UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.
Petitioner

v.

LYNK LABS, INC.
Patent Owner

Patent No. 10,499,466

# PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,499,466

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# I. INTRODUCTION

Samsung Electronics Co., Ltd. ("Petitioner" or "Samsung") requests *inter partes* review of claims 1-16 ("challenged claims") of U.S. Patent No. 10,499,466 ("the '466 patent") (Ex. 1001) assigned to Lynk Labs, Inc. ("PO"). For the reasons below, the challenged claims should be found unpatentable and canceled.

# II. MANDATORY NOTICES

**<u>Real Parties-in-Interest</u>**: Petitioner identifies the following as the real parties-in-interest: Samsung Electronics Co., Ltd., Samsung Electronics America, Inc.

**<u>Related Matter</u>**: The '466 patent is at issue in the following matter:

- *Samsung Electronics Co., Ltd. v. Lynk Labs, Inc.*, No. 1-21-cv-02665 (N.D. Ill.) (seeking declaratory judgment of non-infringement as to the '466 patent and also U.S Patent Nos. 10,492,252, 10,506,674, 10,966,298, 11,019,697, 10,492,251, 10,750,583, 10,687,400, and 10,517,149) ("Illinois Litigation")

The '466 patent claims priority to two provisional applications (U.S. Provisional Application Nos. 60/574,653 filed February 25, 2004 and 60/559,867 filed April 6, 2004) to which U.S. Patent No. 8,531,118, which was at issue in IPR2016-01133, also claims priority.

**Counsel and Service Information**: Lead counsel: Naveen Modi (Reg. No. 46,224), and Backup counsel are (1) Joseph E. Palys (Reg. No. 46,508), (2) Arvind Jairam (Reg. No. 62,759), (3) Howard Herr (*pro hac vice* admission to be requested). Service information is Paul Hastings LLP, 2050 M St., Washington, D.C., 20036, Tel.: 202.551.1700, Fax: 202.551.1705, email: PH-Samsung-LynkLabs-IPR@paulhastings.com. Petitioner consents to electronic service.

## III. PAYMENT OF FEES

The PTO is authorized to charge any fees due during this proceeding to Deposit Account No. 50-2613.

## IV. GROUNDS FOR STANDING

Petitioner certifies that the ’466 patent is available for review and Petitioner is not barred or estopped from requesting review on the grounds identified herein.

## V. PRECISE RELIEF REQUESTED AND GROUNDS

Claims 1-16 should be canceled as unpatentable based on the following grounds:

**Ground 1**: Claims 1 and 2 are unpatentable under pre-AIA 35 U.S.C. § 103(a) as being obvious over *Hack* (Ex. 1005), *Gleener* (Ex. 1007), and *Garcia* (Ex. 1006);

**Ground 2**: Claims 3-6 are unpatentable under § 103(a) as being obvious over *Hack*, *Siwinski* (Ex. 1058), and *Srivastava* (Ex. 1052);

**<u>Ground 3</u>**: Claim 7 is unpatentable under § 103(a) as being obvious over *Hack*, *Logan* (Ex. 1010), *Siwinski*, and *Srivastava*;

**<u>Ground 4</u>**: Claim 8 is unpatentable under § 103(a) as being obvious over *Hack*, *Logan*, *Siwinski*, *Srivastava*, and *Gleener*;

**<u>Ground 5</u>**: Claims 9 and 10 are unpatentable under § 103(a) as being obvious over *Hack*, *Garcia*, *Cordelli* (Ex. 1055), and *Perry* (Ex. 1012);

**<u>Ground 6</u>**: Claims 11 and 14-16 are unpatentable under § 103(a) as being obvious over *Hack*, *Zhang* (Ex. 1051), and *Garcia*; and

**<u>Ground 7</u>**: Claims 12 and 13 are unpatentable under § 103(a) as being obvious over *Hack*, *Zhang*, *Garcia*, and *Beart*.

The ’466 patent issued December 3, 2019 from Application No. 16/523,542 filed July 26, 2019, and claims priority via a chain of applications to eight provisional applications, the earliest of which is U.S. Provisional Application No. 60/547,653 filed February 25, 2004, which Petitioner assumes for the purposes of this proceeding is the critical date for the ’466 patent (Petitioner does not concede that the priority claim to the foregoing provisional, or any application in the priority chain, is proper).

*Hack* published July 31, 2003 from an application filed December 6, 2002. *Cordelli* published December 18, 2003 from an application filed June 17, 2002.

Therefore, *Hack* and *Cordelli* qualify as prior art under pre-AIA 35 U.S.C. §§ 102(a) and/or (e).

*Siwinski* issued November 9, 2004 from an application filed July 23, 2001. *Beart* published July 1, 2004 from an international (PCT) application filed December 16, 2003 that was published in English and designated the United States. Thus, *Siwinski* and *Beart* qualify as prior art at least under pre-AIA 35 U.S.C. § 102(e).

*Gleener* published November 28, 2002. *Garcia* issued October 5, 1999. *Srivastava* issued December 31, 2002. *Logan* published April 15, 1987. Thus, *Gleener*, *Garcia*, *Srivastava*, *Logan*, and *Zhang* qualify as prior art at least under pre-AIA 35 U.S.C. § 102(b).

None of these references were considered during prosecution. (*See generally* Ex. 1004.)

## VI. LEVEL OF ORDINARY SKILL

A person of ordinary skill in the art as of the claimed priority date of the '466 patent ("POSITA") would have had at least a bachelor's degree in electrical engineering, computer engineering, computer science, physics, or the equivalent, and two or more years of experience with LED devices and/or related circuit design, or a related field. (Ex. 1002, ¶¶20-21.)[2] More education can supplement practical experience and vice versa. (*Id.*)

## VII. OVERVIEW OF THE ’466 PATENT

While the ’466 patent purports to identify an invention directed to an LED device/system having various features (*e.g.,* Ex. 1001, 4:27-11:3, 13:40-14:6), the claims are broadly directed to a generic apparatus having a combination of known components and features, such as an LED, data receiver, touch circuit, lens, and a battery (*id.*, 28:15-30:16). The ’466 patent was allowed on first action during prosecution (Ex. 1004, 62-69), the Examiner’s reasons focused on the claimed “transmission conductor configured to wirelessly receive an alternating electromagnetic field that is used to provide power [to] charge the apparatus” (*id.*, 68). However, like all of the other generically claimed features were already known in the prior art. *See In re Gorman*, 933 F.2d 982, 986 (Fed. Cir. 1991) (“The criterion ... is not the number of references, but what they would have meant to a person of ordinary skill in the field of the invention.”). (*Infra* Section IX; Ex. 1002, ¶¶56-57; *see also id.*, ¶¶22-55 (citing, *inter alia*, Exs. 1008, 1061-1079, 1088-1089), 59-201; *see generally* Ex. 1004; Exs. 1022-1043.)

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[2] Petitioner submits the declaration of R. Jacob Baker, Ph.D., P.E. (Ex. 1002), an expert in the field of the ’466 patent. (Ex. 1002, ¶¶1-19; Ex. 1003.)

