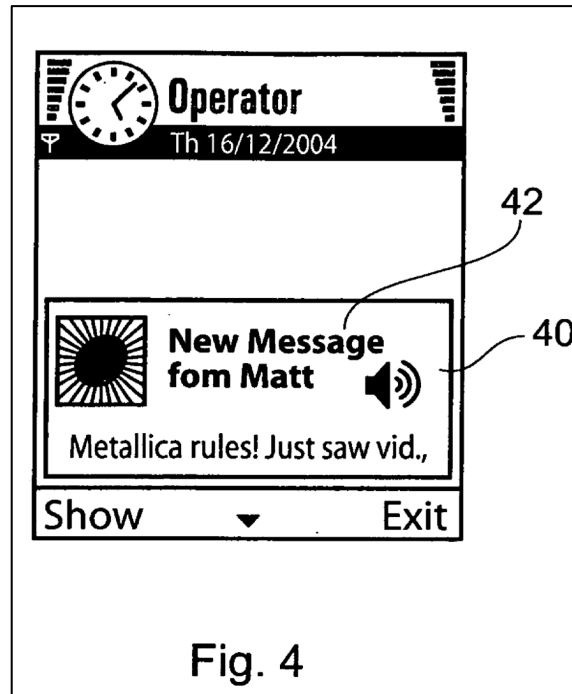
157. Modifying Sutardja-Hobbs-Kelty-078's battery charging system according to Anttila's teachings would have involved applying a known technique (mobile-device notifications) to a known device (the mobile phone of the Sutardja-Hobbs-Kelty-078 battery charging system), ready for improvement, to yield predictable results (mobile-device notifications of charging events).

158. Further a POSITA would have had a reasonable expectation of success in implementing this modification at least because Sutardja-Hobbs-Kelty-078 already teaches wireless transmission of charging alerts via SMS responsive to threshold charging conditions and, as such, incorporating Anttila's known pop-up notification functionality into Sutardja-Hobbs-Kelty-078's would have involved only routine implementation of known message-processing and user-notification functionality using known system components performing their established functions. It was well-known in that phones receiving text messages would also notify the user. For example, the Palm Treo 700p (a "Treo" phone as taught by Kelty-

078) notifies the user when a new text is received by the phone. EX1030-PalmTreo700p, 95 (“...you automatically receive new text messages. You can also configure how your smartphone notifies you when a new message arrives”). Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

B. Claim 2: “*The system of claim 1, wherein the notification is an indicator on a display viewable by the user.*”

159. Sutardja-Hobbs-Kelty-078-Anttila teaches that *the notification is an indicator on a display viewable by the user*. Anttila teaches a “device that...has a display for displaying a pop-up notification.” EX1007-Anttila, [0012]; *see also* Hobbs, [0109] (“When the charging current...drops below the threshold...charger 100 may stop charging...may indicate that charging is complete (...e.g., via indicator lights 108, screen 107, or both.”).



EX1007-Anttila, Fig. 4 (depicting a notification on a display). In the combination, the notification would be displayed on the display (taught by Sutardja) of Kelty-078's phone (implementing Sutardja's UIM-WNIM) - portable controller remote from the vehicle. This display is "viewable by a user" since the user can interact with the display. *See* Claim 1[f]-[g], EX1004-Sutarjda, [0243]. Sutardja-Hobbs-Kelty-078's *portable controller* (Kelty-078's phone implementing Sutardja's UIM-WNIM) comprises an interactable display as taught by Sutardja and Kelty-078's Treo device. EX1004-Sutardja, [0243] ("The user interface module 108 may comprise a keypad, a display.... A user of the vehicle 102-1 may use the user interface module 108 to set charging parameters for charging the battery 14");

EX1005-Kelty-078, Fig. 2 (“Treo”); EX1030-PalmTreo700p, 29 (“To move around the Treo 700p smartphone Screen, you can use the 5way navigator for one-handed navigation, or you can tap items on the screen with the stylus.”).

C. Claim 3: “*The system of claim 2, wherein the display is electrically coupled to the portable controller.*”

160. The ’107 Patent explains the terms “mounted,” “connected,” “supported,” and “coupled,” and variations thereof, are used broadly and encompass both direct and indirect connections. EX1001, 6:29-35.

161. As discussed in Claim 1[f], Sutardja-Hobbs-Kelty-078 teaches a *portable controller* (Kelty-078’s phone implementing Sutardja’s UIM-WNIM). See Claim 1[f]. Sutardja-Hobbs-Kelty-078-Anttila teaches that *the display is electrically coupled to the portable controller*. Sutardja’s user interface module includes a display and is therefore coupled to the *portable controller*. EX1004-Sutardja, [0243] (“user interface module 108 may comprise a keypad, a display, a microphone, and/or a speaker (all not shown).”) Furthermore, Kelty-078’s phone implementing Sutardja’s UIM-WNIM is a Treo device that includes a display and is therefore electrically coupled to the *portable controller*. EX1005-Kelty-078, Fig. 2 (“Treo”); EX1030-PalmTreo700p, 11 (front view from the Treo 700p having a screen/display).

D. Claim 4: “*The system of claim 1, wherein the notification is at least one of a group consisting of a text and an e-mail automatically generated to the user.*”

162. Sutardja-Hobbs-Kelty-078-Anttila teaches a *portable controller* (Kelty-078’s phone implementing Sutardja’s UIM-WNIM) that *generates a notification* (Anttila’s pop up of a Kelty-078’s text), *wherein the notification is at least one of a group consisting of a text and an e-mail automatically generated to the user*. See Claim 1[e][iv], 1[g]. Anttila’s pop up notification is of a text (Kelty-078’s text). Anttila’s pop up notification is a notification that a text message was received. Sutardja-Hobbs-Kelty-078’s alert signal is *automatically generated* at least because Kelty separately discusses and distinguishes the user manually “querying” the state of charge from the electric vehicle from the electric vehicle automatically “notifying” the user of reaching a charge level. Cf. EX1005-Kelty-078, 5:11-13 *with id.*, 5:18-21. Following the automatically generated alert signal, Anttila *automatically generate[s]* the pop-up notification for the incoming message. EX1007-Anttila, [0009].

E. Claim 5: “*The system of claim 1, wherein the portable controller is configured to send signals to the controller of the battery charger to start and stop charging of the battery.*”

163. The ’107 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:37-50 (“As another example, the

controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:18-25 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”) Kelty-078 similarly sends signals (for example, instructions) using wireless communication (for example, Bluetooth). EX1005-Kelty-078, 4:53-58; 4:58-5:1; 4:24-31.

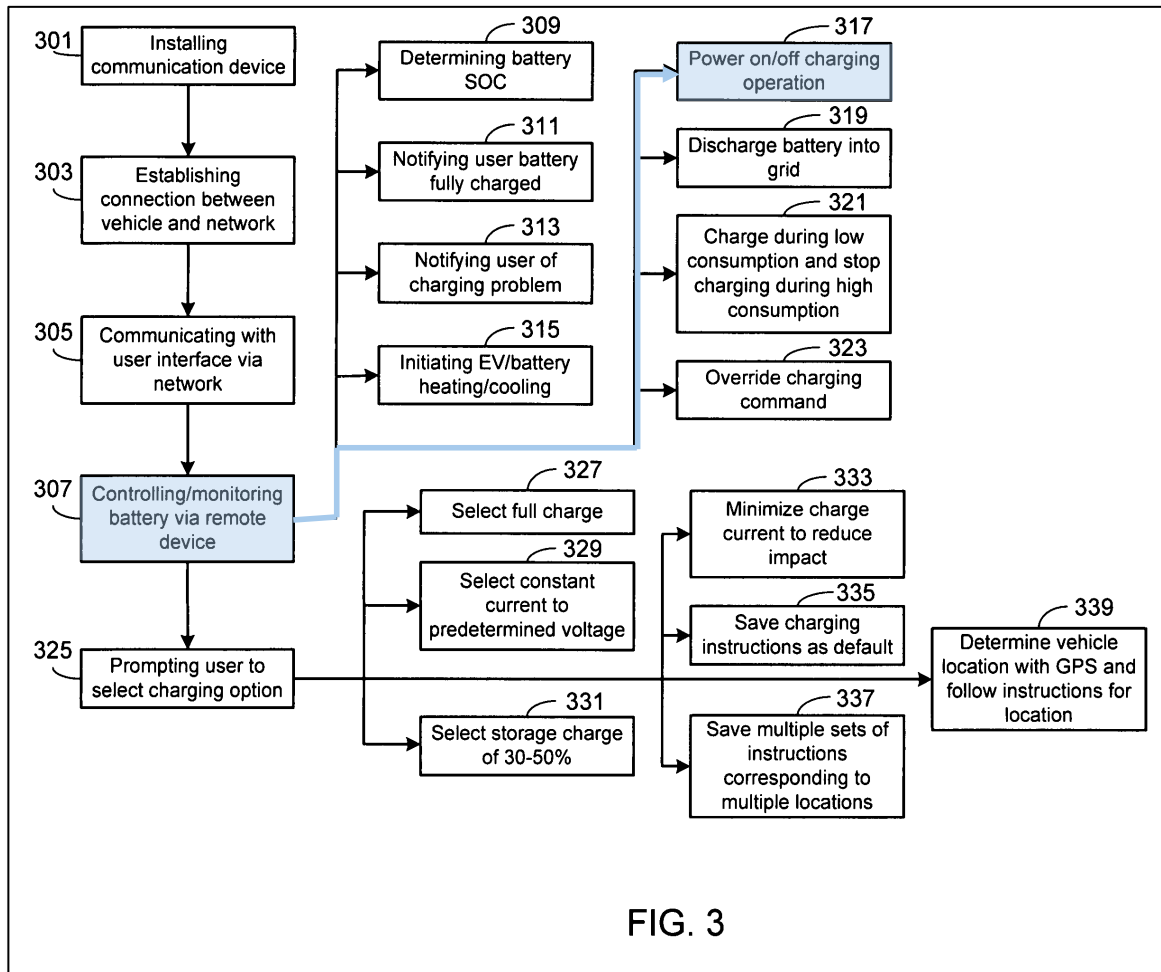
164. Sutardja-Hobbs-Kelty-078-Anttila teaches a *portable controller* (Kelty-078’s phone implementing Sutardja’s UIM-WNIM) configured to wirelessly communicate with the controller of the *battery charger (control module 112/106)*. See Claim 1[c]-1[g]; EX1004-Sutardja, [0241], [0243]-[0244]. Sutardja-Hobbs-Kelty-078-Anttila further teaches that *the portable controller is configured to send signals to the controller of the battery charger to start and stop charging of the battery*.

a) Kelty-078’s Teachings

165. Kelty-078 teaches “the user or driver 20 of the vehicle is [] capable of communicating with the electric vehicle 12 from their portable device such as a cell phone...to program and **send specific instructions** to the electric vehicle 12 for controlling and monitoring the battery system 26 arranged within the electric vehicle 12 (step 307).” EX1005-Kelty-078, 4:58–5:1, FIG. 3. Kelty-078 further teaches, “[t]he user 20 will be capable of communicating with either the first network 16, the second network 18 or **directly with the vehicle 12** via any user interface device 24 (step 305).” EX1005-Kelty-078, 4:16-19.

166. VMS 32 (*controller of the battery charger*) “monitors, controls and coordinates various systems in the electric vehicle 12 including” ESS 26 (the electric vehicle battery). EX1005-Kelty-078, 7:44-51, 4:53-58, 8:44-48. Examples of such “instructions” are illustrated in FIG. 3 and include user 20 “powering on and off” charging of battery 26 and “discharging the battery 26 into the electricity or electric grid.” EX1005-Kelty-078, 4:66, 5:40-52 FIG. 3 (*see steps 317 and 319*). Thus, Kelty-078 teaches the VMS (*controller of the battery charger*) receiving instructions (*signals*) to power off or on charging of the battery, i.e., *to start and stop charging*. EX1005-Kelty-078, 4:66, 5:40-52, FIG. 3 (*see steps 317 and 307*). Examples of such “instructions” are illustrated in FIG. 3 and include user 20 “powering on and off”

charging of battery 26 and “discharging the battery 26 into the electricity or electric grid [.]” EX1007-Kelty-078, 4:66, 5:40-52, FIG. 3 (*see* steps 317 and 319).



EX1005-Kelty-078, FIG. 3. Kelty-078 additionally teaches “**starting and stopping of charging of the battery pack** via the means 25 of keyfob,” where the option of starting/stopping charging “**may also be added to a cell phone connection or other mobile device** to follow the network connections of the first and second network 16, 18 as described above **to allow for choosing of one the charging options and**

setting any default via any user interface device 24.” EX1005-Kelty-078, 7:35-43.

b) Motivation to Combine Sutardja with Kelty-078

167. A POSITA would have been motivated to modify the instructions available using **Sutardja’s UIM-WNIM** to include the start/stop charging commands taught by Kelty-078 to allow the user to remotely start and stop charging while remote from their vehicle. A POSITA would have recognized that automated charging schedules may not always match the user’s immediate needs, and providing start and stop controls would have allowed the user to override or adjust scheduled charging when circumstances changed, such as an unexpected trip, an early departure, or a change in desired charge level. A POSITA would have further recognized that giving a user more direct control over charging (to override or adjust scheduled charging) improves user experience by increasing flexibility and responsiveness of the system.

168. Such a modification would have been applying a known technique (sending start/stop charging signals) to a known device (Sutardja-Hobbs-Kelty-078’s battery charging system), ready for improvement, to yield predictable results (remote control of charging).

169. Further, a POSITA would have had reasonable expectation of success in implementing a start/stop option in **Kelty-078's phone implementing Sutardja's UIM-WNIM**. A POSITA would have understood Sutardja's **controller (modules 112/106)** would already be capable of processing start/stop charging signals from other sources (for example, local commands generated from automatic charging) and, as such, modifying Sutardja-Hobbs-Kelty-078's battery charging system to include sending remote start/stop charging signals would be a simple matter of programming. Start/stop commands were commonly implemented in EV charging systems. For example, Pollack teaches that the user interface may include "an override for requesting immediate charging of the electric vehicle." EX1041-Pollack'89, Claims 4, 15, [0100], [0202]. The parameters displayed on Pollack's user interface include "user-selectable manual charging overrides." EX1041-Pollack'89, Claim 4.

X. OPINIONS REGARDING GROUND 2: OBVIOUSNESS OF CLAIMS 6-9

F. Claim 6

1. Claim 6[Pre]: *"A method of charging a battery of a vehicle, the method comprising:"*

170. Sutardja teaches a *method for charging a battery of a vehicle*. EX1004-Sutardja, [0275] (“method 200 for supplying power to charge the battery 14 in the vehicle 102”), [0277]-[0288], Figs. 8-9. See Claim 1[Pre].

2. Claim 6[a]: “*establishing wireless communication between a controller of the vehicular battery charger and a portable controller of a user remote from the vehicle and the vehicular battery charger;*”

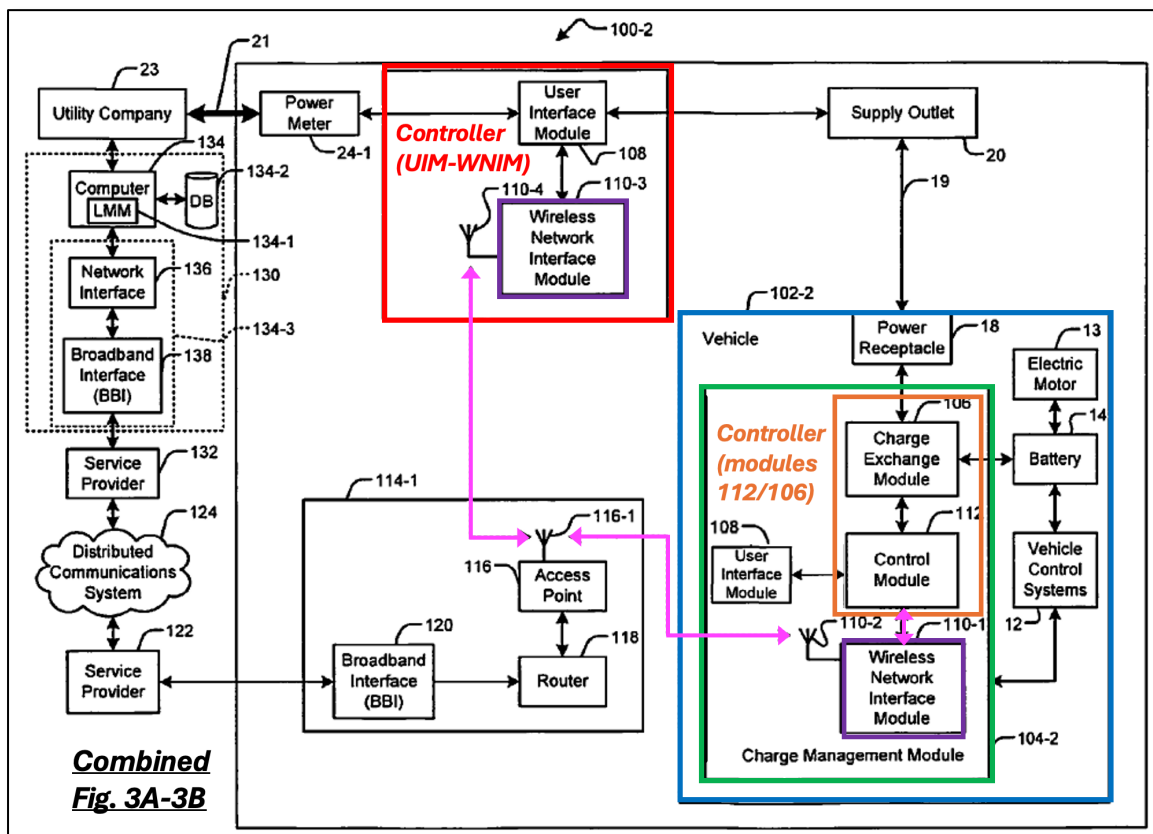
171. Sutardja-Kelty-078 teaches *establishing wireless communication between a controller of the vehicular battery charger (modules 112/106) and a portable controller of a user remote (Kelty-078’s phone implementing Sutardja’s UIM-WNIM) remote from the vehicle and the vehicular battery charger (CMM 104).*

a) Sutardja’s Teachings

172. As discussed in Ground 1, Claim 1[f], Sutardja in view of Kelty-078 teach a *portable controller of a user remote from the vehicle and battery charger that communicates with the battery charger controller (modules 112/106) wirelessly*. A motivation to combine was provided in Ground 1 Claim 1[f] and is incorporated by reference.

173. Sutardja teaches a *controller (modules 112/106) of the vehicular battery charger wirelessly communicating with a...controller (UIM-WNIM)*. See

Ground 1, Claim 1[f]; EX1004-Sutardja, [0241], [0243]-[0244]. As shown in the below combined Figure 3A-3B, *controller* (modules 112/106) “control[s] the operation of the CMM 104-1” and “may receive data input by the user for charging the battery 14...from the user interface module 108” (UIM-WNIM), and wireless network interface module 110-3 includes an antenna 110-4 to wirelessly communicate with a vehicle charger (that includes modules 112/106) having an antenna 110-2. EX1004-Sutardja, [0243]-[0244], [0247].