## VIII. CLAIM CONSTRUCTION

The Board only construes the claims when necessary to resolve the underlying controversy. *Toyota Motor Corp. v. Cellport Systems, Inc.*, IPR2015-00633, Paper No. 11 at 16 (Aug. 14, 2015) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). For purposes of this proceeding, Petitioner believes that no special constructions are necessary to assess whether the challenged claims are unpatentable over the asserted prior art.[3] (Ex. 1002, ¶58.)

## IX. DETAILED EXPLANATION OF GROUNDS

### A. Ground 1: Claims 1 and 2 Are Obvious Over *Hack*, *Gleener*, and *Garcia*

#### 1. Claim 1

##### a) An apparatus comprising:

*Hack* discloses a portable communications device 100 ("apparatus"). (Ex. 1005, ¶[0010] ("Such display systems can be used as hand-held, portable

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[3] Petitioner reserves all rights to raise claim construction and other arguments, including challenges under 35 U.S.C. §§ 101 or 112, in district court as relevant to those proceedings. *See, e.g.*, *Target Corp. v. Proxicom Wireless, LLC*, IPR2020-00904, Paper 11 at 11–13 (Nov. 10, 2020). A comparison of the claims to any accused products in litigation may raise controversies that are not presented here given the similarities between the references and the patent.

communications devices."), FIG. 2A (below); *see also id.*, ¶[0029] ("multi-media display communications device 100").)

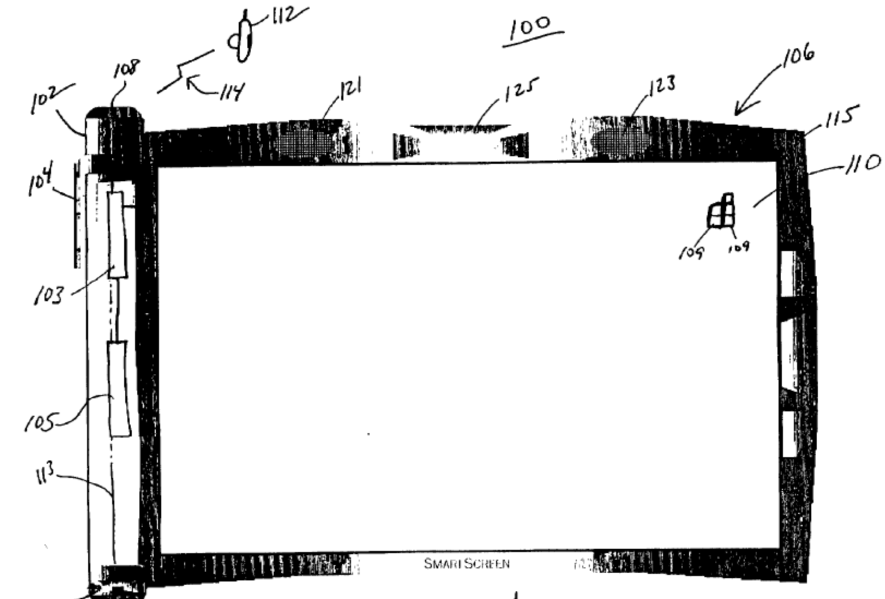



FIG. 2A

(*Id.*, FIG. 2A; *see also id.*, ¶¶[0020], [0029]-[0067] (describing device 100 and Figure 2A), FIGS. 1A-1C, 3A-3C; Sections IX.A.1(b)-(f); Ex. 1002, ¶¶92-93.)

**b) an LED circuit comprising at least one LED;**

*Hack* discloses this limitation.[4] (Ex. 1002, ¶94.) For instance, *Hack*'s device 100 includes a display 106 having a display screen 110 (Ex. 1005, FIG. 2A, ¶[0063]) "comprising a plurality of pixels 109" (*id.*, ¶[0063]) comprising "light emitting elements," which are "OLEDs." (*Id.*; *see also id.*, ¶¶[0064], [0066], [0071]-[0072],

[4] PO relies on an LED display for this limitation in the Illinois Litigation. (*E.g.*, Ex. 1081; Ex. 1082, 2, 26, 59; Ex. 1083, ¶¶39-40; Ex. 1086; Ex. 1087, 2, 25, 54.)

[0076].) A POSITA would have understood that "OLEDs" (an acronym for "organic light emitting diodes") are an example of light emitting diodes (LEDs). (Ex. 1002, ¶94; *see also* Ex. 1005, ¶¶[0004], [0070].) A POSITA would have understood that device 100 containing LEDs necessarily includes an LED *circuit* comprising at least one LED. (Ex. 1002, ¶94.) For example, a POSITA would have had this understanding because an LED is an electrical component that requires power to operate, and such power is provided via a circuit by which current flows across the LED. (*Id.*) Indeed, without an LED circuit, an LED cannot operate. (*Id.*)

**c) a data receiver, wherein the data receiver is configured to receive data from an antenna;**

*Hack* discloses this limitation. (Ex. 1002, ¶95.) For instance, *Hack* discloses receiving data, and further discloses that "device 100 includes radio **transceiver** means 104, such as an **antenna**, for example, for transmitting output radio signals and receiving input radio signals." (Ex. 1005, ¶[0035]; *see also id.*, ¶¶[0010], [0034] ("**data** that the device **receives**"), [0035] ("The radio transceiver means 104 can be adapted to transmit and receive communications signals via any electromagnetic carrier…"), [0040] ("[A]ntenna 104 is adapted to transmit and **receive** broadband, audio/video signals for internet access and telephony. That is, the antenna is capable of transmitting and receiving full duplex data and voice, and provides broadband internet access."), [0042] ("**data** rates of up to about 10 Mbps, or more, are anticipated), [0078], Abstract.)[5] *Hack* discloses that the data obtained from the antenna is processed by downstream components of device 100. For example, "antenna 104 is electrically coupled to [a] processor 103," which is for processing data obtained from the antenna. (*Id.*, ¶[0039]; *see also id.*, ¶[0043]; Ex. 1002, ¶95.) Thus, device 100 includes a data receiver configured to receive data from *Hack*'s antenna, so that the received data can be processed as described in *Hack*. (Ex. 1002, ¶95.)

**d) an adjustable capacitor coupled to the antenna, wherein the adjustable capacitor is configured to tune the antenna; and**

While *Hack* does not explicitly disclose an adjustable capacitor coupled to *Hack*'s antenna, where the adjustable capacitor is configured to tune the antenna, it would have been obvious in view of *Gleener* and state of the art to configure *Hack*'s device 100 to implement such features.[6] (Ex. 1002, ¶¶96-100.) *Gleener* relates to antennas used for RF communications, e.g., in the context of a wireless phone, and thus a POSITA would have found it relevant to consult the teachings of *Gleener* when implementing *Hack*'s device 100 (e.g., cell phone), which includes an antenna

[5] Emphasis added unless indicated otherwise.

[6] PO provides no details how this limitation is met in its contentions. (Ex. 1082, 3-4, 27, 60; Ex. 1087, 3-4, 26, 55.)

for RF communications, e.g., by wireless phones. (Section IX.A.1(c); Ex. 1005, ¶¶[0010], [0034]-[0035], [0040], [0042], [0078], Abstract; Ex. 1007, Abstract, ¶¶[0001]-[0002], [0008]; Ex. 1002, ¶96.) For example, a POSITA contemplating implementing *Hack*'s antenna, which can be used for receiving various types of signals (Ex. 1005, ¶0033), would have sought to consider antenna-related references (such as *Gleener*) and would have found *Gleener* to be a relevant resource regarding how to implement *Hack*'s antenna and/or operate it efficiently, particularly because *Gleener* describes its antenna system as being broadly applicable to various types of antennas. (Ex. 1007, ¶¶[0020], [0027]; Ex. 1002, ¶96.)

*Gleener* discloses a "tunable…antenna system" with a "matching network [104] electrically connected to the transceiver [102]," where "the transceiver may be a…receiver" (Ex. 1007, ¶[0012]), and shows in Figure 3 a variable capacitor 108 (red below) and an antenna 106 (blue below).

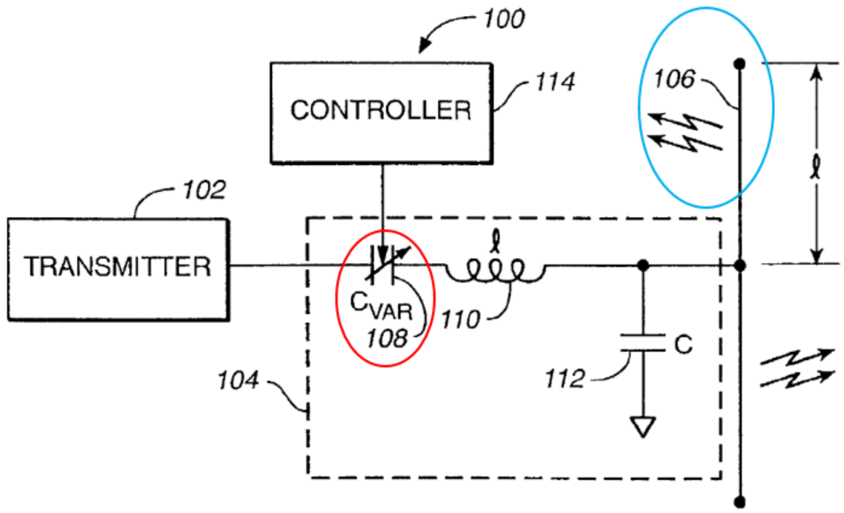



FIG._3

(*Id.*, FIG. 3 (annotated); *see also id.*, ¶¶[0021]-[0022] (describing Figure 3); Ex. 1002, ¶97.)

*Gleener* explains that "referring to FIG. 3, the matching network 104 has a **variable capacitor 108**…connected to the transceiver 102," and an "inductor 110 is electrically connected to the antenna 106," wherein "[t]he matching network 104 **provides impedance matching between the antenna 106 and the transceiver 102** for two frequency bandwidths." (Ex. 1007, ¶¶[0021]-[0022].) "By including the variable capacitor 108 it is possible to **tune the antenna** system 100 for a high bandwidth $B_h$ and a low bandwidth $B_l$." (*Id.*, ¶[0022]; *see also id.*, ¶¶[0013] ("[T]he **variable capacitor is operative to tune the antenna** to a first frequency bandwidth centered on the first frequency and a second frequency bandwidth centered on the second frequency."), [0014], [0024], Abstract; Ex. 1002, ¶98.)

In light of *Gleener*'s disclosures regarding variable capacitor 108 ("adjustable capacitor") that is coupled to antenna 106 and configured to tune the antenna, a POSITA would have been motivated, and found it predictable, to configure *Hack*'s device 100 to include an adjustable capacitor coupled to *Hack*'s antenna, wherein the adjustable capacitor is configured to tune the antenna. (Ex. 1002, ¶99.) For example, a POSITA would have recognized that such a configuration enables an antenna to be precisely tuned to a frequency at which communications are to be received, and also enables it to be tuned to one of multiple frequencies, which increases the versatility of the antenna. (Ex. 1007, ¶¶[0011], [0014]; Ex. 1002, ¶99.) Indeed, *Gleener* explains that such a configuration advantageously "decreas[es] the size and complexity of dual bandwidth antenna systems." (Ex. 1007, ¶[0011].) A POSITA would have found such a configuration useful for *Hack*'s device and consistent with its principles of operation, e.g., because *Hack* describes transmitting/receiving "narrowband and/or broadband signals," including signals compatible with various digital radio standards, for which a POSITA would have found tuning to one or more desired frequencies to be beneficial. (Ex. 1005, ¶[0041]; Ex. 1002, ¶99.)

A POSITA would have found such a configuration to be straightforward and would have had a reasonable expectation of success implementing it. (Ex. 1002, ¶100.) For example, a POSITA would have known that such a configuration was well known in the art and therefore was feasible to implement in the context of *Hack*'s device. (Ex. 1044, 2:62-65, 4:49-55, Abstract; Ex. 1002, ¶100.)[7] Indeed, the above configuration would have been a mere combination of known components and technologies, according to methods known in the art, to produce the predictable outcome of tuning an antenna. (Ex. 1002, ¶100.) *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007).

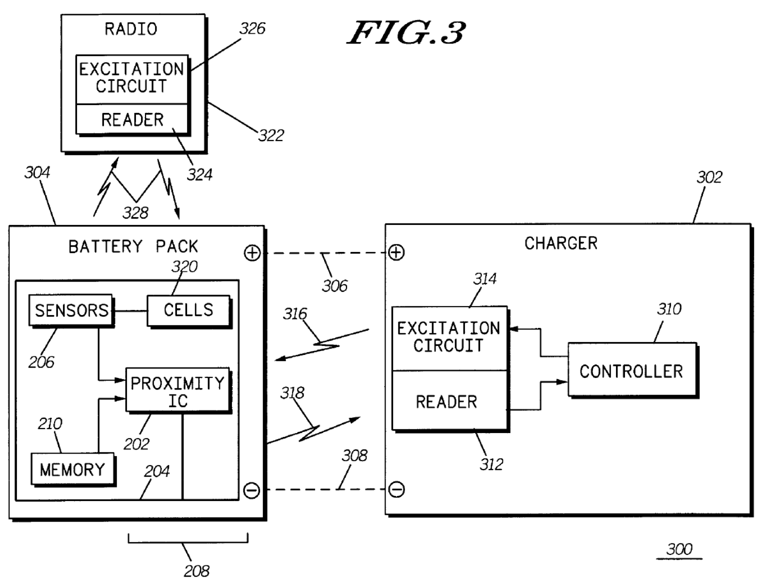
**e) a transmission conductor configured to wirelessly receive an alternating electromagnetic field that is used to provide power to charge the apparatus;**

While *Hack* does not explicitly disclose *a transmission conductor configured to wirelessly receive an alternating electromagnetic field that is used to provide power to charge Hack*'s device 100 ("apparatus"), it would have been obvious in view of *Garcia* to configure device 100 to implement such features. (Ex. 1002, ¶¶101-110.) *Garcia* "relates to battery charging systems, and more particularly to wireless battery charging systems" for charging batteries of "[p]ortable communications products, [which] are often powered off of rechargeable batteries." (Ex. 1006, 1:6-11; *see also id.*, 2:30-3:41, FIGS. 2-3; Ex. 1002, ¶101.) Therefore, a POSITA would have found it relevant to consider the teachings of *Garcia* when implementing *Hack*'s device 100, which is a portable wireless communications

[7] Exhibit 1044 demonstrates state of the art. (Ex. 1002, ¶100.)

device having a rechargeable battery. (Ex. 1005, Abstract, ¶¶[0029], [0035], [0041], [0047], [0053], [0055]; Ex. 1002, ¶101.)