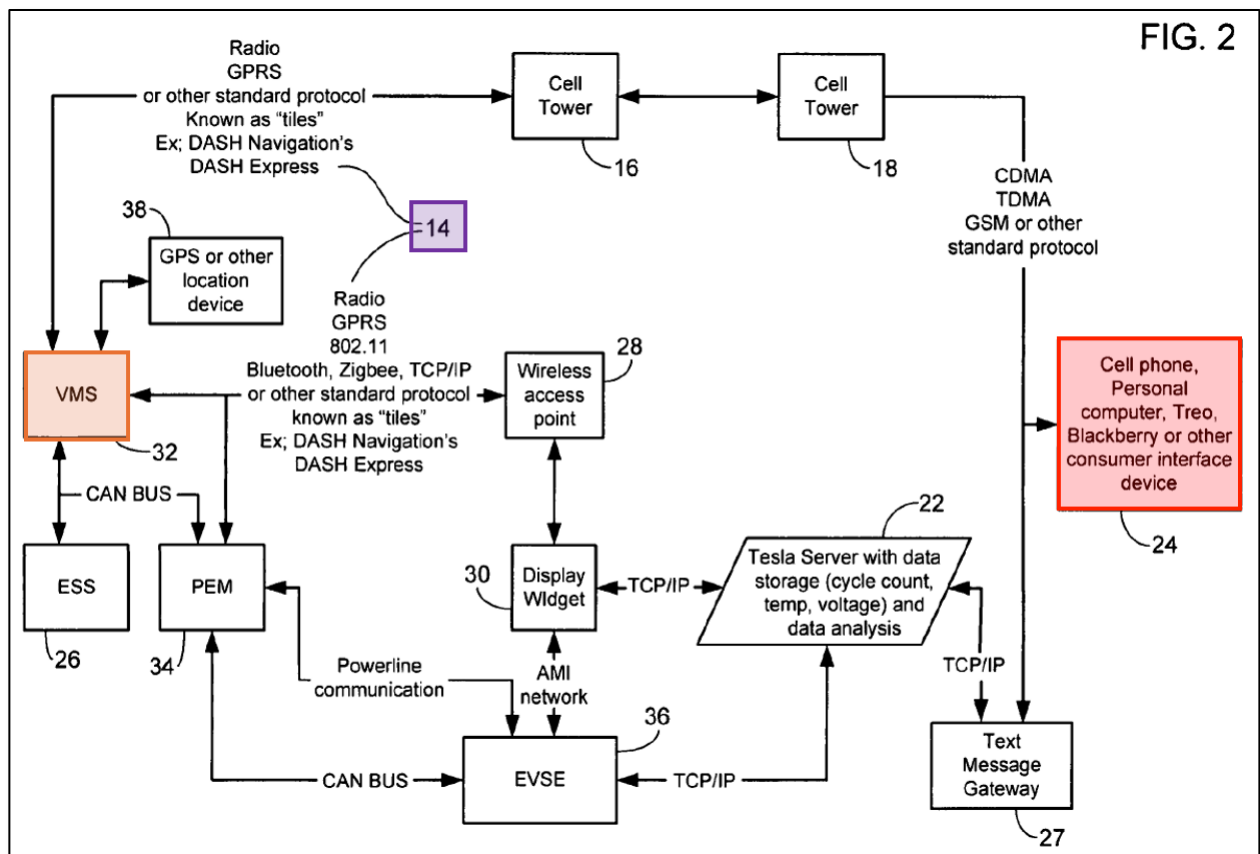


EX1004-Sutardja, Combined Figs. 3A-3B.

b) Kelty-078's Teachings

(i) *establish wireless communication*

174. Kelty-078 teaches that *controller (VMS 32)* uses *communication chip 14* to establish wireless communication (for example, via Bluetooth or GSM/GPRS cellular data) with a *portable controller (interface device 24)*.

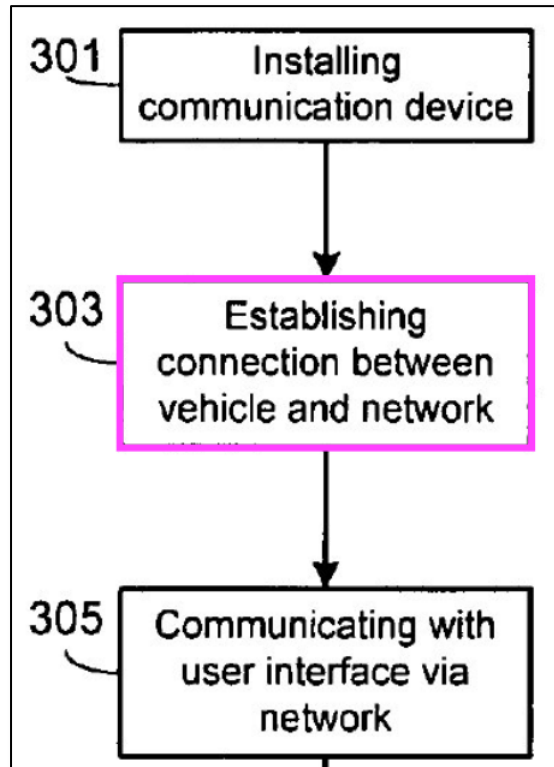


EX1005-Kelty-078, Fig. 2.

175. Kelty-078 teaches “the electric vehicle communication interface generally includes a communication device 14 arranged and installed within the electric vehicle (step 301).” EX1005-Kelty-078, 3:53-56, FIG. 2, FIG. 3 (Step 303).

Communication chip 14 “allow[s] for communication to the first network 16 to allow for the vehicle 12 to contact the user 20 via the user interface device 24....” EX1005-Kelty-078, 4:53-58, 8:44-48 (discussing messages to the user are broadcast through onboard communication chip). The communication between the vehicle and **mobile communication device 24** may be “**completely wireless.**” EX1005-Kelty-078, 3:43-45, 4:4-7, 4:24-39 (listing known short-range and long-range wireless communication protocols, such as Bluetooth and GSM/GPRS).

176. Kelty-078 expressly teaches the **VMS 32** (*controller*) *establish[es] wireless communication*. Kelty-078 teaches “[e]stablishing connection between vehicle and network” and “[c]ommunicating with user interface [24] via network”:



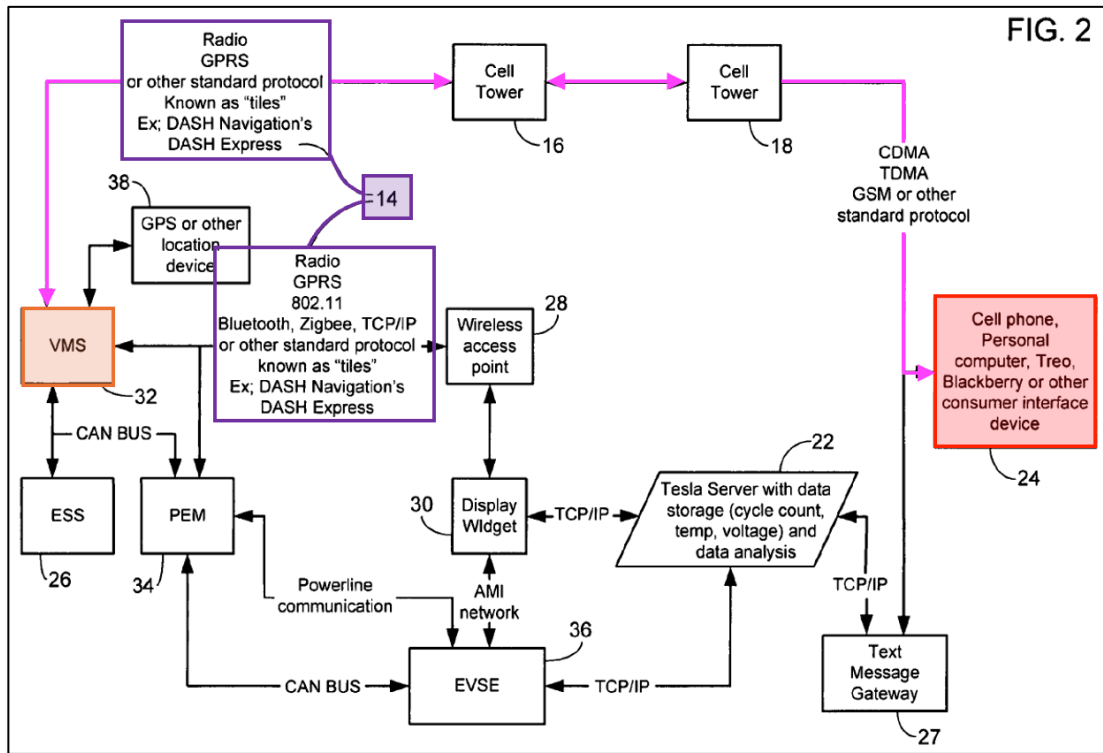
EX1005-Kelty-078, FIG. 3 (excerpt), Abstract (“establishing a connection **from** the vehicle to a network”), 2:25-30 (disclosing “establishing a connection,” including “contacting a user interface device via the network”), 9:64 (Claim 1).

177. Kelty-078 teaches “the user or driver 20 of the vehicle is [] capable of communicating with the electric vehicle 12 from their portable device such as a cell phone...to program and **send specific instructions** to the electric vehicle 12 for controlling and monitoring the battery system 26 arranged within the electric vehicle 12 (step 307).” EX1005-Kelty-078, 4:58–5:1, FIG. 3, 4:16-19 (“[t]he user **20 will be capable of communicating** with either the first network 16, the second network 18 or **directly with the vehicle 12** via any user interface device 24 (step 305).”).

178. Because Kelty-078 teaches (1) **VMS 32**, i.e., the claimed *controller* in the vehicle, establishes a connection with a network (FIG. 3, Step 303) via **communication chip 14**; (2) the connection can be established **from** the vehicle; (3) **VMS 32** “controls” the “various systems in the electric vehicle”; and (4) the **communication chip/device 14** is arranged in the vehicle and “may also be incorporated into the computer controlling the vehicle internal network,” the **VMS (controller)** *is configured to establish wireless communication*. EX1005-Kelty-078, Abstract, 7:44-51, 3:53-59; 4:53-58 (discussing the communication chip allowing for communication between the user interface device 24 and vehicle), 7:43-47 (discussing communication chip 14 communicating with VMS 32 using known communication protocols).

179. Regarding communication with a *portable controller*, Kelty-078 further teaches “[t]he user 20 will be capable of communicating with either the first network 16, the second network 18 or directly with the vehicle 12 **via any user interface device 24** (step 305).” EX1005-Kelty-078, 4:16-19. Disclosed exemplary communication protocols include, amongst others, Bluetooth and GSM/GPRS cellular data connections established through **communication device 14**. EX1005-Kelty-078, 3:53-67, 4:24-39, 7:43-47, FIG. 2. Thus, the controller of the VMS 32

and the user interface device 24 can communicate via Bluetooth connection established through the communication chip 14.

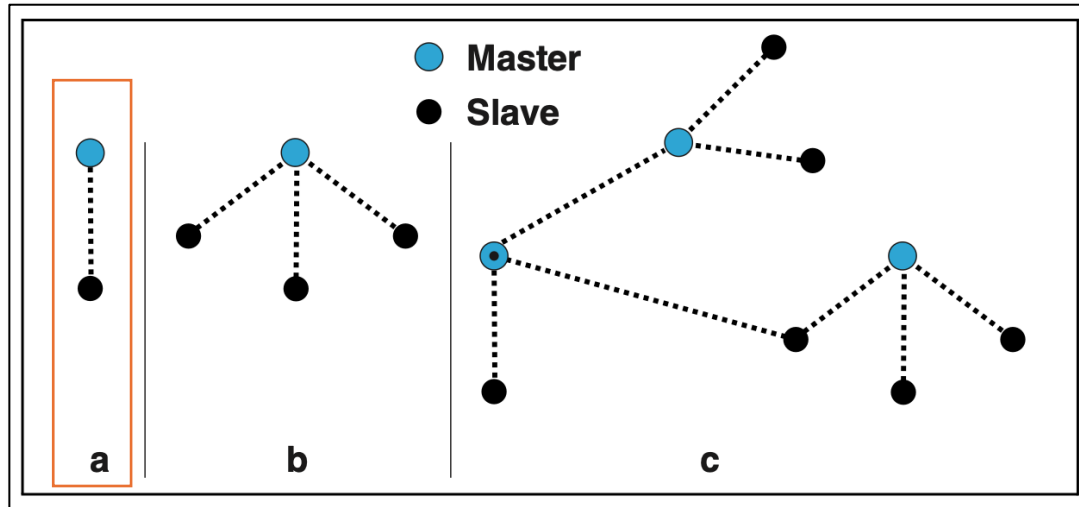


EX1005-Kelty-078, FIG. 2; *see also id.*, 7:44-47 (discussing the communication protocol used to communicate with VMS 32). It is well known that Bluetooth and the GSM/GPRS cellular data protocols are communication protocols that establishes wireless communication between devices.

180. The Bluetooth Specification teaches that “**Bluetooth wireless technology** is a short range **communications system** intended to replace the cable(s) connection portable and/or fixed electronic devices.” EX1014-Bluetooth, 13. “The Bluetooth core system consists of an RF [radio frequency] transceiver, baseband,

and protocol stack. The system offers services that **enable the connection of devices** and the exchange of a variety of classes of data between these devices.” EX1014-Bluetooth, 13. Further, the connection is wireless. EX1014-Bluetooth, 13 (“The Bluetooth RF (physical layer) operates in the unlicensed ISM band at 2.4 GHz.”).

181. “The Bluetooth system provides a point-to-point connection” wherein “the physical channel is shared between two Bluetooth devices.” EX1014-Bluetooth, 63, FIG. 1.1(a). “Two Bluetooth devices use a shared physical channel for communication. To achieve this their transceivers need to be tuned to the same RF frequency at the same time, and they need to be within a nominal range of each other.” EX1014-Bluetooth, 34.



EX1014-Bluetooth, FIG. 1.1. “Figure 1.1:Piconets with a single slave operation (a)... .” EX1014-Bluetooth, 63. The Bluetooth Specification describes four “defined” physical channels: the basic and adapted piconet channels (“used for

communication between connected devices”), an inquiry scan channel (“used for discovering Bluetooth devices”), and a page scan channel (used “for connecting Bluetooth devices”). EX1014-Bluetooth, 34, 63, FIG. 1.1.

182. “In order to establish new connections the paging procedure is used.” EX1014-Bluetooth, 154. In the Kelty-078 system using Bluetooth communications, the paging procedure establish[es] wireless communication between a master (“the paging device,” Kelty-078’s communication chip 14 under the control of VMS 32) and slave (“the page scanning device,” similar Bluetooth functionality connected to the processor of Kelty-078’s portable device 24) devices. EX1014-Bluetooth, 76. Steps of the paging procedure including both devices for pairing entering a “CONNECTION” state and sending packets between the two devices. EX1014-Bluetooth, 159-162, FIGs. 8.1, 8.3, Table 8.3.

183. Because Kelty-078 teaches vehicle wirelessly communicates with **user interface device 24** via the network and the established communication (FIG. 3, Step 305), Kelty-078 teaches the *controller* (**VMS 32**) is *configured to establish wireless communication* through **communication chip 14** over Bluetooth or GSM/GPRS with *a portable controller*, namely **user interface device 24** including a processor.

c) Motivation to Combine

184. Kelty-078 provides express implementation details for the wireless communication performed in Sutardja, including the step of *establishing wireless communication*. A POSITA would have been motivated and found it obvious to apply the teachings of establishing wireless communication between Sutardja's controller (**modules 112/106**) and Kelty-078's phone implementing Sutardja's UIM-WNIM. Sutardja already teaches the controller (**modules 112/106**) wirelessly communicating with **UIM-WNIM**. EX1004-Sutardja, [0243]-[0244] (“**the control module 112** may receive data input by the user for charging the battery 14...from the **user interface module 108**”); [0241]. A POSITA implementing Sutardja's teachings would have looked to Kelty-078's teachings for implementation details on establishing wireless communication that allows a vehicle controller to communicate with a phone, especially for electric vehicle charging systems. EX1005-Kelty-078, 4:53-58, 7:44-47. Kelty-078 teaches an exemplary, commercially-available communication chip and further teaches “standard” wireless protocols utilized by the communication chip, indicating that communication of an onboard vehicle computer with portable devices, such as cellphones, was known and common. EX1005-Kelty-078, 3:65–4:1, 7:44-51. Kelty-078 teaches that the “standard” wireless protocols utilized by the communication chip includes “GPRS...802.11 standard, TCP/IP or any other standard protocol may

communication with a vehicle management system.” EX1005-Kelty-078, 7:44-47.

Kelty-078 expressly teaches, suggests, and/or motivates the modification, explaining there “is a need in the art for a communication interface for an electric vehicle... that will be able to control remotely the charging of the battery.” EX1005-Kelty-078, 1:35-39.

185. This modification would have been applying a known technique (Kelty-078’s step of establishing wireless communication) to a known method (Sutardja’s method of remotely controlling charging for an electric vehicle) ready for improvement to yield predictable results (successful wireless communication). A POSITA would have recognized that implementing Kelty-078’s communication chip 14 would have provided implementation details and improved Sutardja’s method of remotely controlling charging for an electric vehicle by providing Kelty-078’s express advantages described above.

186. A POSITA would have had a reasonable expectation of success looking towards Kelty-078 to fill the missing details not expressly disclosed by Sutardja. Sutardja already teaches wireless communication between *a controller (modules 112/106) of the vehicular battery charger* and *a controller (UIM-WNIM)*. EX1004-Sutardja, [0241], [0243]-[0244]; Ground 1, Claim 1[f]. A POSITA would have understood that for Sutardja’s battery charger controller (*modules 112/106*) to be

able to wirelessly communicate with Kelty-078's phone (implementing Sutardja's UIM-WNIM), Sutardja's battery charger controller (**modules 112/106**) would already establish wireless communication via executing programming instructions to implement this functionality. Instructions to establish wireless communication functionality were well-known, with the Bluetooth Specification's teachings as a notable example. See, Section VI.D.2.a. To the extent required, any programming modifications would have been straightforward and routine, which would have been well-within the skillset of a POSITA. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

3. Claim 6[b]: “receiving, via a user-manipulatable control, data indicative of a predetermined threshold level of charge by which the controller sends an alert, the predetermined threshold level of charge being less than a full charge of the battery;”

187. See Claim 1[e].

4. Claim 6[c]: “supplying power to the battery of the vehicle via the vehicular battery charger;”

188. Sutardja teaches that CMM 104 “charges the battery 14 using the power supplied by the utility company 23 to the supply outlet 20.” EX1004-Sutardja, [0239]. See Claim 1[Pre].