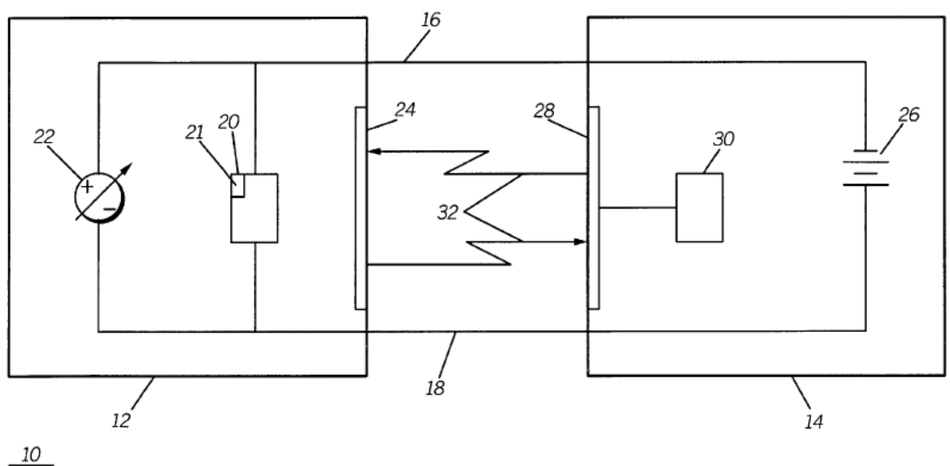
*Garcia* discloses that its "wireless battery charging system" (Ex. 1006, Title) wirelessly charges a battery through a technique described in *DeMuro* (Ex. 1014), which is incorporated by reference into *Garcia*. (Ex. 1006, 2:67-2:4; Ex. 1002, ¶102.) For example, *Garcia* discloses with reference to Figure 3 (below) that a battery charging system 300 includes a charger 302 that wirelessly charges a rechargeable battery pack 304 "in the same manner as … described by [*DeMuro*]." (Ex. 1006, 3:19-22; *see also id.*, 2:60-3:41; Ex. 1002, ¶102.)




(Ex. 1006, FIG. 3.)

Similarly, Figure 1 of *Garcia* (below), which is identical to Figure 1 of *DeMuro* except for being labeled "PRIOR ART," describes the wireless charging technique of *DeMuro*, which was known at the time of *Garcia*, and which *Garcia* summarizes as follows: "When the battery pack 14 is brought next to the battery charger 12 through a small distance, a communication link is established over the wireless channel 32[, and] [t]he battery charger 12 then commences a recharge process…" (Ex. 1006, 2:4-18; Ex. 1002, ¶103.)

FIG.1
(PRIOR ART)




(Ex. 1006, FIG. 1; *see also* Ex. 1014, FIG. 1 (same).)

*DeMuro* provides additional details regarding the wireless charging technique implemented in *Garcia*'s system. (Ex. 1002, ¶104.) For example, *DeMuro* explains that charger 12 wirelessly charges battery pack 14 (both are shown above in Figure 1) through the use of a magnetic flux signal that is transmitted from excitation coil 50 (red below) of charger circuit 40 to coil 58 (blue below) of battery circuit 42. (Ex. 1014, 2:65-3:36, FIG. 2; Ex. 1002, ¶104.)

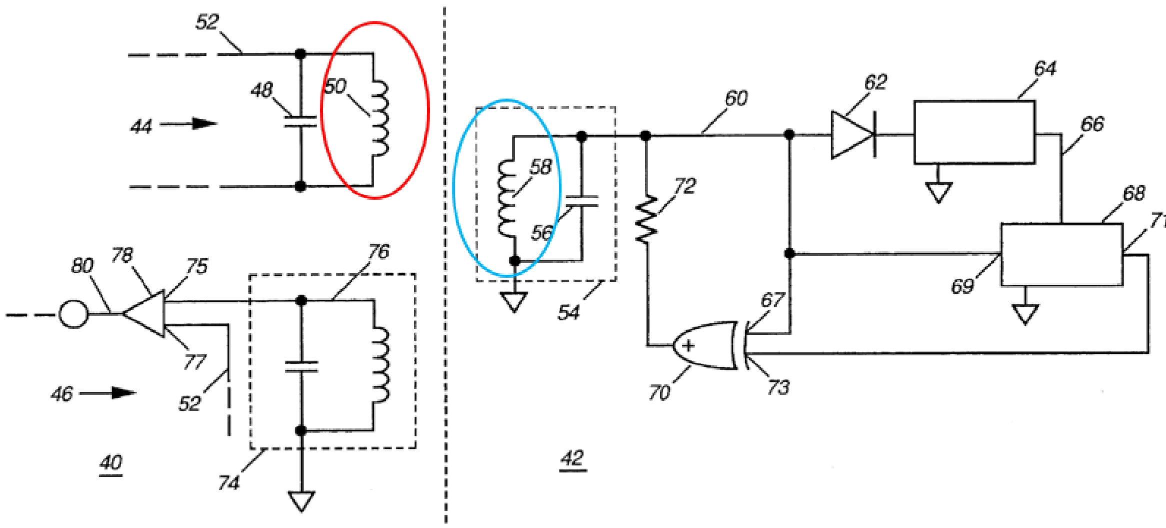



***FIG. 2***

(Ex. 1014, FIG. 2 (annotated); Ex. 1002, ¶104.)

In particular, *DeMuro* discloses that "[a]n oscillator…provides an excitation signal on line 52 to the excitation circuit to excite it, [and] [a]s a result, the charger excitation coil 50 has an **alternating magnetic flux** [that is] provide[d] … in the wireless channel 32 shown in FIG. 1." (Ex. 1014, 3:8-14; Ex. 1002, ¶105.) "When the **coil 58 encounters the magnetic flux signal** of the charger excitation coil 50 …, it is **magnetically coupled** into the charger circuit, 40, [and] [t]he battery tank circuit 54 is stimulated by the magnetic flux signal produced by the charger excitation coil 50, which resonates sympathetically, thus providing a sinusoidal signal on line 60." (Ex. 1014, 3:20-29.) *DeMuro* explains that "[t]his sinusoidal signal is fed to a rectifier 62, and the resulting rectified signal" is further processed to "produce[] a regulated DC voltage on line 66[, which] is used to power components" of the battery circuit 42. (*Id.*, 29-35; Ex. 1002, ¶105.)

Thus, *Garcia* discloses (including the incorporated *DeMuro* disclosures regarding details of *Garcia*'s wireless charging system) wirelessly receiving an alternating electromagnetic field that is used to provide power to charge a battery. (Ex. 1002, ¶106.) For example, a POSITA would have understood that *DeMuro*'s "alternating magnetic flux" that is transmitted to coil 58 of battery circuit 42 is an alternating electromagnetic field. (*Id.*) As shown in Figure 2 of *DeMuro* (above in this section), coil 58 is coupled to other components of battery circuit 42 through a conductor (e.g., wire) (exemplified in red below), each of which is a *transmission conductor configured* in the manner claimed in limitation 1(d). (Ex. 1014, FIG. 2; Ex. 1002, ¶106.)