- 5. Claim 6[d]: “comparing, during charging of the battery with the vehicular battery charger, a level of charge of the battery to the predetermined threshold level of charge; and”**

189. See Claim 1[e].

- 6. Claim 6[e]: “generating and wirelessly transmitting, during the charging of the battery and before the charging of the battery is complete, a signal to the portable controller responsive to detecting the level of charge of the battery reaching the predetermined level of charge of the battery.”**

190. See Claims 1[e]-[g].

- G. Claim 7: “The method of claim 6, wherein the signal includes data indicative of the level of charge of the battery.”**

191. See Claims 1[e]-[g].

- H. Claim 8: “The method of claim 6, wherein wirelessly transmitting the signal comprises wirelessly transmitting the signal from the controller of the vehicular battery charger.”**

192. See Claims 1[e]-[f].

- I. Claim 9: “The method of claim 6, wherein alerting the user comprises alerting the user via at least one of a group consisting of an e-mail and a text.”**

193. See Claim 4.

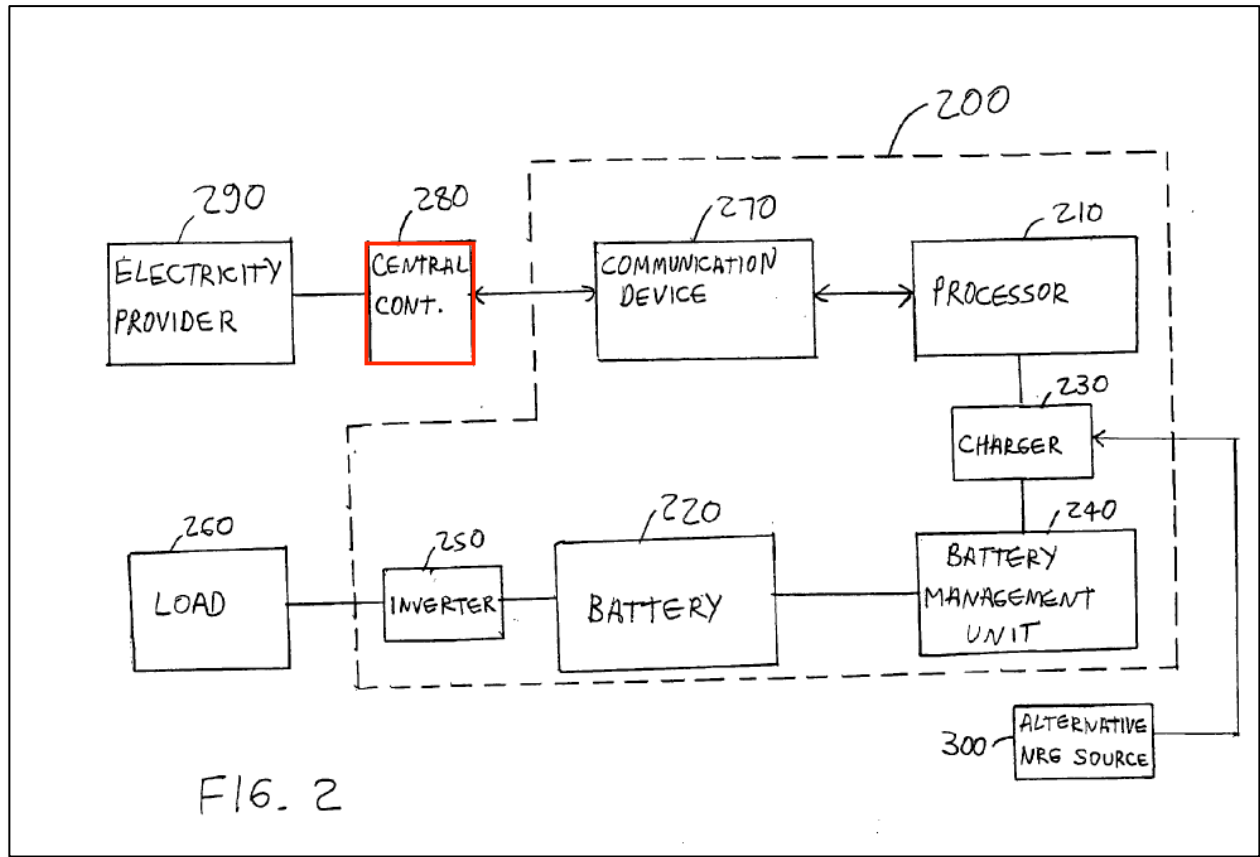
XI. OPINIONS REGARDING GROUND 3: OBVIOUSNESS OF CLAIM 1

A. Alternative Mappings for Claims 1 and 4

194. Claim 1 recites a *portable controller remote from the vehicle and battery charger* that *generates a notification to a user indicating the predetermined threshold level of charge of the battery* as a result of receiving a signal indicative of *the predetermined threshold level of charge of the battery*. EX1001, Claims, 1[f]-[g]. Dependent Claim 4 further recites that *the notification is at least one of a group consisting of a text and an e-mail automatically generated to the user*. *Id.*, Claim 4.

195. To the extent that it is argued that the *notification is* itself a text generated by the *portable controller*, I have been informed by counsel that Petitioner advances this alternative mapping for Claims 1 and 4.

196. Under the alternative mappings, Sutardja's load management module (LMM) in computer 134 of the utility company 23, in view of Kelty-433's teachings of a handheld utility company device, teaches *a portable controller* as recited in Claim 1[f]. As will be further discussed below.



EX1009-Kelty-433, FIG. 2; *see also* [0022] (“Central controller 280 is operated outside the customer’s premises by the electrical provider 290, such as a utility company, and can be a ... hand-held or laptop device...”).

197. Further, Sutardja-Hobbs-Kelty-433-Hunt teaches that *the portable controller generates a notification*, as recited in Claim 1[g]. Sutardja-Hobbs-Kelty-433-Hunt-Kelty-078 teaches that the notification is a text as required in claim 4. Such teachings will be further discussed below.

198. I rely on Sutardja-Hobbs’s teachings as set forth in Ground 1 for Claim limitations 1[Pre]-1[e][iii].

- B. Claim 1[e][iv]:** *“responsive to the level of charge of the battery reaching the predetermined threshold level of charge of the battery, send, before the charging of the battery is complete, at least one signal as the alert via the transmitter, the at least one signal indicative of the predetermined threshold level of charge of the battery; and”*

199. The '107 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:37-50 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:18-25 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”) Hunt similarly sends signals (for example, power usage signals) using wireless communication. EX1008-Hunt, [0028], [0031], [0039], [0066], [0068], [0065], [0027].

200. Sutardja-Hobbs teaches Sutardja's **controller (modules 112/106)** *responsive to the level of charge of the battery reaching the predetermined threshold level of charge of the battery, send, before the charging of the battery is complete,*

at least one signal as the alert. See Ground 1, Claims 1[e][i]-[iii]; EX1006-Hobbs, [0111]. As discussed in Claim 1[c], Sutardja teaches a battery charger with a transmitter. See Ground 1, Claim 1[c].

201. Sutardja-Hobbs in view of Hunt teach Sutardja's **controller (modules 112/106)** *send...via the transmitter, the at least one signal indicative of the predetermined threshold level of charge of the battery. Sutardja-Hobbs-Kelty-433 in view of Hunt teach the portable controller generating a notification based on this signal as further as further discussed in Claim 1[f]-[g]. See Ground 3, 1[f]-[g].*

a) Hunt's Teachings of *at least one signal as the alert via the transmitter*

202. Hunt teaches monitoring users' power usage via sensor 115, which receives data via power meter 112 on an "event driven basis." EX1008-Hunt, [0031]. Sensor 115 communicates power usage data to display/data collector unit 125 which transmits **power usage signals** to datacenter 195. EX1008-Hunt, [0028], [0031], [0039], [0066], [0068], [0065], [0027]. Hunt's datacenter "processes the consumer's power usage data and provides up-to-date feedback to the display/data collector unit 125." EX1008-Hunt, [0031].

b) Motivation to Combine Sutardja and Hunt

203. A POSITA would have been motivated to modify Sutardja-Hobbs such that responsive to the battery charger level reaching Hobbs's predetermined threshold level of charge, user interface 108 transmits a power usage signal (*at least one signal*), per Hunt, via Sutardja's transmitter so that the utility company could monitor the users power usage in order to accurately bill for power used. *See* Ground 1, Claim 1[c] (Sutardja's teachings of a transmitter), 1[e] (Hobbs's teachings of the battery charger level reaching a predetermined threshold level of charge). Sutardja-Hobbs already teaches the controller sending an alert. *See* Ground 1, Claim 1[e][ii].

204. A POSITA would have appreciated that the combination would have been combining prior art elements (power usage signals) according to known methods (monitoring and transmitting power usage) to yield the predictable results of the utility company knowing what charge level the vehicle has reached in order to accurately bill the user or throttle/redirect power since the user's primary charge threshold has been reached. EX1008-Hunt, [0076]-[0078], [0084]. It was well known that a user may charge a vehicle to a first level at a certain rate and a second level at a different rate. For example, Kelty-218 teaches to "turn on the charging circuit during a second time period in which the charging cost rate is above the first threshold." EX1023-Kelty-218, Abstract.

205. A POSITA would have had a reasonable expectation of success in modifying Sutardja per Hunt to specifically transmit a power usage signal so that the utility company could monitor the users power usage in order to accurately bill for power used. Sutardja already teaches user interface module 108 inside the vehicle communicates with LMM of utility computer 134. EX1004-Sutardja, [0253], [0276]- [0277]. Such a modification would have required only reprogramming of Sutardja's software, to include the functionality of sending a power usage signal, using ordinary skill of a POSITA, and hardware already present. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA

C. Claim 1[f]: “a portable controller remote from the vehicle and battery charger, the portable controller configured to wirelessly communicate with the controller of the battery charger via the transmitter;”

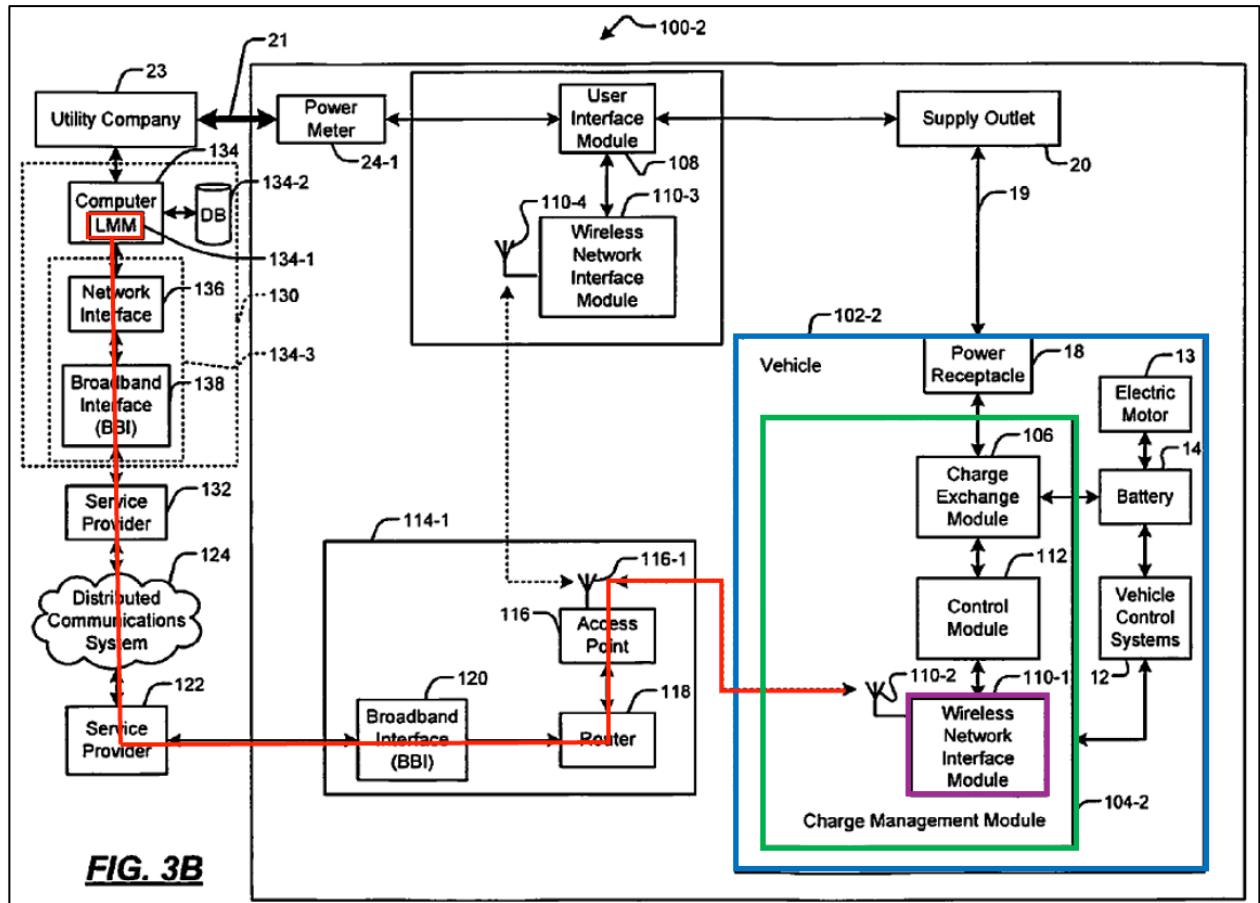
206. The '107 Patent states the “other controller can be one or more processors of a personal computer, phone, PDA, or other processor- based device associated with a user of the vehicle charging cord 22, **one or more processors of a server or other computer associated with a power utility** providing power to the vehicle charging cord 22, and the like.” EX1001, 8:65-9:12.

207. Sutardja-Hobbs-Kelty-433 teaches a *portable controller* (Kelty-433's handheld device implementing Sutardja's LMM functionality) *remote from the vehicle and battery charger, the portable controller configured to wirelessly communicate with the controller of the battery charger via the transmitter* (Sutardja's transmitter in WNIM). As discussed in Ground 1, Claim 1[f], for Sutardja teaches a transmitter.

a) Sutardja's Teachings of a controller

208. Sutardja in view of Hunt teaches *a controller (LMM) remote from the vehicle and battery charger, the controller configured to wirelessly communicate with the controller (modules 112/106) of the battery charger via the transmitter* (transmitter in WNIM).

209. Sutardja discloses a “computer 134 with a load management module (LMM) 134-1” in the utility company 23. EX1004-Sutardja, [0251]-[0252], Fig. 3A-3B. The **LMM in computer 134 of utility company 23 (controller)** is remote from the vehicle and battery charger, as shown in Figure 3B:



EX1004-Sutardja, Fig. 3B.

b) Kelty-433's Teachings of a portable controller

210. Sutardja does not explicitly specify whether **LMM** in computer 134 of utility company 23 is portable; however, Kelty-433 teaches such. Kelty-433 teaches portable and remotely located controllers configured to wirelessly communicate with charging and battery-management systems. Specifically, Kelty-433 discloses a “central controller 280” in two-way communication with a remotely located power-management device through communication device 270. EX1009-Kelty-433,

[0009], [0022], Fig. 2. Kelty-433 further teaches that central controller 280 “is operated outside the customer’s premises by the electrical provider 290” and “can be a ... **hand-held or laptop device**” *Id.* Kelty-433’s central controller 280 is thus *remote from the vehicle and battery charger* (because it is located outside the customer’s premises) and a *portable controller* (because it can be hand-held). Kelty-433 further teaches that central controller 280 “receives data from, and sends instructions to, processor 210,” including monitoring battery charge conditions and controlling battery charging operations. EX1009-Kelty-433, [0022]-[0023]. For example, Kelty-433 explains that “processor 210 monitors the state of charge of battery 220, and sends this information to central controller 280 via communication device 270,” and that central controller 280 “is configured to instruct processor 210 to charge battery 220 at an off-peak time when demand for electricity is low.” EX1009-Kelty-433, [0023]. Kelty-433 additionally teaches that processor 210 may be programmed “using a conventional personal computer (PC) or via the internet.” EX1009-Kelty-433, [0024].

c) Motivation to Combine Sutardja and Kelty-433

211. A POSITA would have been motivated and would have found it obvious to implement Sutardja’s **controller (LMM in computer 134)** using Kelty-433’s portable controller so that battery charge monitoring operations would be

performed using portable devices capable of wirelessly communicating with vehicle-charging systems. For example, utility company technicians might carry portable controllers to install, monitor, and diagnose battery charger installations as they visit customers' premises. Sutardja teaches that LMM 134-1 remotely communicates with the controller (module 112/106) through wireless communication systems, receives charging parameters, analyzes charging requests and electrical-grid load conditions, and transmits charging instructions and alternate charging parameters to CMM 104-1 and/or users. EX1004-Sutardja, [0244]-[0253], [0262]-[0267]. Kelty-433 similarly teaches a remotely located central controller 280 in two-way communication with processor 210 through communication device 270, where central controller 280 monitors battery charge conditions and transmits charging-control instructions. EX1009-Kelty-433, [0009], [0022]-[0023]. This allows, for example, the LMM to manage power distribution among all electric vehicles being charged. A POSITA would have recognized several practical and technical benefits from implementing Sutardja's LMM 134-1 using Kelty-433's handheld (portable) functionality. Kelty-433 teaches handheld (portable) controller is portable and wireless, implementing Sutardja's LMM 134-1 as such would allow for monitoring and controlling at any convenient location, for example, outside the customer's (vehicle users') premises. EX1009-Kelty-433, [0009], [0022]-[0023].

Kelty-433 also discloses several such benefits. Kelty-433 teaches the handheld device may monitor “the state of charge of battery 220,” control battery charging during “off-peak time[s],” and communicate charging-control instructions through communication device 270. EX1009-Kelty-433, [0022]-[0023]. Kelty-433 additionally explains that such systems improve electrical-grid efficiency, reduce peak-demand loading, and provide improved remote monitoring and management of battery systems. EX1009-Kelty-433, [0005]-[0017].

212. Modifying Sutardja according to Kelty-433’s teachings would have been a simple substitution of one known element (handheld device) for another (computer) to obtain predicable results (being able to remotely monitor power usage).

213. Furthermore, a POSITA would have had a reasonable expectation of success in making such a modification. For example, Sutardja describes the utility management functionality as being implemented on a utility company computer, which (per Kelty-433) may be a desktop, laptop, server, or handheld. EX1009-Kelty-433, [0022]. LMM 134-1 remotely communicates with the controller (module 112/106) through wireless communication systems, receives charging parameters, analyzes charging requests and electrical-grid load conditions, and transmits charging instructions and alternate charging parameters to CMM 104-1 and/or users.

EX1004-Sutardja, [0244]-[0253], [0262]-[0267]. This allows LMM to manage power distribution among all electric vehicles being charged. A POSITA would have recognized several practical and technical benefits from implementing Sutardja's LMM 134-1 using Kelty-433's handheld (portable) functionality. As such, implementing Sutardja's LMM functionality on Kelty-433's central controller would be a simple matter of programming, well within the abilities of a POSITA.

D. Claim 1[g]: *“wherein the portable controller generates a notification to a user indicating the predetermined threshold level of charge of the battery following and as the result of receiving the at least one signal indicative of the predetermined threshold level of charge of the battery.”*

214. The '107 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:37-50 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:18-25 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and

the vehicle charging cord 22.)”). Hunt similarly sends signals (for example, power usage signals) using wireless communication. EX1008-Hunt, [0028], [0031], [0039], [0066], [0068], [0065], [0027].

215. In the combination, **Kelty-433’s portable (handheld) controller implementing the functionality of Sutardja’s LMM of computer 134** (Claim 1[f]) would have generated a notification based on Hunt’s teachings to a user indicating the predetermined threshold level of charge of the battery following and as the result of receiving the at least one signal indicative of the predetermined threshold level of charge of the battery based on Hobbs’s teachings in Ground 1, Claim 1[e] and Hunt’s teachings in Ground 3, Claim 1[e]. In claim 4, this *notification* is limited to an *email* or *text message*. Although not claimed, this notification (once generated by Kelty-433’s remote central controller implementing Sutardja’s LMM functionality) would be sent to the user’s mobile device using a conventional communication technique.

a) Hunt’s Teachings for *generating a notification*

216. Hunt teaches generating and displaying notification alerts to a user responsive to received power-usage and status information communicated from a remotely located system.