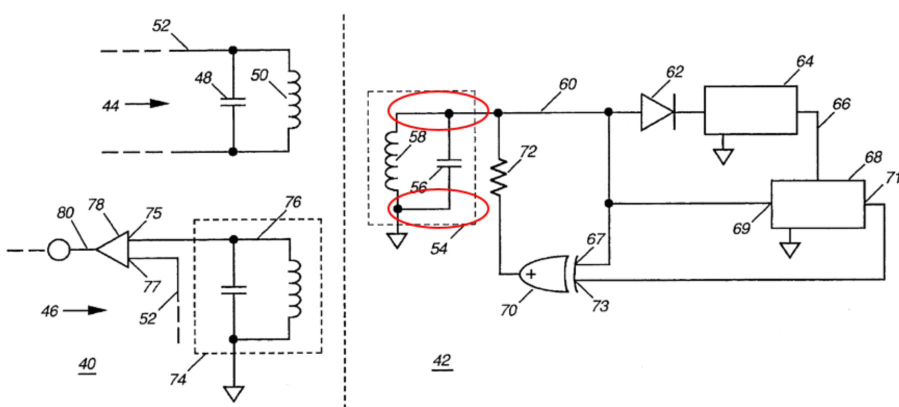



***FIG. 2***

(Ex. 1014, FIG. 2 (annotated); Ex. 1002, ¶106.)

In light of *Garcia*'s disclosure (incorporating *DeMuro*), a POSITA would have been motivated, and found it predictable, to configure *Hack*'s device 100 ("apparatus") to include a transmission conductor configured in the manner described above in this section (i.e., to implement the features of limitation 1(e)). (Ex. 1002, ¶107.) For example, a POSITA would have recognized benefits of wirelessly receiving an alternating electromagnetic field that is used to provide power to charge the battery of *Hack*'s device 100, e.g., to ensure continued supply of power to components of device 100. (Ex. 1002, ¶107.) Indeed, *Hack* discloses that its battery is rechargeable (Ex. 1005, ¶[0053]), and a POSITA would have understood that wirelessly receiving such an alternating electromagnetic field, to wirelessly charge the battery, would have been a convenient charging technique. (Ex. 1002, ¶107.) *Naskali* discloses wirelessly charging a battery using a magnetic flux transferred wirelessly from one coil to another, demonstrating that the benefit of wireless charging was known. (Ex. 1017, 5:53-66; Ex. 1002, ¶107.)[8]

Thus, a POSITA would have recognized in view of *Garcia* that the power to charge *Hack*'s device (i.e., to charge the rechargeable battery of the device) can be provided wirelessly. (Ex. 1002, ¶108.)

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[8] Exhibit 1017 demonstrates state of the art. (Ex. 1002, ¶107.)

The above configuration would have feasible and straightforward for a POSITA to implement, e.g., because inductor coils and related circuitry such as those described in *Garcia* were known to be fundamental components used in electrical engineering and circuit design. (Ex. 1002, ¶109.) A POSITA would have been capable of implementing such a configuration. (*Id.*) For example, a POSITA would have been skilled at circuit design and would have been capable of implementing a transmission conductor and related circuitry, e.g., using known integrated circuit design principles, in a manner compatible with and consistent with the structure and operation of *Hack*'s device 100. (*Id.*) Indeed, a POSITA would have known that integrated circuits (ICs) were commonly used for implementing various types of circuits in a small form factor, and such a skilled person would have been able to implement in *Hack*'s device a transmission conductor as recited in limitation 1(e), particularly given that the device already includes circuitry. (*Id.*)

A POSITA would have had a reasonable expectation of success implementing such a configuration, e.g., as demonstrated by other state of the art references also using a similar coil-based wireless power transmission technique. (Ex. 1010, Title, Abstract, 1:10-12, 2:2:1-6, 3:19-28, FIGS. 1-2; Ex. 1017, FIGS. 2-3, 5:53-66; Ex.

1002, ¶109.)[9] A POSITA would have been skilled at implementing circuits, including providing power to circuit components, and would have had the capability to make any necessary technical adaptations to *Hack*'s device to implement the above configuration. (Ex. 1002, ¶110.) For example, *Hack* describes an arrangement in with its display 106 "can be detachably coupled or removably connected to the housing 102, as well as to any number of external devices, such as … laptop or personal computers" (Ex. 1005, ¶[0103]), and thus *Hack* contemplates that its device may operate with various arrangements and sizes. (Ex. 1002, ¶110.) Therefore, a POSITA would have found it obvious to configure *Hack*'s device as needed to accommodate the above configuration in device 100, to ensure proper wireless reception of power in *Hack*'s device. (*Id.*) Accordingly, a POSITA would have been motivated to implement, and capable of implementing, any needed circuitry or design adjustments to *Hack*'s device 100 for achieving a working system with the above configuration regarding the claimed "transmission conductor…" and would have had a reasonable expectation of its successful operation. (*Id.*)

[9] Exhibit 1010 (*Logan*) is cited in Ground 1 to demonstrate state of the art. (Ex. 1002, ¶109.)

**f) wherein the apparatus is portable.**

*Hack* discloses this limitation, as discussed above for the preamble of claim 1. (Section IX.A.1(a); Ex. 1005, ¶[0010] ("Such display systems can be used as hand-held, **portable** communications devices."); *see also id.*, Abstract, ¶¶[0002]-[0003], [0041], [0103], [0118]; Ex. 1002, ¶111.)

**2. Claim 2**

**a) The apparatus of claim 1, wherein the apparatus is configured for use in telecommunications.**

*Hack* discloses this limitation. (Ex. 1002, ¶112.) For example, as discussed above for the preamble of claim 1, *Hack* discloses a "communications device 100" ("apparatus"), which a POSITA would have understood is configured for use in telecommunications. (Ex. 1005, ¶[0029]; *see also id.*, ¶¶[0036] ("process, transmit, and receive packet-switched communications..., [0037]; Section IX.A.1(a); Ex. 1002, ¶112.)

### B. Ground 2: Claims 3-6 Are Obvious Over *Hack*, *Siwinski*, and *Srivastava*

#### 1. Claim 3

##### a) An apparatus comprising:

*Hack* discloses a communications device 100 ("apparatus"), as discussed above for the preamble of claim 1. (Section IX.A.1(a); Ex. 1002, ¶¶113-114; *see also* Sections IX.B.1(b)-(f).)

##### b) an LED circuit comprising a plurality of LEDs;

*Hack* discloses this limitation. (Ex. 1002, ¶¶115-117.) *Hack* discloses that "a flexible **OLED backlight** can be used to illuminate a flexible LCD to provide a flexible backlit LCD." (Ex. 1005, ¶[0072].) A POSITA would have understood that organic LEDs (LEDs) are a type of LEDs, and that *Hack*'s device includes an OLED *circuit* ("LED circuit") comprising the OLEDs that provide backlighting, because OLEDs require current, which a POSITA would have known flows in an electrical circuit. (Ex. 1054, 3:24-39; Ex. 1056, ¶[0034]; Ex. 1002, ¶115.)[10] To the extent *Hack* does not specifically disclose how many OLEDs are used (and specifically, that a *plurality* of OLEDs are used) for providing *Hack*'s backlighting, it would have been obvious in view of the state of the art to implement a *plurality* of OLEDs for such backlighting. (Ex. 1002, ¶115.)