217. Hunt teaches that its “display/data collector unit 125 may include a display to display various information to the consumer, such as intermittent energy

costs and notification indicators to alert the consumer of a high cost period or strained power grid.” EX1008-Hunt, Abstract, [0019] (“the data collection unit may include a display to display various information to the consumer, such as intermittent energy costs and notification indicators to alert the consumer of a high cost period or strained power grid”); [0026] (“Notification indicator(s) or alerts may additionally be communicated to the display/data collection unit”); Fig. 10 (notification indicators/alerts 1035). Hunt further teaches that “the display/data collector unit 125 may receive updated information from the data center 195, such as cost-to-date estimated cost, billing rate changes, notification of alerts and messages,” and thereafter “display[]” such information “for the consumer to view.” EX1008-Hunt, [0084], [0073]-[0075].

b) Motivation to Combine Sutardja-Hobbs-Kelty-433 with Hunt

218. A POSITA would have been motivated to modify the combined Sutardja-Hobbs-Kelty-433 system to incorporate Hunt’s notification-display functionality such that, upon receipt of a signal indicating that the battery has reached the predetermined threshold level of charge, Kelty-433’s handheld implementing Sutardja’s LMM of computer 134 would generate and display a notification to the user indicating that the predetermined threshold level of charge

had been reached. Such a modification would have provided a direct indication to the user, making access to information more immediate and improving Sutardja-Hobbs-Kelty-433 system. Hunt expressly teaches a remotely located display/data collector unit 125 that receives power-related information and “display[s] various information to the consumer, such as intermittent energy costs and notification indicators to alert the consumer.” EX1008-Hunt, Abstract, [0019], [0026] (“Notification indicator(s) or alerts may additionally be communicated to the display/data collection unit”), [0073]-[0075], Fig. 10 (notification indicators/alerts 1035).

219. A POSITA would have been further motivated to incorporate Hunt’s notification functionality because Hunt expressly teaches that providing consumers with remote “notification indicators or alerts” and “up-to-date feedback” regarding energy conditions improves consumer awareness and allows users to respond to energy-related conditions in real time. EX1008-Hunt, [0006]-[0008], [0025]-[0026], [0073]-[0078]. Applying Hunt’s notification teachings to the combined Sutardja-Hobbs-Kelty-433 charging system would have similarly improved the system by remotely informing users when a desired threshold level of charge had been reached, thereby allowing users to make informed charging and vehicle-use decisions without requiring continuous monitoring of the vehicle charger itself.

220. Modifying the combined Sutardja-Hobbs-Kelty-433 system according to Hunt's teachings would have involved use of a known technique (Hunt's remote notification and alert-display technique) to improve similar devices (remote energy-management and monitoring system) in the same way. Specifically, Sutardja already teaches a distributed charging-management architecture in which the controller (modules 112/106) and CMM 104-1 communicate with a remotely located LMM 134-1/UIM-WNIM through wireless network interface modules 110-1 and 110-3. EX1004-Sutardja, [0243], Figs. 1, 3A-3B. Hobbs further teaches generating a signal indicative that the battery has reached a predetermined threshold level of charge before charging is complete. *See* Ground 1, Claim 1[d]-[e]. In the modified system, modules 112/106 and CMM 104-1 would transmit Hobbs's threshold-level signal through Sutardja's disclosed wireless communication architecture to the remote LMM 134-1, which would execute Hunt's known notification-display functionality to generate and display a user notification indicating that the predetermined threshold level had been reached.

221. Furthermore, a POSITA would have had a reasonable expectation of success in making such a modification, as doing so would have been a simple matter of programming Sutardja's LMM to generate such notifications, which would have been well within the skill of a POSITA. Implementing this modification would have

required only routine programming and configuration of known wireless communication, processing, and display components performing their established functions. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

XII. OPNIONS REGARDING GROUND 4: OBVIOUSNESS OF CLAIM 4

A. Claim 4: “*The system of claim 1, wherein the notification is at least one of a group consisting of a text and an e-mail automatically generated to the user.*”

222. As explained above, Sutardja-Hobbs-Kelty-433-Hunt teaches that Sutardja-Hobbs-Kelty-433-Hunt’s handheld LMM 134-1 (*the portable controller*) generates a notification to a user indicating that the predetermined threshold level of charge of the battery has been met. *See* Ground 3, Claim 1[g].

a) Kelty-078’s Teachings

223. Kelty teaches generating and communicating signals in the form of text messages. *See* Ground 1, Claim 1[e][iv]; *see also*, EX1005-Kelty-078, 4:19-39 (“Contemplated user interface devices 24 may include ... mobile devices, such as cellphones, PDA’s, handheld devices, desktop computers, laptop computers or any other communication device that is capable of producing...IM, ... for

communication between any of the known user interface devices 24 and the ... the electric vehicle 12 directly.”), 4:54-5:1 (“The use of the communication chip 14 ... in the electric vehicle 12 may allow for communication to the first network 16 to allow for the vehicle 12 to contact the user 20 via the user interface device 24 by any known mobile device or desktop, laptop, etc., via either...instant messaging or any other known communication protocol. Also, it should be noted that the user or driver 20 of the vehicle is also capable of communicating with the electric vehicle 12 from their portable device such as a cell phone, PDA, laptop, personal computer, server, any known text messaging device, any known display device located at any known location or any other communication device either directly with the vehicle 12 or through the first and second networks 16, 18 to the vehicle to program and send specific instructions to the electric vehicle 12 for controlling and monitoring the battery system 26 arranged within the electric vehicle 12 (step 307).”).

b) Motivation to Combine Sutardja with Kelty-078

224. In the combined system Sutardja-Kelty-433, handheld LMM 134-1 (*portable controller*) would generate charging notifications to the user in the form of a text. Specifically, upon receipt of Hobbs’s threshold-level charging alert signal through Sutardja’s disclosed wireless communication architecture, the modified Hunt notification functionality implemented in LMM 134-1 would generate and

display a notification to the user indicating that the predetermined threshold level of charge had been reached, and Kelty-078 teaches that such portable communication devices were capable of producing “instant messaging” (text) communications. EX1005-Kelty-078, 4:19-39 (handheld device and laptop computers capable of producing IM, and communicating via CDMA, TDMA, GSM, 802.11, BlueTooth, ZigBee.), 4:54-5:1.

225. A POSITA would have been motivated to incorporate Kelty-078’s known portable-device messaging functionality into the combined Sutardja-Hobbs-Kelty-433-Hunt system because Kelty-078 expressly teaches portable communication devices capable of generating and communicating charging-related information through text messaging communications. EX1005-Kelty-078, 4:19-39, 4:54-5:1. A POSITA would have recognized that Sutardja’s handheld LMM already receives charging-related information remotely, and that Kelty-078’s instant-messaging functionality is a specific way to implement the user-facing communication of that information on the same portable device.

226. Modifying the combined system according to Kelty-078’s teachings would have involved applying a known technique (portable-device messaging) to improve a similar device (remote charging-management and notification system) in the same way (to provide mobile notifications).

227. Further, a POSITA would have had a reasonable expectation of success in making such a combination. Hunt already teaches generating user notifications responsive to received energy-management information and Sutardja already teaches remotely communicating charging-related information through wireless communication systems. EX1008-Hunt, [0019], [0026], [0084], [0073]-[0075], Fig. 10; EX1004-Sutardja, [0243], Figs. 1, 3A-3B. Incorporating Kelty-078's known IM/text messaging functionality into the combined system would have involved only routine implementation of known communication and messaging functionality using known portable communication devices and processors performing their established functions. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

XIII. OPINIONS REGARDING GROUND 5: OBVIOUSNESS OF CLAIMS 10-12, 14

A. Claim 10

1. Claim 10[Pre]: "A system for charging a battery of a vehicle and for wireless communication with a phone having a controller, the system comprising:"

228. To the extent the preamble is limiting, Hobbs teaches *a system for charging a battery of a vehicle and for wireless communication with a phone*. Hobbs

discloses an electric-vehicle charger 100 “configured to charge batteries (e.g., batteries 152) that are located on electric or hybrid electric vehicles (e.g., vehicle 150)” (*system for charging a battery of a vehicle*). EX1006-Hobbs, Abstract, [0026], [0029], [0037], [0051], [0054].

229. Hobbs’s battery charger 100 “communicate[s] with diagnostic device 130” via *wireless* local area network using “cellular telephony.” EX1006-Hobbs, [0037], [0051], [0054]. Hobbs teaches diagnostic device 130 is a **handheld personal digital assistant (PDA)** with a keypad and screen that can communicate with the vehicle charger using “cellular telephony, infrared serial link, or wireless local area network.” EX1006-Hobbs, [0037]. Therefore, Hobbs teaches *a system for wireless communication with a phone*.

(i) Hobbs’s Teachings: *a phone having a controller*

230. The ’107 Patent states the “other controller can be one or more **processors** of a personal computer, **phone**, **PDA**, or other processor-based device associated with a user...”. Therefore, the claimed *phone having a controller* includes at least a processor of a phone. EX1001, 8:67-9:13.

231. Because Hobbs’s PDA communicates using cellular telephony and has user interface functionality (keypad), Hobbs’s PDA performs the fundamental function of a cellular telephone and would have been understood by a POSITA as a type of phone. EX1006-Hobbs, [0037] (“Diagnostic device 130 ... may

communicate with charger 100 by another means, for example, via cellular telephony, infrared Serial link, or wireless local area network. Diagnostic device 130 may be hand held, may have a key pad and Screen as shown, and may be configured to diagnose faults within charger 100, program charger 100, provide additional charging information, etc. Diagnostic device 130 may be a personal digital assistant (PDA)[.]”). It was well known that a PDA with cellular telephony and user interface capabilities is a phone. For example, the Palm Treo devices having interactable displays and cellular telephony capabilities were commonly referred to as PDA/phone hybrid devices and smartphones. *See* Section VI.C. Hobbs thus teaches a phone in the form of a PDA that communicates with the vehicle charger via cellular telephony (Hobbs’s phone).

232. Hobbs’s phone⁵ performs manual control of charger 100, processes keypad inputs, and communicates with charger 100. EX1006-Hobbs, [0037].

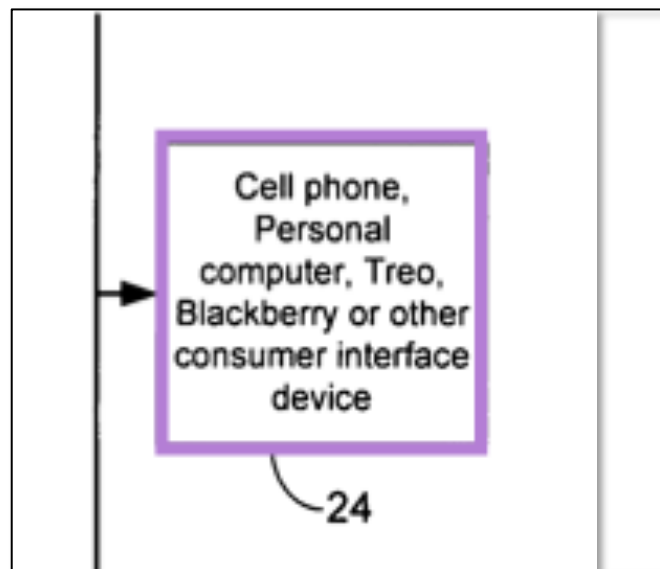
⁵ As used herein, mappings referencing Hobbs’s phone (diagnostic device 130) should be understood to also be referencing the processor of Hobbs’s phone (diagnostic device 130) or Hobbs’s phone processor as modified by Kelty-078. Discussed mappings reference to Hobbs’s phone given how Hobbs's or Hobbs's in view of Kelty-078 discusses functionality relative to Hobbs's phone.

Cellphones were well known to include processors, and a POSITA would have understood that Hobbs's phone included a processor for performing these functions. EX1006-Hobbs, [0037]. For example, the Treo smartphone includes an Intel Xscale processor. EX1030-PalmTreo700p, 247 ("Processor Technology: Intel Xscale processor, 312MHz"); *see also* Section VI.C.

(ii) Kelty-078's Teachings: *a phone having a controller*

233. To the extent that it is argued Hobbs does not teach a processor, a POSITA would be motivated to look to Kelty-078 for implementation details of a PDA phone.

234. Kelty-078 teaches a Treo, a specific PDA *phone* that includes a processor (*controller*):



EX1005-Kelty-078, Figs. 2, 1 (excerpts). The Treo PDA phone includes a processor. It was known that Treo devices were PDA/phone hybrids and included processors. For example, US Patent Application Publication No. 2007/0248089 to Redi et al, (“Redi”) teaches example “combination PDA/telephone device[s] such as the Treo 180, Treo 270, Treo 600, Treo 650, Treo 700, or the Treo 700w,” and the Palm Treo 700p User Manual teaches that the Palm Treo 700p included an Intel Xscale processor. EX1033-Redi, [0024]; EX1030-PalmTreo700p, 247 (“Processor Technology: Intel Xscale processor, 312MHz”); *see also* Section VI.C. Because (1) Kelty-078 teaches a specific example of device 24 that is a commercially available device known to have a processor; (2) Kelty-078’s device 24 performs functionality requiring a processor; and (3) cellphones were well known to include processors, Kelty-078 teaches a *phone having a controller* (namely the Treo, a specific PDA phone).

a) Motivation to Combine Hobbs and Kelty-078

235. A POSITA would have been motivated to look towards Kelty-078 for teachings regarding implementation details of Hobbs’s phone. Kelty-078 provides details about the internal circuitry of a phone. A POSITA would have been motivated and found it obvious to apply the teachings of Kelty-078’s internal circuitry to Hobbs’s phone. As discussed, Kelty-078 specifically teaches the Treo smartphone.

EX1005-Kelty-078, Fig. 2; *see also* Section VI.C (discussion of the Treo smartphone). Kelty-078 provides details of the functionality that Hobbs's phone already performs, such as receiving user input, displaying, and communicating with the vehicle charger using "cellular telephony, infrared serial link, or wireless local area network.". EX1006-Hobbs, [0037]; *see also* Section VI.C (describing Treo devices including interactable displays, processors, transmitters, cellular telephony capabilities, and wireless connectivity capabilities). A POSITA would have been motivated to modify Hobbs using Kelty-078's known technique to improve similar devices (Hobbs's phone, Kelty-078's phone) in the same way by utilizing a processor in Hobbs-Kelty-078 to execute programming instructions and perform Hobbs's device functions. EX1006-Hobbs, [0037].

236. A POSITA would have found such hardware implementation details to be obvious since it was well known to have hybrid phone/PDA devices, such as the Palm Treo. EX1033-Redi, [0024] ("mobile device is a combination PDA/telephone device such as the Treo 180, Treo 270, Treo 600, Treo 650, Treo 700, or the Treo 700w"); EX1029-MobileTechReviewArchived, 1 (refers to the Palm Treo OS line devices as "nearly defin[ing] the PDA phone market"), 1 (the Treo 700wx "is both a PDA and a phone"), 3 ("PDA phones and smartphones"); *see also* Section VI.C (describing it was common to refer to a wireless PDA/phone hybrid device as a

phone). As discussed above, Hobbs already has a phone that is operable to manually control charger 100, process keypad inputs, and communicate with charger 100, and a processor allows Hobbs's phone to process those functions. EX1006-Hobbs, [0037].

237. A POSITA would have had a reasonable expectation of success looking towards Kelty-078 to fill Hobbs's missing express implementation detail disclosures since a POSITA would have understood that for Hobbs's phone to be able to manually control charger 100, process keypad inputs, and/or communicate with charger 100, Hobbs's phone would have a processor executing programming instructions to implement this functionality.

2. Claim 10[a]: “a battery charger having: an electrical power cord releasably attachable to at least one of the vehicle and a source of power;”

238. Hobbs teaches a *battery charger* (i.e., charger 100 together with connector/cable 125/126⁶) for an electric vehicle, namely charger 100 comprising *an electrical power cord releasably attachable to... the vehicle* (e.g., via cable 125

⁶ Hereinafter, “battery charger 100” may be used for simplicity where the connector/cable 125/126 is not relevant to the mapping.

and plug or connector 126). EX1006-Hobbs, [0031]-[0032], [0065]-[0066], [0075].

Connector 126 is “configured to connect to an electric vehicle 150 and deliver the direct-current output (e.g., direct current 293 described below) to the vehicle 150.”

EX1006-Hobbs, [0032]. Hobbs teaches that charger 100 will not start charging until

connector 126 is connected to vehicle 150. EX1006-Hobbs, [0076]. When the

connector is disconnected, the power supply to the charger is turned “off.” EX1006-

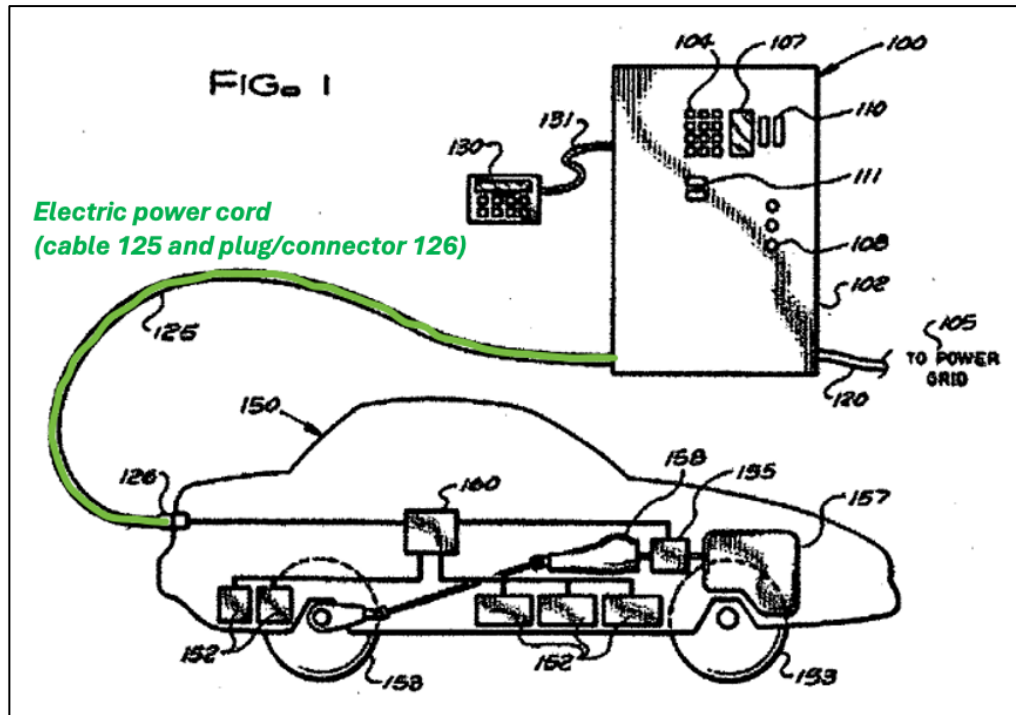
Hobbs, [0076]. Therefore, Hobbs’s cable 125 and plug or connector 126 is

releasably attachable to the vehicle. A POSITA would have understood that a plug

or connector that has to connect to the vehicle before charging, as taught by Hobbs,

is a plug or connector that can be plugged in and unplugged from the vehicle, and is

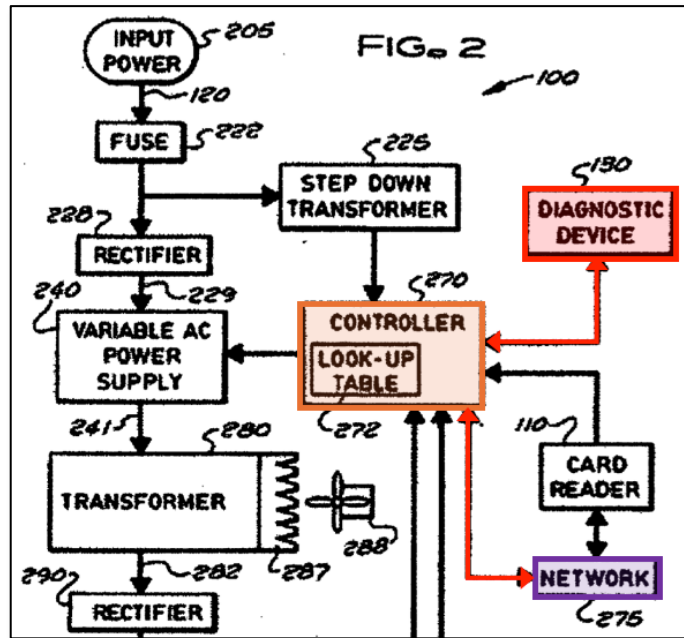
thus *releasably attachable to the vehicle*.