[10] Exhibits 1054 and 1056 are cited to demonstrate state of the art. (Ex. 1002, ¶115.)

For example, a POSITA would have known that the choice of using a single OLED, or instead a plurality of OLEDs, for providing OLED backlighting would have been a design choice. (*Id.*, ¶116.) Accordingly, a POSITA would have recognized that at least in some contexts, it would have been predictable and appropriate to use a plurality of OLEDs for such backlighting. (*Id.*) For example, a POSITA would have recognized that using a plurality of OLEDs for backlighting would have enabled increased illumination and/or more uniform illumination for the backlighting, through appropriate spatial positioning of the OLEDs. (*Id.*) Indeed, it was known to use multiple OLEDs for backlighting. (Ex. 1011, 5:55-67; *see also id.*, Title, Abstract; Ex. 1002, ¶116.)[11]

Moreover, *Hack* itself discloses using multiple OLEDs, for implementing a display. (Ex. 1005, ¶¶[0063] ("[T]he light emitting elements are ... organic light emitting devices (OLEDs)..."), [0064] ("OLEDs"), [0066] ("the OLEDs"). At minimum, in light of the state of the art (as discussed above) regarding using multiple OLEDs for backlighting, and *Hack*'s disclosure of multiple OLEDs, a POSITA would have found it predictable and obvious to implement *Hack*'s OLED backlighting using a plurality of OLEDs. (Ex. 1002, ¶117.) Such an implementation would have been a mere combination of known components and

[11] Exhibit 1011 demonstrates state of the art. (Ex. 1002, ¶116.)

technologies—indeed, a mere multiplicity of a known component (OLED)—according to known methods, to produce predictable results with a reasonable expectation of success. (Ex. 1002, ¶117.) *KSR*, 550 U.S. at 416.

**c) a data receiver, wherein the data receiver is configured to receive data from an antenna;**

*Hack* discloses or suggests this limitation for the reasons discussed above regarding limitation 1(c). (Section IX.A.1(c); Ex. 1002, ¶118.)

**d) a circuit configured to detect touch via capacitive sensing, the touch being of a person; and**

*Hack* in combination with *Siwinski* discloses or suggests this limitation. (Ex. 1002, ¶¶119-125.) For example, *Hack* discloses that "the display system 106 [of device 100] includes a touch responsive screen 110 … so that the device 100 can detect the presence and position of any touch input." (Ex. 1005, ¶[0087]; *see also id.*, ¶¶[0092], [0093].) "For example, the user can use such a touch responsive screen, in conjunction with a stylus (or the user's finger) to write on the screen." (*Id.*, ¶[0087]; *see also id.*, ¶¶[0011], [0013], [0022]-[0023], [0089], FIGS. 4-5.) Thus, *Hack* discloses that device 100 is configured to detect touch, the touch being of a person. (Ex. 1002, ¶119.) To the extent *Hack* does not explicitly disclose the touch display uses capacitive touch sensing (and a *circuit* configured to detect touch via capacitive sensing), it would have been obvious in view of *Siwinski* to configure *Hack*'s device 100 implement such features. (*Id.*, ¶119.)

A POSITA would have understood that capacitive touch sensing was a known way of implementing touch input technologies. (Ex. 1002, ¶120; *see also* Ex. 1048, ¶[0037]; Ex. 1049, ¶¶[0011]-[0013], FIGS. 1, 8, 9 ¶¶[0014], [0036], [0041] [0052], [0064]; Ex. 1050, ¶¶[0107], [0116], [0132].)[12] Indeed, *Siwinski* discloses a "touch control circuit and method of manufacture" and describes various aspects of "commonly used touch screen technologies," including in the context of devices having OLED displays. (Ex. 1058, Title, 1:45-50; 2:58-3:22, FIGS. 1-5; *see also id.*, Abstract, 9:18-39; Ex. 1002, ¶120.) Therefore, a POSITA would have had reason to consider the teachings of *Siwinski* when implementing *Hack*'s device, which includes a touch responsive display, as discussed above. (Ex. 1002, ¶120.)

Consistent with that known in the art, *Siwinski* discloses in its background section with reference to Figure 1 a "prior art touch screen 10," explains that "[t]here are three commonly used touch screen technologies that utilize this basic structure: resistive, **capacitive**, and surface acoustic wave (SAW)," and shows a capacitive touch screen 10 at FIG. 3A. (Ex. 1058, 1:28-50, 2:17-37; Ex. 1002, ¶121.)

[12] Exhibits 1048, 1049, 1050 cited to demonstrate state of the art. (Ex. 1002, ¶120.)

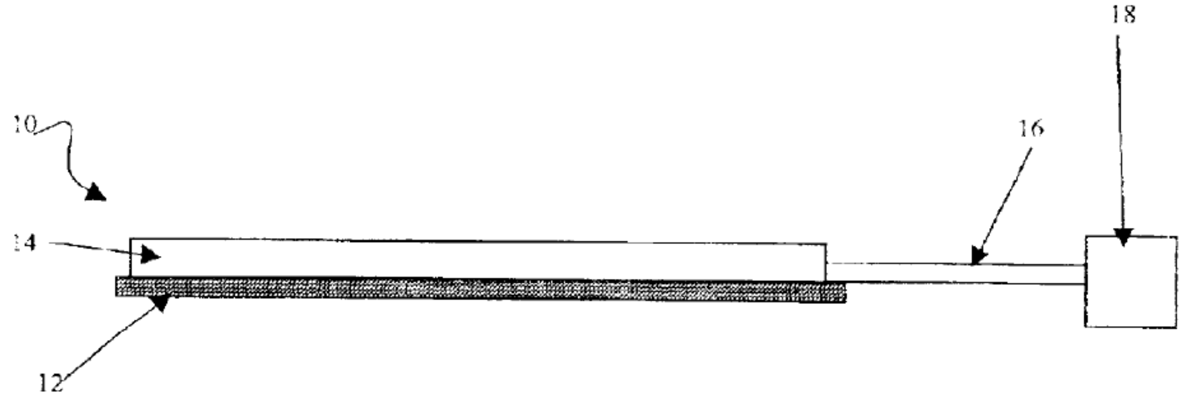


Fig. 1: (Prior art)

(Ex. 1058, FIG. 1.)