EX1006-Hobbs, Fig. 1.

3. Claim 10[b]: “a transmitter;”

239. Hobbs’s battery charger 100 communicates with Hobbs’s phone (diagnostic device 130) via “cellular telephony, infrared serial link, or wireless local area network” (WLAN). EX1006-Hobbs, [0037]. Hobbs teaches a “network 275” with two-way communication between the phone and battery charger controller 270 that is used to “remotely monitor the use of charger 100, program controller 270, provide data for look-up table 272, perform the functions of diagnostic device 130, etc.” EX1006-Hobbs, [0056], [0075].



EX1006-Hobbs, Fig. 2 (excerpt).

240. To communicate via wireless or cellular communications with Hobbs's phone via network 275, Hobbs's battery charger 100 would have included a transmitter and receiver for communicating via network 275, whether as one hardware unit as a transceiver or separate hardware units.⁷ EX1006-Hobbs, [0037] (Hobbs's battery charger 100 communicating via "cellular telephony, infrared serial link, or wireless local area network."). At the time of the '107 Patent, wireless

⁷ "Reference herein and in the appended claims to a 'receiver' and a 'transmitter' is intended to encompass transceivers as well as separate receivers and transceivers."

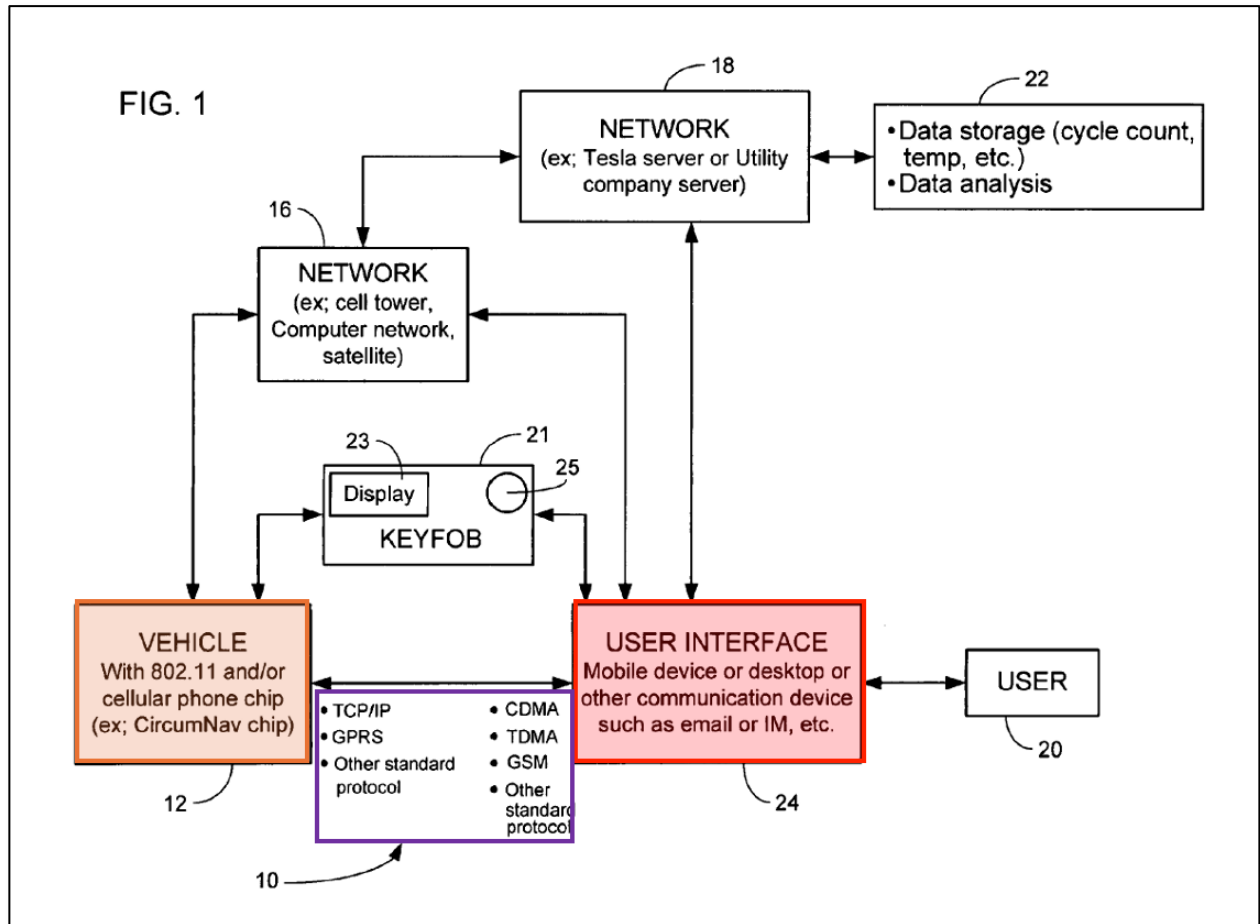
communication interfaces implemented transmitters and receivers (whether separate components or together as a transceiver) to enable bidirectional data communication between devices. For example, US Patent No. 7,764,932 (“Rofougaran”) teaches that wireless communication devices included a built-in transceiver (i.e., receiver and transmitter) in order to participate in wireless communications. EX1034-Rofougaran, 1:34-37, 2:6-9; *see* Section VI.B. For example, US Patent No. 5,367,558 (“Gillig”) describes a cordless cellular telephone including a transceiver and an antenna, capable of wirelessly communicating with a base station. EX1019-Gillig, Abstract, 2:25-27; *see* Section VI.B. Another example, US Patent No. 7,956,570 (“Lowenthal-570”) discloses that “[a] transceiver is a device that has both a transmitter and a receiver.” EX1028-Lowenthal-570, 2:35-36. Transmitters and receivers were ubiquitous components in wireless communication systems long before the priority date of the ’107 Patent. *See* Section VI.B. Hobbs’s battery charger 100 included a transmitter to wirelessly communicate with Hobbs’s phone, as expressly taught in Hobbs. EX1006-Hobbs, [0037]. A POSITA would have understood that Hobbs’s battery charger 100 wirelessly communicate with Hobbs’s phone via “cellular telephony, infrared serial link, or wireless local area network.”

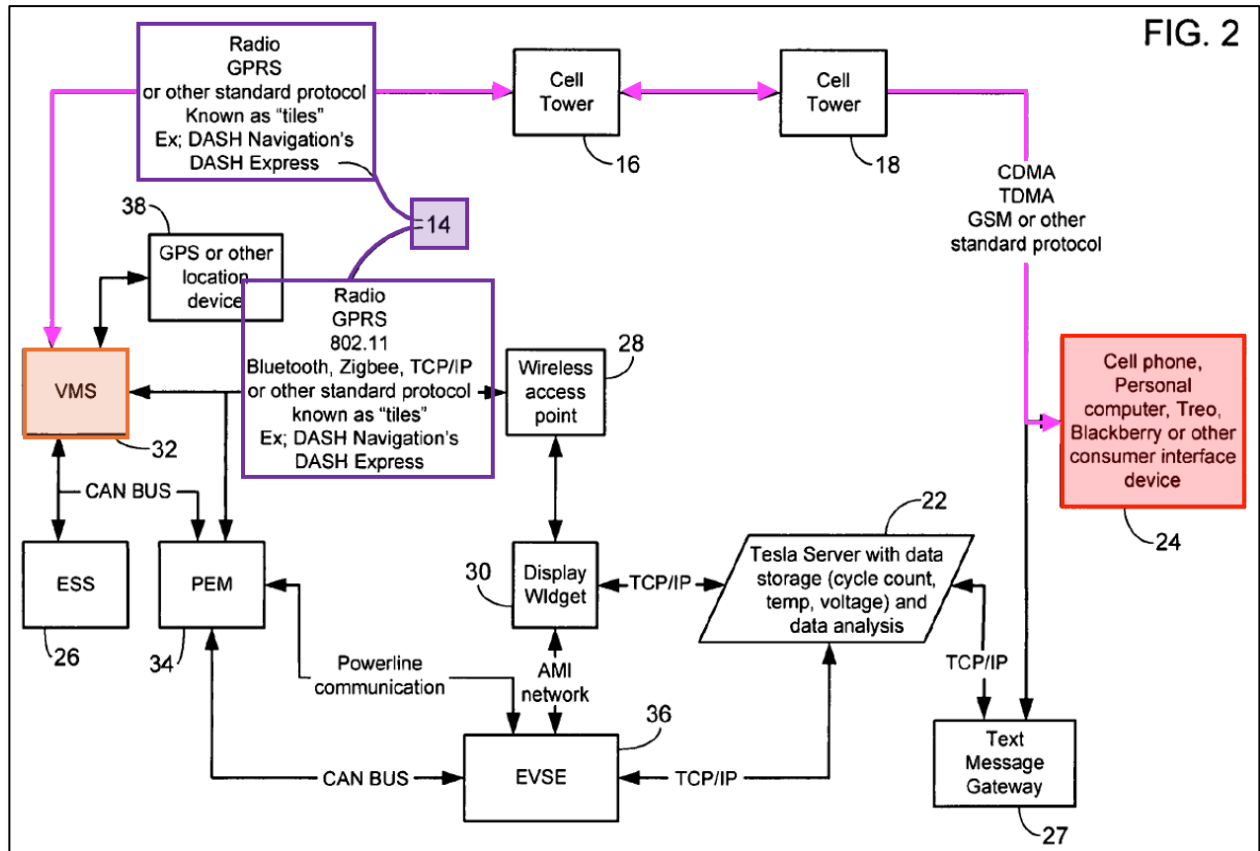
a) Kelty-078’s Teachings

241. To the extent it is argued that Hobbs lacks express hardware implementation details regarding a transmitter, Kelty-078 teaches these details.

242. Kelty-078 teaches a *transmitter*, namely communication chip 14, using “standard” wireless protocols to communicate with Kelty-078’s device 24 (i.e., a phone). Kelty-078 teaches “electric vehicle communication interface 10,” which “includes a communication device 14” or “communication chip 14.” EX1007-Kelty-078, 3:47–4:7; *see also* FIG. 2 (labeling rn. 14 a “radio”). Kelty-078 teaches communication interface 10 of the electric vehicle includes vehicle management system (VMS) 32, which “is the onboard computer that monitors, controls and coordinates various systems in the electric vehicle 12[.]” EX1007-Kelty-078, 7:44–51, 4:1–39 (disclosing communication between vehicle and device 24 via communication chip 14 utilizing various known, wireless protocols), 4:53–5:9, 3:62–4:1. Kelty-078 teaches that “[t]he use of the communication chip 14 as described above in the electric vehicle 12 may allow for communication to the first network 16 to allow for vehicle 12 to contact the user 20 via the user interface device 24 by an known mobile device or desktop, laptop, etc., via...instant messaging or any other known communication protocol.” EX2005-Kelty-078, 4:53–58. Communication chip 14 allows for the vehicle 12 to contact the user 20 of device 24. EX1007-Kelty-078, 4:43–58. Communication chip 14 uses “standard

protocol[s]” such as GPRS (general packet radio service), TCP/IP, Bluetooth, and others. EX1007-Kelty-078, 3:62-65 (“Generally, the communication device 14 is a communication chip which may use an 802.11 protocol, cellular or other standard protocol which are all well known in the art.”), 4:1-4 (“The electric vehicle 12 uses a communication chip 14 that is capable of communicating via any known protocol such as TCP/IP. GPRS, or any other standard protocol.”), 7:44-51 (“The communication chip 14 using the GPRS, which is a general packet radio service protocol, 802.11 standard, TCP/IP or any other standard protocol may communicate with a vehicle management system 32 which is the onboard computer that monitors, controls and coordinates various systems in the electric vehicle 12 including the power electronics module 34, the energy storage system (ESS) 26 and the HVAC system along with the user interface 24.”), FIGS. 1-2. As depicted below, communication interface 10 allows bidirectional communication between vehicle 12 and device 24.





EX1007-Kelty-078, Figs. 1-2.

243. Because Kelty-078's communication chip 14 (which serves as a "radio" and includes a transmitter and receiver) implements protocols such as GPRS or Bluetooth, and further because VMS 32 is in communication with communication chip 14 and device 24 over such common wireless communication protocols, Kelty-078's communication chip 14 includes a *transmitter*, as claimed. EX1007-Kelty-078, 4:53-58, 7:43-47. It was known in the art that wireless communication devices use radio signals which are generated by a transmitter and captured by a receiver. EX1034-Rofougaran, 1:34-37, 2:6-9 ("[f]or each wireless communication device to

participate in wireless communications, it includes a **built-in radio transceiver (i.e., receiver and transmitter)** or is coupled to an associated radio transceiver”); *see also* Section VI. B. It was also known in the art that devices capable of communication over common wireless communication protocols had transmitters. For example, Rofougaran further teaches such wireless communication devices (including a transmitter) supporting WLAN, WPAN (including Bluetooth), and WWAN (including GPRS) communications. EX1034-Rofougaran, 5:20-55; *see also* Section VI.D.2 (describing Rofougaran’s wireless communication device supporting various wireless protocols).

b) Motivation to Combine Hobbs with Kelty-078

244. To the extent argued that Hobbs does not teach implementation details readily apparent to a POSITA, a POSITA would have been motivated to and found obvious to look to Kelty-078 to obtain additional specificity on a transmitter for wirelessly communicating via a network. Hobbs already teaches a battery charger 100, having the ability to transmit and receive information wirelessly to Hobbs’s phone. EX1006-Hobbs, [0037], [0056], [0075], Fig. 2. Kelty-078 simply provides the additional specificity of communication chip 14 for performing such wireless transmission and receipt of communications between a controller of the vehicle and

a phone, especially for electric vehicle charging systems. EX1007-Kelty-078, 4:53-58, 7:44-47; EX1006-Hobbs, [0037].

245. Kelty-078 teaches an exemplary, commercially available communication chip and further teaches “standard” wireless protocols utilized by the communication chip, indicating that communication of an onboard vehicle computer with portable devices, such as cellphones, was known and common. EX1007-Kelty-078, 3:65–4:1, 7:44-51. Kelty-078 teaches that the “standard” wireless protocols utilized by the communication chip includes “GPRS...802.11 standard, TCP/IP or any other standard protocol may communication with a vehicle management system.” EX1007-Kelty-078, 7:44-47. Kelty-078 even expressly suggests the motivation, explaining there “is a need in the art for a communication interface for an electric vehicle...that will be able to control remotely the charging of the battery.” EX1007-Kelty-078, 1:35-39. Kelty-078 discusses various advantages of providing communication between the vehicle and a portable device, such as a phone. EX1007-Kelty-078, 2:32-50. Each of Kelty-078’s express advantages is also an advantage of the proposed combination, as the combination is simply providing a communication interface (e.g., Kelty-078’s communication chip 14) in the existing Hobbs’s battery charger 100 including controller 270 for communicating wirelessly with a Hobbs’s phone, as otherwise taught by Kelty-078.

As will be discussed below, these advantages would allow the user to be remote from the vehicle and still have access to the charging system and information.

246. This modification would have been the use of a known technique (Kelty-078's communication chip 14) to improve a similar device (Hobbs's battery charger 100) in the same way.

247. The modification would have improved the usability and functionality of Hobbs's battery charger 100 as well as user accessibility to the charging information. As discussed above, Kelty-078 teaches certain advantages that would increase the user's control of charging and access to information regarding the operability of the electric vehicle. EX1005-Kelty-078, 2:39-50. For example, communication between Hobbs's battery charger 100 controller 270 and Hobbs's phone would advantageously allow Hobbs's controller 270 to receive data and information from external sources outside of the battery charger 100, as already contemplated by Hobbs. EX1006-Hobbs, [0037]. A POSITA would have appreciated that, in certain situations, a user of the vehicle would appreciate being able to receive information while outside the vehicle via this wireless communication. Kelty-078 further teaches that the communication with VMS 32 via user interface would allow "the vehicle to notify the user when the battery is fully charged or if a problem has occurred during charging thus affecting the operability

of the electric vehicle.” EX1005-Kelty-078, 2:46-50. Additionally, such remote reception of charging information would provide the user the option of being outside the vehicle during charging. For example, if the user were to leave their vehicle on the charger while in the grocery store, the user would be able to see information regarding the charging status of the vehicle on their mobile phone (user interface device 24). Thus, this would increase user accessibility to charging information. Since the user would not be required to be in a particular place to receiving charging information and use the system, a POSITA would have appreciated that this would greatly improve flexibility.

248. The modification also would have created more convenience for the user of the electric vehicle, as otherwise expressly acknowledged by Kelty-078. Specifically, Kelty-78 teaches that “another advantage of the present invention may be that it provides an interface that will allow for communication between the user and the vehicle to enable the user to control certain aspects of charging the battery.” EX1005-Kelty-078, 2:40-45. A POSITA would have appreciated that the user being able to communicate with Hobbs’s battery charger 100, controller 270 about the charging of the vehicle via Hobbs’s phone, would allow the user to set various charging criteria when they are away from the vehicle, thereby increasing the user

convenience of the charging process. EX1005-Kelty-078, 2:40-45; EX1006-Hobbs, [0037].

249. A POSITA would have had a reasonable expectation of success modifying Hobbs's battery charger 100 per Kelty-078. As discussed above, already teaches a battery charger 100, having the ability to transmit and receive information wirelessly to Hobbs's phone. EX1006-Hobbs, [0037], [0056], [0075], Fig. 2. Implementing Kelty-078's communication chip 14 to communicate with Hobbs's phone would require nothing more than the addition of a well-known hardware component into Hobbs's battery charger 100, especially given that Kelty-078 teaches an exemplary, commercially-available communication chip and commercially-available cellphones. EX1005-Kelty-078, 3:66-4:1 ("In one specific embodiment, a **communication chip 14 developed by CircumNav Network** may be used for the communication device 14..."); FIG. 2 (teaching that "user interface device 24" can be "**Treo**" or "**Blackberry**" mobile phones). In addition to implementing Kelty-078's communication chip 14 into Hobbs's system, straightforward modifications to the programming instructions would be implemented, where such programming is well within the POSITA's expertise.

4. **Claim 10[c]:** *"a battery charger controller electrically coupled to the electrical power cord and to the transmitter, the battery charger controller configured to:"*

250. Hobbs teaches a *battery charger* 100 with a variable AC power supply that is controlled by *battery charger controller* 270. EX1006-Hobbs, [0026]. Hobbs's battery charger 100 includes *controller* 270, "a digital controller" which includes "a circuit board with a processor and memory for data storage" with associated "software configured to perform the functions described herein, including digital control, display and diagnostics." EX1006-Hobbs, [0051]. Battery controller 270 manages the vehicle battery power supply 240. EX1006-Hobbs, [0049]-[0050]. Hobbs's battery charger *controller* is *electrically coupled to the electrical power cord and to Hobbs's or Hobbs's in view of Kelty-078's transmitter (network 275)* as depicted in Figure 2.

EX1006-Hobbs, Fig. 2. **Controller 270** is *electrically coupled* to **connector 126** and **network 275**. EX1006-Hobbs, [0031], [0043], [0049]-[0051], [0056].

251. The '107 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:37-50 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the

power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:18-25 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”) Kelty-078 similarly sends signals (for example, text) using wireless communication (for example, Bluetooth). EX1005-Kelty-078, 4:53-58; 4:58-5:1; 4:24-31. *See* Claim 10[h].

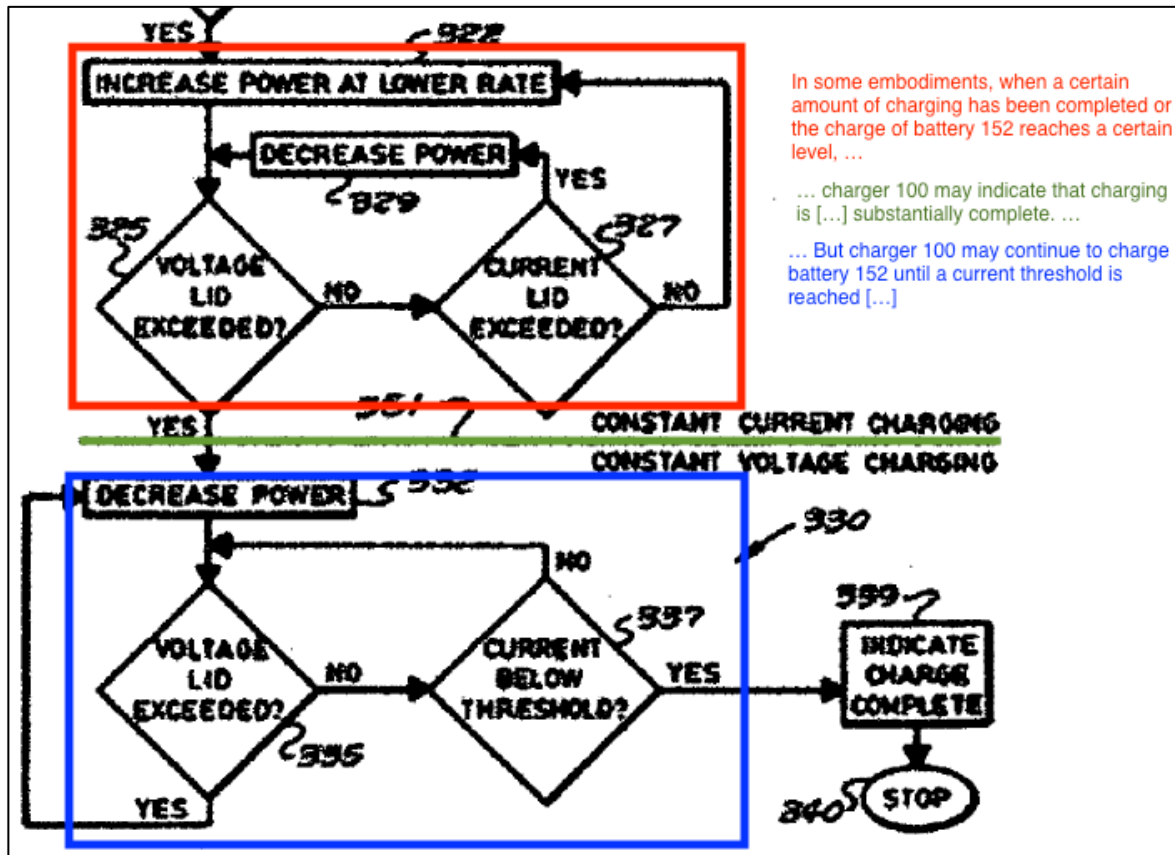
252. As discussed in Claim 10[Pre], Hobbs’s battery charger 100 controller 270 communicates with Hobbs’s phone’s controller (per Hobbs or Hobbs-Kelty-078) via “cellular telephony, infrared serial link, or wireless local area network” using the transmitter (per Hobbs or Hobbs-Kelty-078) by sending signals. EX1006-Hobbs, [[0054] (“**Controller 270** may interface or communicate with diagnostic device 130”); [0113] (“[w]hile charging is taking place (e.g., steps 313 through 339), **controller...may provide a signal** to card reader 110 or network 275 indicating the amount of energy used or the price charged for the charging energy provided thus far...Network 275 may be used...perform the functions of diagnostic device 130 , etc.”), [0037].

6. Claim 10[e]: “control supply of power to the battery in the course of a charging session as the level of charge of the battery is increased,”

253. Hobbs’s battery charger 100’s **controller 270** *control[s] supply of power to the battery in the course of a charging session as the level of charge of the battery is increased.*

254. Hobbs’s battery charger 100 starts “charging at a starting level” and “incrementally or gradually increase[s] the charging level.” (*in the course of a charging session*). EX1006-Hobbs, [0073]. Hobbs’s battery charger’s **controller 270** “control[s] the power level of alternating current 241.” EX1006-Hobbs, [0049]-[0050]. **Controller 270** “may repeatedly check the charging voltage (step 325) and current (step 327) and either increase (step 322) or decrease (step 329) the power level to keep the charging current (e.g., direct current 293) substantially at the current lid.” EX1006-Hobbs, [0103], [0086]. As discussed above, Hobbs teaches monitoring the charge level of the battery during charging (*see* Ground 1, Claim 1[e][i]-1[e][iv]), for the purpose of reducing the charging rate when a user-specified threshold is reached. Thus, Hobbs teaches that the battery charger is configured to *control supply of power to the battery in the course of a charging session as the level of charge of the battery is increased*. EX1006-Hobbs, FIG. 3. As shown below in Fig. 3, over the course of a charging session charge is monitored and controlled, charging is

performed until a voltage lid is reached and continues charging until a current threshold is reached. EX1006-Hobbs, [0111], Fig. 3.



EX1006-Hobbs, Fig. 3 (excerpt), [0111].

7. Claim 10[f]: “receive, via a user-manipulatable control, data indicative of a predetermined threshold level of charge by which the battery charger controller sends an alert, the predetermined threshold level of charge being less than a full charge of the battery;”

255. The '107 Patent provides “percentage of full charge” and “kWh” as examples of threshold levels. EX1001, 12:47-51, 12:54-60, 23:50-54, 13:19-22, 13:46-56.

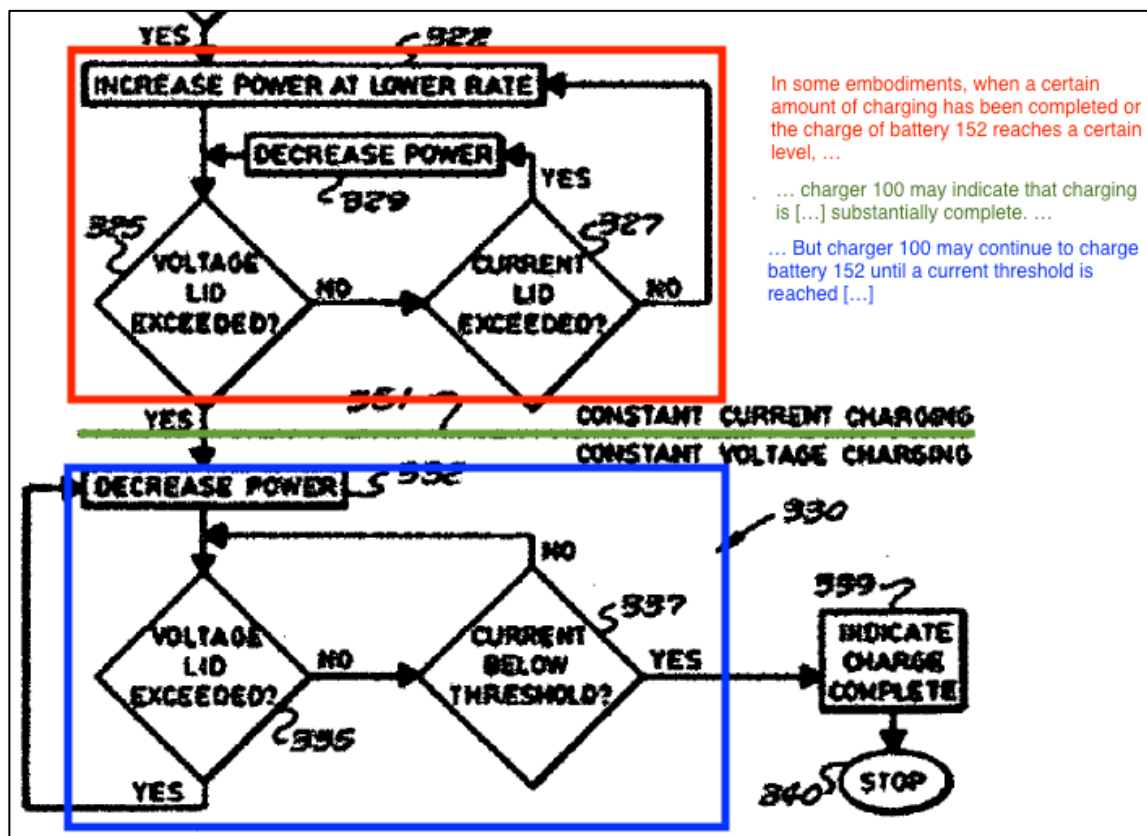
256. Hobbs's *controller 270* receive[s], via a user-manipulatable control (Hobbs's key pad), *data indicative of a predetermined threshold level of charge* (Hobbs's certain level of charge of battery 152) *by which* Hobbs's *controller 270* sends an alert (Hobbs's indication), *the predetermined threshold level of charge being less than a full charge of the battery* (Hobbs's continuing to charger after Hobbs's indication).

a) Hobbs's Teachings

257. Hobbs teaches controller 270 “communicate[s] with the user, for example, via key pad 104, screen 107, or lights or gauges 108...” EX1006-Hobbs, [0055]. Battery charger 100's controller 270 “provide[s] instructions or prompt the user for information via writing on screen 107, and the user may input information via key pad 104.” EX1006-Hobbs, [0036].

258. Hobbs teaches that “**fast or opportunity charging may take place for a particular amount of time or energy**, for example, **entered by the user into key pad 104** ... when a certain amount of charging has been completed or **the charge of battery 152 reaches a certain level, charger 100 may indicate** that charging is

...substantially complete.” EX1006-Hobbs, [0111], [0109]. Even after this indication point (alert) is reached, charger 100 “continue[s] to charge battery 152 until a **current threshold** is reached...” EX1006-Hobbs, [0111]. Hobbs’s current threshold is “stored in look-up table 272 for...battery 152.” EX1006-Hobbs, [0107]. Hobbs charges fast until the battery level reaches the first current threshold using a first charging rate which corresponds to a particular amount of energy, sends an indication (alert) when this particular amount of energy is met, and then slows down the charging rate to the second current threshold and charging **continues** at this second, slower rate. EX1006-Hobbs, [0107]-[0111].



EX1006-Hobbs, Fig. 3 (excerpt), [0111].

259. Hobbs's indication of substantially charged in [0111] is done "in real time" via "indicator lights 108, screen 107, or both." EX1006-Hobbs, [0109], [0112], [0113] ("[w]hile charging is taking place (e.g., steps 313 through 339), **controller...may provide a signal** to...network 275 indicating the amount of energy used ...").

b) Sutardja's Teachings

260. Complimenting Hobbs's teachings of multiple thresholds and user-supplied amounts of charge, Sutardja teaches that the user can input desired charge amount (predetermined levels of charge) in terms of charge percentages. Sutardja teaches user inputting charging parameters include "charge levels of the batteries" and determining that a battery is charged to "predetermined level... that may be indicated in the charging parameters." EX1004-Sutardja, [0126], [0243], [0270]. Sutardja provides an example of a charge level as a percentage of charge level. EX1004-Sutardja, [0231] ("Batteries in these vehicles may have charge remaining (for example, 50%, 60% or higher charge remaining"), [0237]. Thus, Hobbs-Sutardja teaches *data indicative of a predetermined threshold level of charge*.

c) Motivation to Combine Hobbs with Sutardja

261. A POSITA would have been motivated to modify Hobbs so that the user can input a predetermined charge level in terms of charge percentages for the vehicle battery per Sutardja. Hobbs already teaches accepting user input as instructions to the battery charger's controller. EX1006-Hobbs, [0036], [0055]. Sutardja's teachings of user inputted charging parameters provides a clear and user-friendly interface for the user to specify charge level of the battery. Sutardja, [0243], [0126], [0270]. Such a combination would have been the use of a known technique (user inputting charge level threshold) to improve similar devices (Hobbs's charger 100, which accepts user inputs of charge amounts via a keypad and/or display and Sutardja's charger) in the same way. A POSITA would have appreciated that specifying a charge threshold percentage rather than a particular amount of energy would have been more convenient to a user since it is generally easier for a typical user to understand a percentage of charge compared to energy units. For example, charge levels were commonly discussed in the art based on percentage, and corresponds to the way users would understand battery charge level, as charge levels were commonly displayed to users as a percentage. EX1013-Berdichevsky, [0031] ("Generally, the storage charge is approximately a **30 to 50% charge**."); EX1038-Uchida, [0078] ("After the travel is started, until the **SOC** of power storage device B becomes smaller than a specified value SC (**20%** for example),"); EX1015-Chan,

8 (“Its onboard charger (220 V, 2.2 kW) could provide **80%** charge within 3 h and **100%** within 6 h.”); EX1020-Hanssen, [0015]-[0016], [0050]-[0051], and [0068] (“The CDU 60 also displays information to the user, such as the state of charge (SOC) of the advanced battery (in numeric or graphic form)[.]”), Figs. 10-13; EX1004-Sutardja, [0231] (“Batteries in these vehicles may have charge remaining (for example, 50%, 60% or higher charge remaining”). This modification would have advantageously allowed a user to specify a charge threshold in a simpler and more straightforward manner than Hobbs’s native functionality provides. A POSITA would have appreciated that a user would benefit from inputting the level of charge needed and that Hobbs teaches a corresponding current threshold, since the user may have a planned trip and need a specific amount of charge to travel a certain distance. The user’s need to know that the vehicle has a certain level of charge was known in the art. For example, Kelty-078 describes methodologies contemplated allowing the user to determine if the battery is capable of driving the distance the user must travel, and if the battery is capable of a maximum mileage trip. EX1005-Kelty-078, 4:53-5:57. Hobbs-Sutardja thus advantageously allows a user to input a charge threshold percentage and receive an alert when the threshold is reached, improving system ease-of-use and notification capabilities for the user.

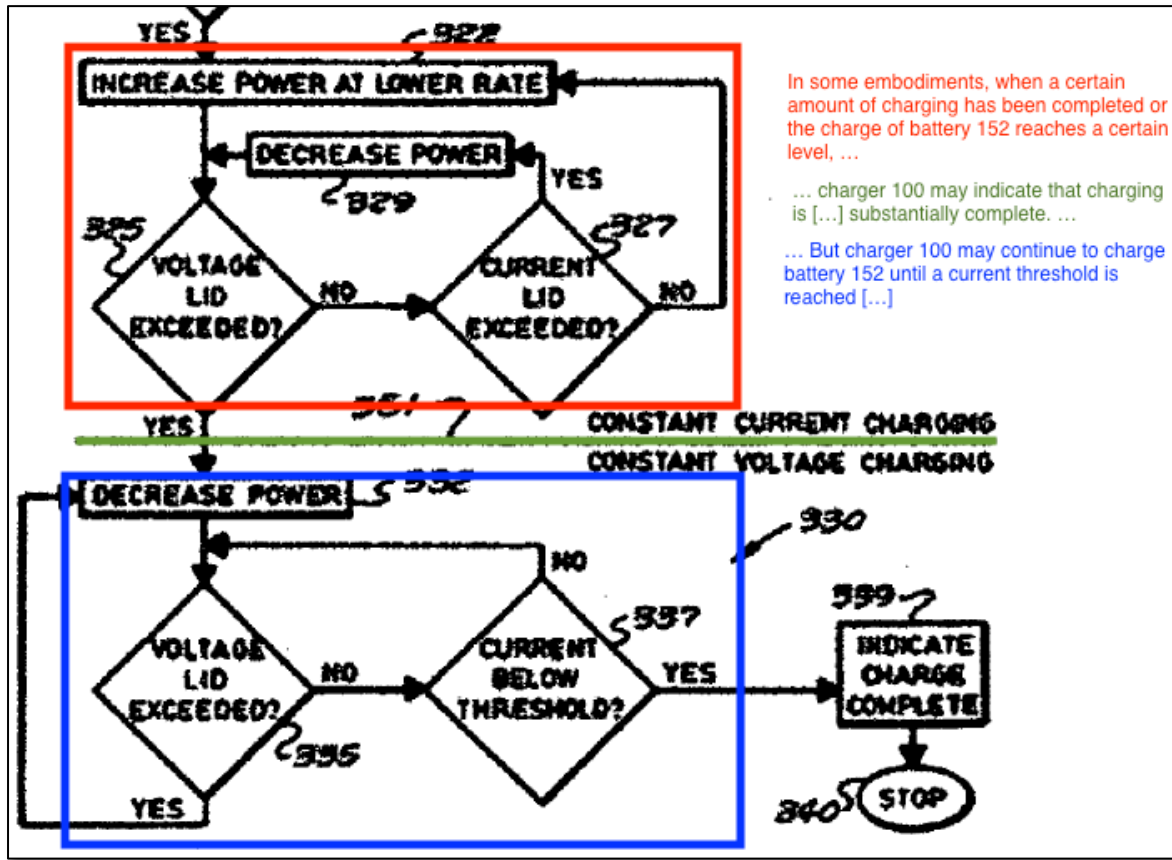
262. A POSITA would have had a reasonable expectation of success modifying Hobbs per Sutardja's teachings. Hobbs provides a known technique for making that type of charge-level determination: Hobbs compares that charging current to a current threshold associated with the battery. Hobbs's current threshold is "stored in look-up table 272 for...battery 152." EX1006-Hobbs, [0107]. A POSITA would have appreciated once the user inputs Sutardja's desired charge amount (predetermined levels of charge), Hobbs would look up the associated current threshold to that charge amount. Charge level of a battery was commonly estimated based on battery voltage. EX1039-Wakeman, Abstract. A POSITA would have understood that Sutardja's charge level (predetermined levels of charge), estimated based on voltage, would have a proportional relationship to an associated current threshold, based on Ohm's Law. EX1040-Weinberg, [0060] ("This is basically defined by Ohm's law wherein, $V=IR$ wherein V is the voltage, I is the current[.]"). This would have required only straightforward modifications to programming instructions, which would have been well-within the skillset of a POSITA. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA. Then Hobbs would compare the level of charge to the current

threshold level by determining whether the current has exceeded the current threshold. EX1006-Hobbs, [0107] (“The charger 100 or controller 270 may monitor whether the charging current has dipped below a current threshold (step 337).”), [0108]-[0109], [0111], Fig. 3. It was well known that to determine whether the charge level has reached the predetermined threshold level of charge, the current charge level would need to be compared against the charge level threshold, and that monitoring a charge level during charging can be done by measuring current flow which Hobbs teaches. EX1006-Hobbs, [0107]-[0109], [0111].

263. Hobbs’s native system already allows a user to specify charge energy indicative of a level of charge and includes the necessary hardware for implementing Sutardja’s known technique of a charge level in a percentage form. Thus, such a combination would have utilized Hobbs’s existing hardware and merely required straightforward and routine modifications to Hobbs’s software using ordinary skill of a POSITA. EX1006-Hobbs, [0111], [0109]. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

8. Claim 10[g]: “compare, during charging of the battery with the vehicular battery charger, a level of charge of the battery to the predetermined threshold level of charge; and”

264. Hobbs's **controller 270** *compare[s], during charging of the battery with the vehicular battery charger, a level of charge of the battery* (as measured using Hobb's current flow measurements) *to the predetermined threshold level of charge* (Hobbs-Sutardja's user-set level of charge for notification, as measured by Hobbs's current threshold). *See* Claim 10[f]. Hobbs teaches controller 270 of charger 100 "monitor[s] whether the charging current has dipped below a current threshold (step 337)." EX1006-Hobbs, [0107]. Hobbs's **controller 270** compares "the charging voltage with the voltage lid (step 335)" and compares "the charging current with the current threshold (step 337)" until "the rate of charge (e.g., direct current 293) decreases until the charging current drops below the **threshold** (step 337)." EX1006-Hobbs, [0108].