Front View

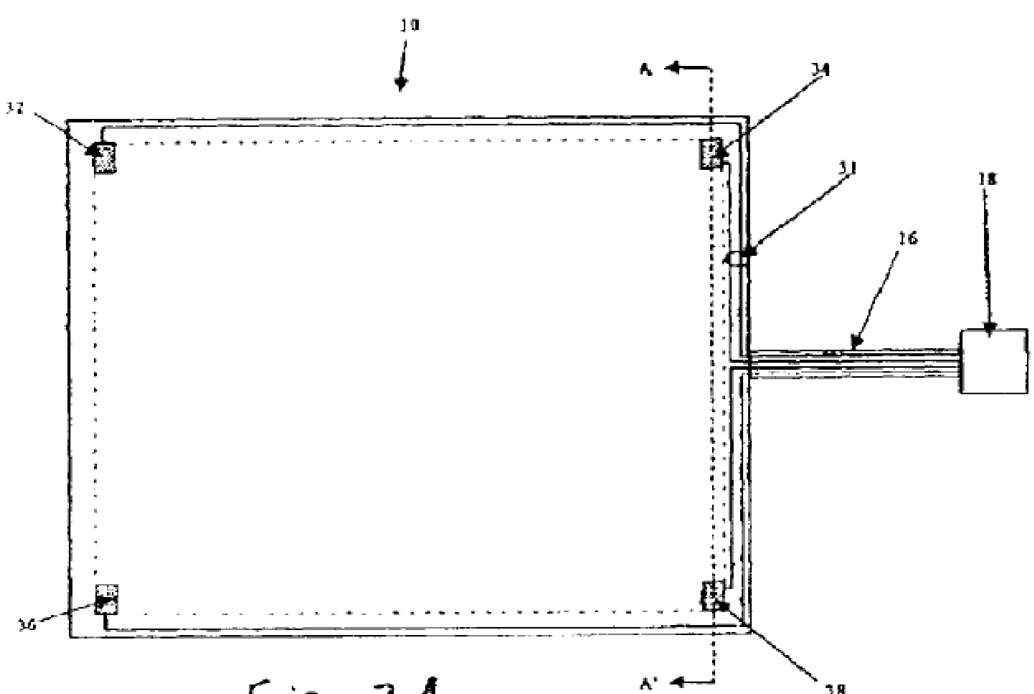


FIG. 3A
(PRIOR ART)

(*Id.*, FIG. 3A.)

Additionally, *Siwinski* describes in detail with reference to Figure 10 a particular example of a capacitive touch screen. (*Id.*, FIG. 10, 5:53-6:4 (describing capacitive touch screen shown in Figure 10); *see also id.*, FIG. 7, 3:40-43; Ex. 1002, ¶122.)

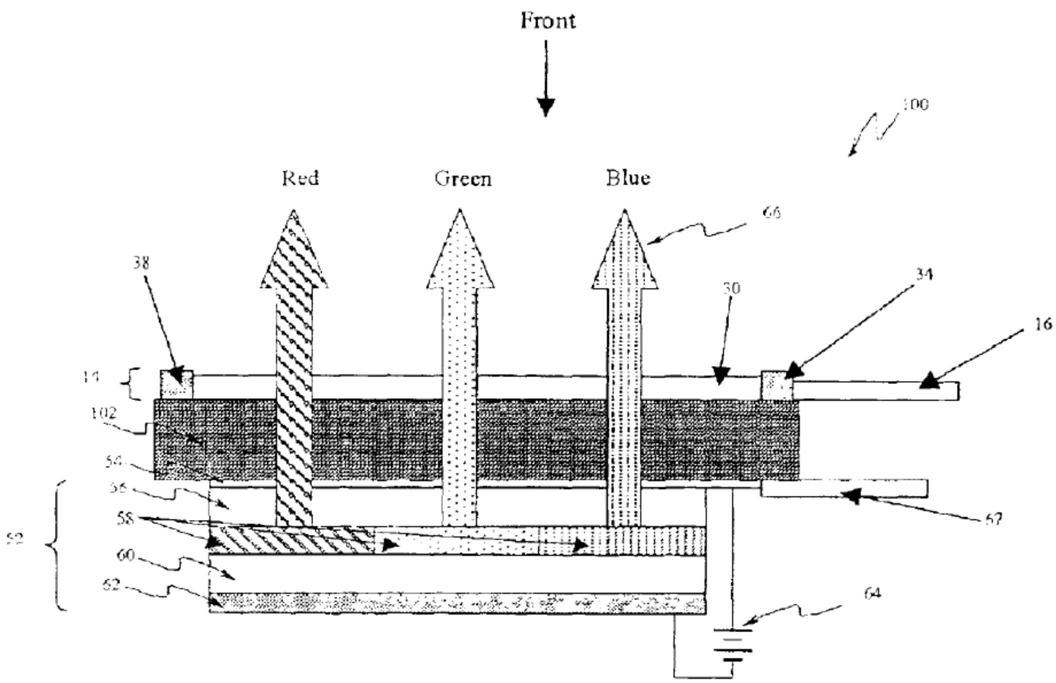


Fig. 10

(Ex. 1058, FIG. 10.)

A POSITA would have also understood that capacitive touch sensors used for touch screens/displays and the like were implemented with circuitry. (Ex. 1002, ¶123.) Indeed, *Siwinski*'s capacitive touch screen shown in Figure 10 shows a circuit, e.g., as seen from the voltage source 64 at bottom right and conductors connected to it in a manner that forms an electrical circuit. (*Id.*; *id.*, 2:67-3:3; Ex. 1002, ¶123.) Additionally, *Siwinski* describes "circuitry … necessary to detect a touch by an object" in context of Figure 1 (Ex. 1058, 1:34-38), and also describes "circuitry 31," "conductors," and an applied voltage and current flow in context of capacitive touch screen 10 of Figure 3A. (*Id.*, 2:21-33 ("When a **finger or other conductive object touches** the touch screen, it **capacitively** couples with the screen causing a minute amount of **current to flow** to the point of contact…"); Ex. 1002, ¶123.)

In light of the state of the art, further confirmed by *Siwinski*'s disclosures, a POSITA would have been motivated, and found it predictable, to configure *Hack*'s device to implement a *circuit* configured to detect touch *via capacitive sensing*. (*Id.*, ¶124.) This would have been a known and foreseeable way to implement *Hack*'s touch screen. For example, given it was known that capacitive touch screens/pads/displays and related sensors required circuitry to operate, and given that *Siwinski* expressly describes circuitry for touch detection as discussed above, a POSITA would have found it predictable to implement in *Hack*'s device 100 a *circuit* configured to detect touch, particularly because a POSITA would have recognized that device 100 is an electronic device that includes circuitry. (Ex. 1005, ¶¶[0056] ("video processing **electronics** can be used…"), [0061] ("each pixel 109 can include **circuitry**"), [0066] ("facilitate the fabrication of **circuitry**"); Ex. 1002, ¶124.) Additionally, a POSITA would have recognized that capacitive sensing was one of a finite number of identified, predictable solutions for touch detection, and such a person would have had good reason to pursue capacitive sensing as one of the known options within a POSITA's grasp. (Ex. 1058, 1:45-50; Ex. 1002, ¶124.) *KSR*, 550 U.S. at 421.

A POSITA would have found the above configuration to be a straightforward implementation and would have had a reasonable expectation of success, particularly because *Siwinski* describes details regarding how to implement one way of providing touch sensing and also because capacitive sensing and associated circuitry were commonly known used before the alleged invention date, and because a POSITA would have been aware of and had the skills to configure and implement such a capacitive touch sensing circuit in light of such knowledge and experience. (Ex. 1016, 12:14-23; Ex. 1018, ¶[0002]; Ex. 1002, ¶125.)[13] Indeed, the above modified configuration in the *Hack-Siwinski* apparatus would have been a combination of known components and technologies, according to known methods, to produce predictable results. (Ex. 1002, ¶125.) *KSR*, 550 U.S. at 416.