EX1006-Hobbs, Fig. 3 (excerpt), [0111].

265. Hobbs teaches “the charge of battery 152 reaches a certain level, charger 100 may indicate that charging is complete (step 339) or substantially complete.” EX1006-Hobbs, [0111]. Hobbs teaches after this, “charger 100 may continue to charge battery 152 until a current threshold is reached...” EX1006-Hobbs, [0111].

266. As an example, Hobbs’s charger 100 “may indicate that charging is complete at one current threshold (step 337) and stop charging at a lower current threshold (similar to step 337).” EX1006-Hobbs, [0111]. It was a well-known

concept for charging to reach a first level and continue charging at a second level. For example, U.S. Patent Application Publication No. 2009/0021218 to Kelty et al. (“Kelty-218”) teaches to “charge the battery until the second energy stored level 508 is reached[,]” and further teaches methods of “charging a battery of an electric vehicle to a first energy stored level... charges the battery to a second energy stored level....” EX1023-Kelty-218, [0041], [0037], [0040] (“charging a battery to a first energy stored level during a first time period 504 and charging the battery during a second time period 506[.]”).

9. Claim 10[h]: “responsive to detection of the level of charge of the battery reaching the predetermined threshold level of charge during the charging session and before charging of the battery is complete, send a signal indicative of the level of charge being reached via the transmitter to the controller of the phone as the alert.”

267. The '107 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:37-50 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:18-25 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle

charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.)”) Kelty-078 similarly sends signals (for example, text) using wireless communication (for example, Bluetooth). EX1005-Kelty-078, 4:53-58; 4:58-5:1; 4:24-31.

268. Hobbs-Sutardja in view of Kelty-078 teaches **controller 270** is *responsive to detection of the level of charge of the battery reaching the predetermined threshold level of charge* (Sutardja user set charge level measured by Hobbs’s current threshold) *during the charging session and before charging of the battery is complete* (Hobbs’s continuing to charger after Hobbs’s indication), *send a signal* (Hobbs’s alert via Kelty-078’s transmitting text functionality) *indicative of the level of charge being reached via the transmitter* (See Claim 10[b]) *to the controller of the phone* (Hobbs’s phone) *as the alert*. See Claim 10[f].

(i) *send a signal* (Hobbs’s alert via Kelty-078’s transmitting text functionality) *indicative of the level of charge being reached via the transmitter to the controller of the phone* (Hobbs’s phone) *as the alert*.

269. Sutardja-Hobbs teaches data indicative of a predetermined threshold level of charge by which the battery charger controller sends an alert is displayed to the user as discussed in Claim 10[f]. See Claim 10[f].

a) Kelty-078's Teachings

270. Kelty-078 provides details as to what the signal as an alert might contain. Kelty-078 teaches *to send a signal (text) indicative of the level of charge being reached via the transmitter to the controller of the phone* (per Hobbs/Hobbs-Kelty-078's teachings) *as the alert*.

271. Kelty-078 teaches the electric vehicle communicates with the user via (for example, text message). *See* Ground 1, Claim 1[e][iv].

b) Motivation to Combine Hobbs with Kelty-078

272. Modifying Hobbs according to Kelty-078's teachings would have involved the use of a known technique (text) to improve similar wireless communication and charging-notification devices (Hobbs's phone and battery charger) in the same way (so the user can be alerted when away from their vehicle on the charging status). Hobbs already teaches the controller sending an alert. *See* Claim 10[f]. A POSITA would have been motivated and would have found it obvious to implement Kelty-078's known text messaging cell phone alert functionality to transmit Hobbs's alert as a signal (per Kelty-078 teachings) to Hobbs's phone so that the driver of the vehicle would be notified when the charge was nearing completion, so the user would return to their car. This would avoid the user being required to stay with their car during charging, and/or to check back

repeatedly until the charging was complete. Kelty-078 provides teachings of text alerts that a POSITA would have the necessary knowledge to implement, as it was well-known to implement text communication on devices with cellular telephony capabilities. EX1030-PalmTreo700p, 94, 247; *see* Section VI.C; EX1027-Lowenthal-340, [0052], Fig. 4; *see* Section VI.D.1. A POSITA would have been motivated to make all the necessary firmware/software modifications needed to be able to transmit messages. It was well known that PDA phone devices such as the Palm Treo received texts. EX1030-PalmTreo700p, 95 (“...you automatically receive new text messages.”); *see also* Section VI.C (describing Treo devices’ cellular telephony capabilities, including texts).

273. A POSITA would have appreciated that such a modification would have allowed the user of Hobbs to implement the well-known teachings of text being wirelessly sent as a signal between controllers, so Hobbs’s controller 270 would have efficiently communicated with Hobbs’s phone. EX1030-PalmTreo700p, 94, 247; *see* Section VI.C; EX1027-Lowenthal-340, [0052], Fig. 4; *see* Section VI.D.1. This combination would have implemented the wireless network transmitter capabilities of Hobbs-Kelty-078 to send a text message as a signal, a feature well within the skill set of a POSITA. Hobbs already teaches being able to communicate wirelessly via cellular telephony or wireless local area network and a POSITA would

be motivated to look towards text protocols to communicate with a user via the communication protocols with which they were familiar. EX1006-Hobbs, [0037].

274. A POSITA would have had a reasonable expectation of success modifying Hobbs according to Kelty-078's teachings. Hobbs's battery charger 100 already has cellular telephony capability to transmit information to Hobbs's phone. Hobbs's battery charger 100 already indicates via "indicator lights 108, screen 107, or both," to the user when battery charging is substantially complete. EX1006-Hobbs, [0109], [0111]-[0112], and [0113]. Because Hobbs's battery charger 100 already included cellular communication capability, a POSITA would have reasonably looked to conventional cellular messaging techniques, including SMS (text), as predictable options for remotely notifying the user of charging completion. Rather than requiring the user to remain near the vehicle, repeatedly check the vehicle display, or maintain an active data application. Cellular messaging very well-known and a common capability of devices having wireless transceiver capable of bidirectional communication. EX1030-PalmTreo700p, 94, 247; *see* Section VI.C; EX1027-Lowenthal-340, [0052], Fig. 4; *see* Section VI.D.1. A POSITA would have appreciated that Hobbs's battery charger controller 270 would transmit a concise text message such as a charging substantially complete alert using the vehicle's existing cellular communication capability.

- B. Claim 11:** *“The system of claim 10, wherein the signal indicative of the level of charge being reached is at least one of a group consisting of a text and an e-mail automatically generated to the user.”*

275. See Claim 10[h]; Ground 1, Claim 4.

- C. Claim 12:** *“The system of claim 10, wherein the battery charger controller is further responsive to signals from the phone to start and stop charging of the battery.”*

276. The '107 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:37-50 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user's computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:18-25 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”) Kelty-078 similarly sends signals (for example, instructions) using wireless communication (for example, Bluetooth). EX1005-Kelty-078, 4:53-58; 4:58-5:1; 4:24-31.

277. Hobbs in view of Kelty-078 teach Hobbs's *battery charger controller 270 is further responsive to signals from the phone to start and stop charging of the battery*. Hobbs's phone has an associated keypad and screen and allows "manual control of battery charging, or programming of charger 100." EX1006-Hobbs, [0037]. The "user may start charger 100 (step 302), for example by pressing a button on charger 100[.]" EX1006-Hobbs, [0074]. Hobbs is not specific as to if "the manual controls of battery charging" includes a signal from the user to **start and stop** battery charging.

a) Kelty-078's Teachings

278. Kelty-078 teaches that the system acts *responsive to signals from the phone to start and stop charging of the battery*. See Ground 1, Claim 5.

b) Motivation to Combine Hobbs with Kelty-078

279. A POSITA would have been motivated to modify Hobbs's phone so that the user can input start and stop charging as part of Hobbs's "manual control of battery charging, or programming of charger 100" via Hobbs's phone keyboard or screen per Kelty-078's teachings. EX1006-Hobbs, [0037]. A POSITA would have recognized that automated charging schedules may not always match the user's immediate needs, and providing start and stop controls would have allowed the user to override or adjust scheduled charging when circumstances changed, such as an

unexpected trip, an early departure, or a change in desired charge level. A POSITA would have further recognized that giving a user more direct control over charging (to override or adjust scheduled charging) improves user experience by increasing flexibility and responsiveness of the system.

280. Such a combination would have been the use of a known technique (start and stop charging options) to improve similar devices (Hobbs's phone user control of charger 100) in the same way. This would have been combining prior art elements (start/stop charging via a signal) according to known methods (user input) to yield predictable results of Hobbs being able to start and stop when a user wishes to charge their vehicle.

281. Further, a POSITA would have had reasonable expectation of success in implementing a start/stop option in Hobbs's phone. A POSITA would have understood Hobbs's phone to be already be capable of controlling charging as a part of "manual control of battery charging" and, as such, implementing a start/stop option in Hobbs's phone would be a simple matter of programming. EX1006-Hobbs, [0037], [0074]. Start/stop commands were commonly implemented in EV charging systems. For example, Pollack teaches that the user interface may include "an override for requesting immediate charging of the electric vehicle." EX1041-Pollack'89, Claims 4, 15, [0100], [0202]. The parameters displayed on Pollack's

user interface include “user-selectable manual charging overrides.” EX1041-Pollack’89, Claim 4.

D. Claim 14: *“The system of claim 10, wherein the battery charger controller is further responsive to detection of interruption of power to the battery by sending another signal indicative of the interruption via the at least one of the group consisting of the transmitter and the receiver to the controller of the phone.”*

282. The ’107 Patent gives an example of a “wireless signal” transmitted using “wireless communication.” EX1001, 22:37-50 (“As another example, the controller 44 of the vehicle charging cord 22 can transmit a wired or wireless signal to the user’s computer and/or to the power utility 48 (i.e., to the controller 50 of the power utility 48) in any of the manners of communication described above in connection with the controller 50...”), 10:18-25 (“communication along any portion or all of the distance between the controller 50 of the power utility 48 and the vehicle charging cord 22 can include wireless communication. In such cases, any number of wireless transmitters and receivers (and associated antennae) can be used to send and receive communications between the controller 50 of the power utility 48 and the vehicle charging cord 22.”). Kelty-078 similarly sends signals (for example, instructions) using wireless communication (for example, Bluetooth). EX1005-Kelty-078, 4:53-58; 4:58-5:1; 4:24-31.

283. Hobbs in view of Kelty-078 teaches Hobbs's *battery charger controller is further responsive to detection of interruption of power to the battery* (utility supply fault) *by sending another signal indicative of the interruption via the transmitter to the controller of the phone.*

284. In the Hobbs-Kelty-078 combination, *another signal* is the battery charger 100-transmitted fault command—i.e., a signal transmitted to Hobbs's phone from battery charger 100, this second signal received from Hobbs's phone, instructing Hobbs's controller 270 to stop charging battery 152 during the charging session. EX1006-Hobbs, [0084], [0111].

285. The '107 Patent describes that if the supply of power has been interrupted, the controller 44 can send a power interrupt fault message. EX1001, 42:67-43:6 (“Otherwise, the controller 44 can check or otherwise determine whether the supply of power to the vehicle charging cord 22 has been interrupted at 127. If the supply of power has been interrupted, the controller 44 can send a power interrupt fault message to the user in any of the manners also described above in connection with the embodiment of FIGS. 2, 5-11, and 15 (at 129).”). The '107 further describes “power interruption” as “stopping battery charging.” EX1001, 4:10-20, 43:7-17.

a) Hobbs's Teachings

286. Charger 100 includes “screen 107 and key pad 104” configured to “provide diagnostics and manual control.” EX1006-Hobbs, [0037], FIG. 1. As discussed in Claim 14[Pre], Hobbs teaches a phone (diagnostic device 130). Hobbs teaches “charger 100” communicates “with digital diagnostic device 130 configured to facilitate maintenance of the battery charger or diagnosis of faults.” EX1006-Hobbs, [0037].

287. Hobbs explicitly states a function of its system is to provide an indication of “charging equipment or **utility supply fault.**” EX1006-Hobbs, [0036].

288. Hobbs teaches if the voltage of the vehicle battery is not within a defined range after a certain number of charge additions, its charger 100 “may **stop charging and provide a fault indication** via screen 107.” EX1006-Hobbs, [0084]. A POSITA would have understood Hobbs’s fault indication to be in response to a power interruption, as a POSITA would have recognized that the battery not having voltage in a defined range after receiving charge would be an interruption of the power supplied to the vehicle. Additionally, Hobbs teaches that “when a certain amount of charging has been completed or the charge of battery 152 reaches a certain level, **charger 100 may indicate that charging** is complete...or **substantially complete.**” EX1006-Hobbs, [0111]. Hobbs additionally explains that “charger 100 may **indicate that charging is complete at one current threshold...and stop**

charging at a lower current threshold.” *Id.* In each of these descriptions, Hobbs teaches *sending a signal including a power interruption notification*. EX1006-Hobbs, [0084], [0111].

289. Hobbs further teaches that the user is notified via a display or screen. Hobbs teaches that “the voltage, current, or power level at which charging is taking place...may be indicated, for example, in real time, via an LED or screen 107.” EX1006-Hobbs, [0109]. “When the charging current ... drops below the threshold ... charger 100 may stop charging ... may indicate that charging is complete (... e.g., via indicator lights 108, screen 107, or both), or both.” *Id.*

b) Kelty-078’s Teachings

290. Kelty-078 teaches “an electric vehicle communication interface that allows for the vehicle **to notify the user** when the battery is fully charged or if a problem has occurred during charging thus affecting the operability of the electric vehicle.” EX1005-Kelty-078, 2:46-50; 5:5-9 (describing “**communication between** the electric vehicle 12 and user 20 or user 20 and electric vehicle 12....”). Specifically, EX1005-Kelty-078 teaches “electric vehicle 12 notifying the user or driver 20... that a problem occurred during charging of the battery 26 (step 313) and that the maximum distance for travel for the electric vehicle 12 has been reduced or that the electric vehicle 12 needs immediate servicing and is not available for driving

at the present time.” EX1005-Kelty-078, 5:19-26, FIG. 3. Kelty-078 teaches “the user or driver 20 of the vehicle is [] capable of communicating with the electric vehicle 12 from their portable device such as a cell phone...to program and **send specific instructions** to the electric vehicle 12 for controlling and monitoring the battery system 26 arranged within the electric vehicle 12 (step 307).” EX1005-Kelty-078, 4:58–5:1, FIG. 3.

c) Motivation to Combine

291. A POSITA would have been motivated to modify Hobbs’s **controller 270** so that **controller 270** transmits a fault indication signal to a user on Hobbs’s phone. EX1006-Hobbs, [0037]. As discussed, Hobbs’s phone is implemented with details provided by Kelty-078. *See* Claim 10[Pre]. A POSITA would have understood Hobbs’s battery charger **controller 270** to already be capable of communicating with Hobbs’s phone. EX1006-Hobbs, [0037]. *See* Claim 10[d].

292. Such a combination would have been the use of a known technique (transmitting a fault indication signal to a Hobbs’s phone) to improve similar devices (Hobbs’s phone user control of charger 100) in the same way. A POSITA would have recognized the combination constitutes applying a known technique (transmitting a power interruption notification to a user’s device, per Hobbs-Kelty-078) to a known system ready for improvement (Hobbs’s phone) to the yield

predictable result of notifying the user quickly and conveniently when charging has stopped, leading to a reasonable expectation of success. Transmitting a fault indication to the phone would have predictably improved the system by allowing the user to learn that charging was interrupted without the user needing to remain near the charger.

293. This combination would have been combining prior art elements (fault indication signal) according to known methods (transmitting signals to phones) to yield predictable results of the user of Hobbs's phone being alerted when a problem has occurred during charging of battery via Hobbs's **controller 270**. Thus, in the combination, Hobbs's **controller 270** *is configured to send another wireless signal including a power interruption notification* (the instruction comprising the Hobb's charging complete indication) to Hobbs's phone via Hobbs's battery charger 100 transmitter. *See* Claim 10[b], EX1006-Hobbs, [0111].

294. Further, a POSITA would have had reasonable expectation of success for Hobbs's **controller 270** transmitting a fault indication signal to a user on Hobbs's phone via Kelty-078's teachings of notifying the user of a problem occurring while charging. A POSITA would have appreciated that Hobbs already teaches providing an indication of faults in a vehicle battery charging session. EX1006-Hobbs, [0036]. Hobbs teaches "charger 100" communicates "with digital diagnostic device 130

configured to facilitate maintenance of the battery charger or diagnosis of faults.”

EX1006-Hobbs, [0037]. Thus, in the combination, Hobbs’s power interruption notification is wirelessly provided to Hobbs’s phone to allow the user to **monitor** the battery conveniently and remotely, motivating the combination via Kelty-078’s teachings of notifying the user of a problem occurring while charging. Given (1) Hobbs’s battery charger **controller 270’s** capabilities to communicate with Hobbs’s phone, (2) Hobbs’s teachings of fault indications, and (3) Kelty-078’s teachings of notifying the user of a problem occurring while charging, a POSITA would have understood that to modify Hobbs’s controller 270 to transmit a fault indication signal to a user’s phone would simply involve routine modifications to Hobbs’s software using ordinary skill of a POSITA. Indeed, this modification would have had a reasonable expectation of success because only straightforward and routine changes to programming instructions would have been required, which would have been well-within the skillset of a POSITA.

XIV. OPINIONS REGARDING GROUND 6: OBVIOUSNESS OF CLAIM 13

- A. Claim 13:** “*The system of claim 10, wherein the battery charger is releasably attachable to the vehicle and the source of power, and is portable as a single unit.*”

295. As discussed in Claim 10[a], Hobbs teaches *the battery charger is releasably attachable to the vehicle*. See Claim 10[a]. Hobbs in view of Kuromame

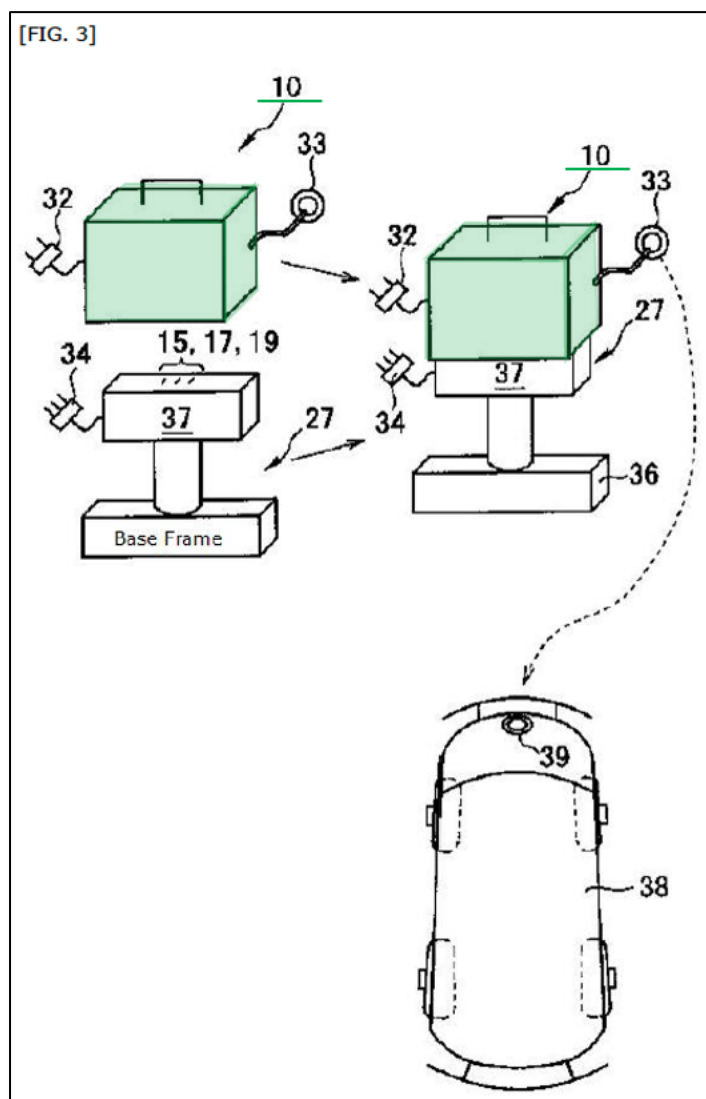
further teaches *the battery charger is releasably attachable to the...source of power, and is portable as a single unit*. Hobbs teaches “embodiments of the present invention include ...**mobile**...battery chargers” but does not provide further information. EX1006-Hobbs, [0026]. For example, Hobbs teaches that using “a foil-type transformer for step-down transformer 225 may reduce size, mass, or both. Thus, charger 100 may be lighter in weight and smaller than other fast chargers known in the art.” EX1006-Hobbs, [0053]. Hobbs does not provide further implementation details for Hobbs’s mobile battery charger, and a POSITA would have been motivated to look towards Kuromame to find more implementation details for a mobile (portable) battery charger.

a) Kuromame’s Teachings

296. Kuromame teaches a “**portable charging device 10** constituting the charging system for electric vehicles[.]” EX1010-Kuromame, [0011]-[0012]. The ’107 Patent describes *portable* as “can be readily moved from vehicle to vehicle, ...and can be moved into and out of (can be transported by) vehicles with ease.” EX1001, 24:39-43. Kuromame teaches the driver “exits the vehicle, retrieves the portable charging device 10 from the trunk[.]” Kuromame teaches the portable charging device 10 “can be used alone[.]” EX1010-Kuromame, [0038], [0032], [0035]. Therefore, Kuromame teaches *a battery charger is portable as a single unit*.

297. Kuromame's **portable charging device 10** has “a plug 32 for a commercial AC 100 V power supply connected to a filter unit 1, a high-frequency inverter 5, and an output paddle 33 connected to a communication unit 6.” EX1010-Kuromame, [0011]-[0012]. Kuromame teaches the driver connects the **portable charging device 10** (retrieved from the trunk) “to the stationary power supply device 27 by docking it, as shown in FIG. 3. Next, the driver plugs the plug 34 of the stationary power supply device 27 into a commercial AC 200V outlet provided in the garage and connects the charging cable 33 to the charging port 39 of the electric vehicle 38 to prepare for charging. The driver then turns on the power breaker (not shown) located inside the housing 37.” EX1010-Kuromame, [0027], [0023], [0025].

298. Kuromame's *battery charger is releasably attachable to the source of power, and is portable as a single unit* because the driver retrieves the portable charging device 10 from the trunk and connects it to the power device for charging. EX1010-Kuromame, [0027], [0023], [0025].



EX1010-Kuromame, Fig. 3.

b) Motivation to Combine Hobbs and Kuromame

299. A POSITA would have been motivated to modify Hobbs's vehicle charger to be portable. A POSITA would have appreciated that Hobbs already teaches "embodiments of the present invention include ...mobile...battery

chargers.” EX1006-Hobbs, [0026]. A POSITA would have understood that Hobbs envisions Hobbs’s vehicle charging system being implemented with a mobile battery charger. Hobbs teaches that using “a foil-type transformer for step-down transformer 225 may reduce size, mass, or both. Thus, charger 100 may be lighter in weight and smaller than other fast chargers known in the art.” EX1006-Hobbs, [0053]. Hobbs provides a teaching in the prior art (mobile battery charger) that would have led one of ordinary skill to modify the prior art (Hobbs’s battery charger) per Kuromame’s portable battery charger teachings to arrive at the claimed invention (portable battery charger).

300. As such, a POSITA would have been motivated to seek out a reference, such as Kuromame, that provides more implementation details for a mobile battery charger. A POSITA would have appreciated that such a modification would have allowed a user to take a trip and bring a portable charger with them, and therefore would have been motivated to modify the Hobbs combination to utilize a portable charger. As the portable charger is retrievable from the trunk of the vehicle, allowing the user to charge their vehicle at multiple locations, per Kuromame. EX1010-Kuromame, [0038], [0032], [0035]. Such a modification would have been the simple substitution of one known element (Kuromame’s portable battery charger) for

another (Hobbs's mobile battery charger) to obtain predictable results of being able to charge a vehicle on the go.

301. A POSITA would have realized that Hobbs's vehicle charger is already detachable from the car as discussed in Claim 10[a], Hobbs's vehicle charger is releasably attachable to the vehicle. *See* Claim 10[a]. A POSITA would have been motivated to make the vehicle charger portable to allow charging anywhere with a power outlet. The capability to allow vehicle charging anywhere with a power outlet using a portable battery charger would certainly expand users' travel options, being able to travel further and not be bound to a single charging location, adding flexibility and convenience. Such a modification would have been the use of a known technique (portable battery charging) to improve similar devices (Hobbs's battery charger) in the same way by improving the portability of the battery charger. Making the charger portable would have predictably addressed the known need for flexible charging access without changing the charger's basic function of supplying controlled power to the vehicle battery.

302. A POSITA would have had a reasonable expectation of success in modifying Hobbs per Kuromame. Hobbs already teaches mobile battery chargers. EX1006-Hobbs, [0026]. Kuromame provides implementation details for a portable charging device for electric vehicles. Ex1010-Kuromame, [0011]-[0012], [0027],

[0023], [0025], [0038], [0032], [0035], Fig. 3. Thus, said modification would have been simply a matter of implementing Hobbs's mobile battery charger to be retrievable from a trunk and connectable to a source of power, as taught by Kuromame.

XV. CONCLUSION

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

Dated: 17 June 2026

By: 

Scott Andrews

Scott Andrews

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Petaluma, CA

Summary

Creative, energetic, and innovative internationally recognized technical executive experienced in general management, systems engineering, advanced product development, advanced technology, business development, strategic planning, and program management

- Location Based Technologies
- Vehicle Information Systems
- Vehicle Electrical/Electronics Systems
- ITS and Related Industries
- Communications Systems
- Mobile Information Technology
- Multimedia/Internet Computing
- Mobile Technology Test Instrumentation
- Vehicle Safety and Control Systems
- Enterprise Software

Experience

12/2001-Present Cogenia Partners, LLC

Systems engineering consulting supporting and mobile information, mobile electronics and automotive safety and entertainment systems development

Current Engagements:

- Expert witness for patent litigation, contracts and trade secrets:
 - Audi AG, related to automotive systems integration
 - Lordstown Motors, related to infotainment systems
 - Uber, related to location based systems
 - Toyota, related to vehicle-mobile device interfaces
 - Cummins Diesel, related to cloud based vehicle data collection

Prior Engagements/Projects:

- Technical consultant for connected vehicle security credential management system management concepts; Sponsored by Transport Canada
- Technical consultant for sensor supplemented message validation system for vehicle to vehicle communication based collision warning/avoidance systems. Sponsored by US DOT NHTSA
- Technical consultant for connected vehicle security credential management system deployment; Sponsored by US DOT NHTSA
- Subject matter expert and co-principle investigator on DSRC performance Measures development project for U.S.DOT NHTSA.
- Subject matter expert on communications data delivery system study to understand optimal roadside unit placements to support security credential management in connected vehicle systems; Sponsored by U.S. DOT RITA
- Developed systems engineering methodology for vehicle E/E systems; Applied methodology on project for Yazaki to reverse engineer the E/E architecture for a 2004 BMW 5 series vehicle.
- Co-Principal investigator for Integrated Advanced Transportation System; A 30+ year future technical feasibility assessment and strategy for U.S. DOT Federal Highway Admin. (FHWA).
- Technical consultant to American Association of State Highway Transportation Officials (AASHTO) for connected vehicle deployment analysis and strategy.
- Chief System Architect for the Vehicle Infrastructure Integration (VIIC) program

(BMW, Chrysler, Daimler Benz, Ford, GM, Honda, Nissan, Toyota, VW); A connected vehicle research program funded by U.S. DOT FHWA.

- Technical consultant to Michigan State DOT (Enterprise Pooled Fund) to develop a system architecture and deployment strategy for Rural ITS.
- Telematics delivery architecture development for a Fortune 100 service provider
- Technical consultant to the Vehicle Safety Consortium developing Dedicated Short Range Communications (DSRC) standards for safety systems;
- Designed novel super capacitor based high performance hybrid vehicle as part of an early stage startup company; Developed performance requirements, conceptual designs and patented integrated electrical system architecture concept.
- Toyota Motor Sales – 10 year technology survey;
- Connected Vehicle Trade Association- Transferred AMI-C specifications to ISO TC 22, TC 204 AND OSGi. Developed OSGi Vehicle Interface Specification;
- Expert witness for:
 - Orbital Sciences, related to vehicle fleet management
 - Volkswagen, related to vehicle control technologies
 - Apple, related to mobile communications device control
 - Google, related to map displays
 - Platform Sciences, related to location based fleet management
 - Unified Patents, various location based technology cases
 - Uber, related to display of multiple terminals on navigation display
 - Directed Electronics, related to vehicle remote start systems
 - ZTE, related to cell phone location and orientation systems
 - Audi, America, related to vehicle control systems
 - Club Car, related to golf cart navigation systems
 - Unified Patents, various location based technology cases
 - Toyota, related to vehicle communications systems
 - American GNC vs. LG, related to MEMS sensors
 - Dale Progress, Ltd. vs. Toyota, related to vehicle information display systems
 - Blackberry vs. SNAP, related to display of multiple terminals on navigation display
 - Location Services vs. Google, related to augmented reality displays
 - Alert Signal vs. Apple, related to cell phone messaging systems
 - AGIS vs. LG related to cell phone messaging systems
 - Maxell vs. ASUS, related to cell phone navigation systems
 - AGIS vs. HTC, related to cell phone location systems
 - AGIS vs. Huawei, related to cell phone location systems
 - AGIS vs. LG
 - Michigan Motor Technologies vs. Hyundai, related to vehicle control systems
 - Princeton Digital vs. Konami et al, related to video game display systems
 - Delphi, related to automotive safety systems
 - ATT vs. Vehicle IP relating to cell phone navigation systems
 - VW/Audi vs. Beacon, relating to traffic information systems
 - VW/Audi vs. Blitzsafe relating to mobile device integration and mobile audio systems
 - T-Mobile vs. TracBeam relating to wireless location technologies
 - VW/Audi vs. Joao relating to remote service architectures
 - Apple Computer vs. Porto relating to cell phone navigation systems

- Mercedes vs. Adaptive Headlamp Technologies relating to adaptive headlamps
- Liberty Mutual, Geico and Hartford vs. Progressive Insurance relating to usage based insurance systems
- Toyota vs. American Vehicular Sciences (AVS) relating to occupant sensing systems
- Lenovo and Amazon vs. Pragmatus relating to device tracking
- Ford in a patent vs. Eagle Harbor Holdings relating to Bluetooth systems and mobile device integration in the vehicle
- Bentley vs. Cruise Control Technologies relating to adaptive cruise control
- Google vs. Walker Digital relating to 3D navigation displays
- Volkswagen/Sirius-XM vs. case relating to traffic information systems
- Volkswagen, Ford and GM in patent cases vs. Affinity Labs, relating to the iPod interface
- Honda vs. American Calcar, relating to telematics equipment and user interfaces
- Alpine, Denso and Pioneer Corporation in an International Trade Commission patent case vs. Honeywell, related to navigation systems
- BMW vs. American Calcar, relating to telematics equipment and user interfaces

4/2000 to 12/2001 Cogenia, Inc.

President and Chief Executive Officer, Founder

Founded company in 2000 to develop enterprise class data management software system. Responsibilities included development of business concept and plan, corporate administration including financial and legal management, leadership of executive team in product development, fundraising, business development, organizational development, and investor relations. Raised \$2.2M between 8/00 and 5/01 from individuals and funds;

1996 to 4/2000 Toyota Motor Corporation, Japan

Project General Manager, R&D Management Division

Responsibilities included the conceptualization and development of multimedia and new technology products and services for Toyota's future generations of passenger vehicles in the United States and Europe, Heavy emphasis on strategy for information systems, and on development of technical concepts for computing and Internet oriented systems. Led automated vehicle Development program leading up to 1997 Automated Highway Systems (AHS) demonstration in Sand Diego, CA; Supported technology acquisition for hybrid vehicle control systems; Working under direction of Toyota board members, established the Automotive Multimedia Interface Collaboration (AMI-C), a partnership of the world's car makers to develop a uniform computing architecture for vehicle multimedia systems, and led all early technical, planning and legal work. Provided technical management of technical contracts with Carnegie Mellon University Robotics Lab (Image based collision warning systems), and the development of Toyota's position on the US Intelligent Vehicle Initiative.

1983 to 1996 TRW, Inc.

Held a series of increasingly responsible positions in program management, technology development and business development.

1993 to 1996 TRW Automotive Electronics Group

Director, Advanced Product Planning/Development

Specific responsibilities included leadership and overall management of advanced

development programs such as Automotive Radar, Adaptive Cruise Control, Occupant Sensing, In Vehicle Information Systems, and other emerging transportation products; Managed remotely located advanced development laboratory performing approximately \$6M in annual development projects.

1983 to 1993 TRW Space & Electronics Group

Manager, MMIC Products Organization

Developed TRW's commercial GaAs MMIC business. Responsibilities included development of business strategy and business plan, and overall management of customer and R&D programs. Developed extensive international business base and took operation from start-up to \$5M sales per year in under two years. Developed the first single chip 94 GHz Radar (Used for automotive cruise control and anti collision systems).

1979-1983 Teledyne Microwave

Developed high reliability microwave components. Developed CAD tools.

1977-1979 Ford Aerospace, Advanced Development Operation

Designed, tested and delivered microwave radar receiver systems

Education

MSEE Stanford University, 1982

BSEE University of CA, Irvine 1977

TRW Senior Leadership Program 1992

Publications

1. Two Dimensional Vehicle Control for Obstacle Avoidance in Multi-Lane Traffic Environments; Published in the proceedings of the 1998 IEEE International Conference on Intelligent Vehicles.
2. Automotive Multimedia Interface Collaboration; Briefing Presented to the 9th VERTIS Symposium, April 1999, Tokyo Japan.
3. Privacy and Authenticity in Telematics Systems; Published in the Proceedings of the Society of Automotive Engineers World Congress, 1999
4. Automated Highway Systems Acceptance and Liability; Briefing presented to the Automated Vehicle Guidance Demo 98 Conference, Rinjwoude, The Netherlands, June 1998.
5. What is Telematics? Briefing presented at IIR Telematics Conference Scottsdale, AZ, December 2001
6. Advanced Telematics Services: A Hard Look at Reality; Briefing presented at IIR Telematics Conference Scottsdale, AZ, December 2001
7. Consumer Electronics and Telematics; Briefing presented at Eye For Auto Telematics Update Conference Las Vegas, NV, January 2003
8. The Automotive Multimedia Interface Collaboration Software and Network Architecture: Extending the Concept of Platform Independent Computing;

- Briefing Presented to the Future Generation Software Architectures in the Automotive Domain Conference, San Diego, CA, January 2004
9. Quality, Choice and Value: How New Architectures are Changing the Vehicle Lifecycle; Briefing presented at IEEE Convergence Conference, October 2004
 10. Critical Standards for the Next Generation of Telematics Systems and Services; Briefing presented at the Telematics Update Conference, December 2004
 11. VII System Overview; Briefing presented To Transportation Research Board, ITS and V-HA Committees 2007 Mid-Year Meeting; July 2007
 12. Testing and Development of In-Vehicle Equipment and Private Applications (P08-1634); Briefing presented to the Transportation Research Board Annual Meeting, Washington, DC, January 2008
 13. A Comparison of Communications Systems for VII; Presented at the ITS World Congress, New York, NY, October, 2008
 14. Vehicle Infrastructure Integration Systems Overview; Presented at the ITS America Annual Meeting, June 1 2009, National Harbor, Maryland
 15. Telematics Standards: Logical Next Steps; ITS International, August 2009
 16. IntelliDriveSM Overview; ITS International, May 2009
 17. Time Synchronization and Positioning Accuracy in Cooperative IntelliDriveSM Systems; Presented at the 2010 ITS America Annual Meeting, June 2010, Houston, Texas
 18. Systematic Development of Positioning Requirements for Vehicle Applications; Presented at the 18th World Congress on Intelligent Transportation Systems , November, 2011, Orlando, Florida
 19. The Interpretation of GPS Positioning Accuracy and Measurement Integrity in a Dynamic Mobile Environment; Presented at the 18th World Congress on Intelligent Transportation Systems, November, 2011, Orlando, Florida
 20. Connected Vehicle Positioning Requirements and Possible Solutions; Presented at the 22nd World Congress on Intelligent Transportation Systems, October, 2015, Bordeaux, France
 21. Connected Vehicle Performance Requirements; Presented at the 22nd World Congress on Intelligent Transportation Systems, October, 2015, Bordeaux, France

Patents

1. Mobile Body Reporting Device And Its System; Patent Number: JP11118902; 4/30/1999
2. Multiformat Auto-Handoff Communications Handset; Patent Number: US5,649,308; 07/15/1997
3. A Communications Terminal Device, A Communications System, And A Storing Medium For Storing A Program To Control Data Processing By The Communications Terminal Device; Patent Number: EP0867850, A3; 09/30/1998
4. Communication System For Controlling Data Processing According To A State Of A Communication Terminal Device; Patent Number: US 6,122,682 3/23/1998
5. Method And Apparatus For Controlling An Adjustable Device; Patent Number: US 5,864,105; 01/26/1999
6. Automatic Brake Device; Patent Number: JP2000108866; 4/18/2000
7. Visual Field Base Display System; Patent Number: JP2000029618; 01/28/2000
8. Intersection Warning System; Patent Number: US 5,926,114; 07/20/1999
9. Security For Anonymous Vehicular Broadcast Messages; Patent Number: US 7,742,603 3/27/2006
10. Digital Certificate Pool; Patent Number: US7,734,050 3/27/2006
11. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 7,802,263 9/21/2010
12. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 8,209,705 6/26/2012
13. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 8,566,843 10/22/2013
14. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 9,575,817 2/21/2017
15. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 9,705,765 7/11/2017
16. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 10,002,036 6/19/2018

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18. System, Method And Computer Program Product For Sharing Information In A Distributed Framework; Patent Number: US 10,248,477 4/2/2019
19. System for Location Based Triggers for Mobile Devices; Patent Number 9,973,899 5/15/2018
20. System for Location Based Triggers for Mobile Devices; Patent Number 10,194,291 1/29/2019
21. System for Location Based Triggers for Mobile Devices; Patent Number 10,194,292 1/29/2019
22. System for Location Based Triggers for Mobile Devices; Patent Number 10,349,243 7/9/2019
23. System for Location Based Triggers for Mobile Devices; Patent Number 10,499,215 12/3/2019
24. System for Location Based Triggers for Mobile Devices; Patent Number 10,631,146 4/21/2020
25. System for Location Based Triggers for Mobile Devices; Patent Number 10,735,922 8/4/2020