**e) a lens doped with particles configured to receive and transmit light from the plurality of LEDs;**

While *Hack* does not explicitly disclose the features of limitation 3(e), it would have been obvious in view of *Srivastava* to configure *Hack*'s device 100 to

[13] Exhibits 1016 and 1018 demonstrate state of the art. (Ex. 1002, ¶125.)

implement these features.[14] (Ex. 1002, ¶¶126-132.) As discussed for limitation 3(b), *Hack* discloses that its display is an OLED backlit liquid crystal display (LCD). (Section IX.B.1(b); Ex. 1005, ¶[0072].) *Srivastava* describes an illumination system for processing light emitted by a light source (e.g., OLED backlighting an LCD), and thus a POSITA would have had reason to consider the teachings of *Srivastava* when contemplating implementing *Hack*'s device that includes an OLED backlit LCD. (Ex. 1052, Title, Abstract, 1:5-12, 5:29-30; Ex. 1002, ¶126.)

*Srivastava* discloses a lens doped with phosphor particles configured to receive and transmit light from an OLED. (Ex. 1002, ¶127.) For example, *Srivastava* discloses with reference to Figure 2 (below) that an "LED chip 11 is encapsulated within a shell 17 which encloses the LED chip and an encapsulant material 19," where "[t]he encapsulant material may be, for example, an epoxy or a polymer material, such as silicone" and "[t]he shell 17 may be, for example, glass or plastic." (Ex. 1052, 7:22-36.) *Srivastava* further discloses that "[b]oth the shell 17 and the encapsulant 19 should be **transparent to allow white light 23 to be transmitted** through those elements" and "a separate shell 17 may be omitted and the outer surface of the encapsulant material 19 may comprise the shell 17." (*Id.*,

[14] PO refers to an AMOLED display for this limitation in the Illinois Litigation. (Ex. 1082, 8; Ex. 1087, 8.)

7:36-53.)

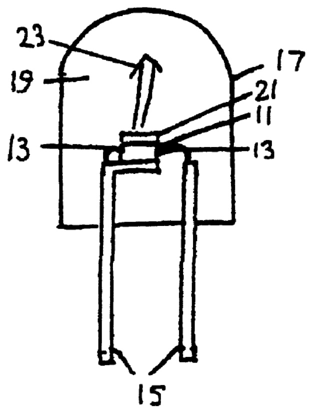


FIGURE 2

(*Id.*, FIG. 2.)

*Srivastava* further discloses with reference to Figure 3 (below) that "[t]he structure of FIG. 3 is the same as that of FIG. 2, except that [] first 3 and second 4 **phosphor powders are interspersed within the encapsulant material 19**, instead of being formed over the LED chip 11." (*Id.*, 7:58-63; *see also id.* 7:63-8:14; Ex. 1002, ¶128.) Thus, *Srivastava* discloses the use of phosphor powders ("particles"). (Ex. 1002, ¶128.)

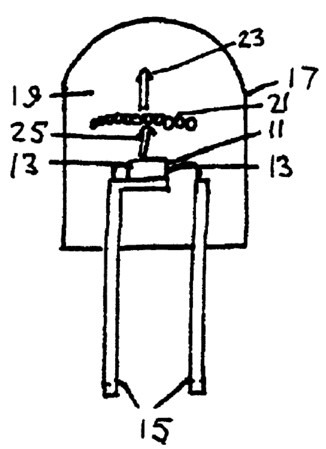


FIGURE 3

(Ex. 1052, FIG. 3.)

*Srivastava* explains that "the phosphor layer 21 [comprising the first and second phosphors 3, 4] absorbs the radiation 25 emitted by the LED and in response, emits white light 23." (*Id.*, 8:14-16; *see also id.*, 7:44-57.) *Srivastava*'s technique utilizing phosphors 3, 4 is also depicted in Figure 1:

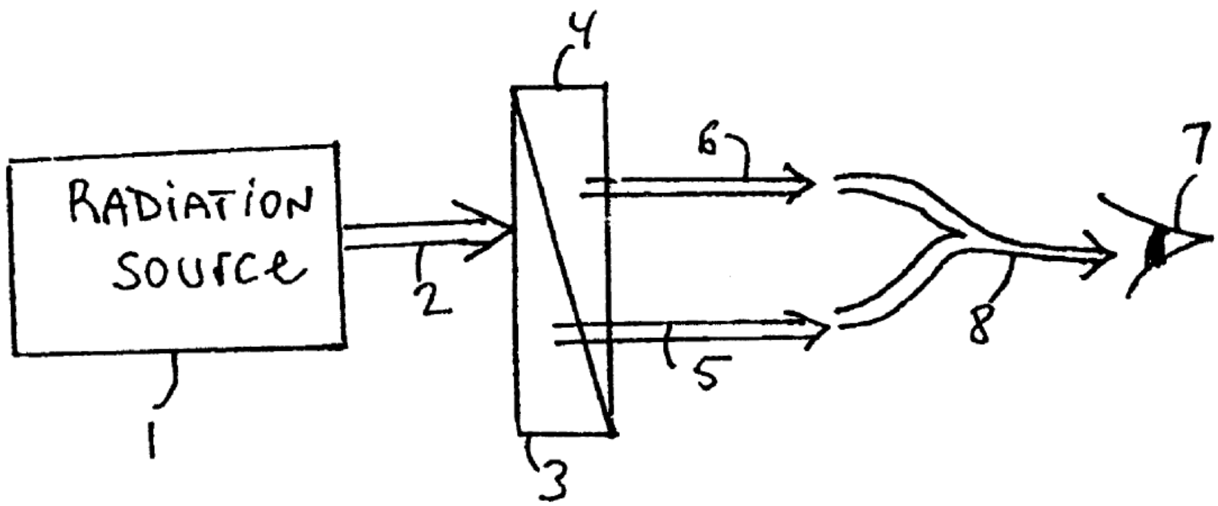


**FIGURE 1**

(Ex. 1052, FIG. 1; *see also id.*, 2:65-67, 4:25-37; Ex. 1002, ¶129.)

A POSITA would have understood that *Srivastava*'s encapsulant 19 (shown above in, e.g., Figure 3), which is transparent and within which phosphor powders are interspersed, discloses a *lens doped with particles configured to receive and transmit light*, consistent with the disclosure of the '466 patent. (Ex. 1001, 14:24-30, 16:44-50, 18:36-43, 19:6-13, FIGS. 2, 16, 25, 27; Ex. 1002, ¶130.)

In light of *Srivastava*'s disclosures in context of the knowledge of a POSITA regarding the state of the art, a POSITA would have been motivated, and found it predictable, to configure *Hack*'s device 100 to implement the features of limitation 3(e). (Ex. 1002, ¶131.) For example, *Srivastava* explains that its technique (regarding a lens with phosphor particles as discussed above) is useful in an OLED-backlit LCD, for improving color uniformity of the backlight. (Ex. 1052, 1:10-12, 1:42-49 ("[I]f the color output of the LED deviates from the desired parameters, then the light output by the system deviates [from] the desired parameters as well..."), 2:25-26.) *Srivastava* further explains that its approach yields "a white light illumination system whose color output is less sensitive to variations during system operation and manufacturing process, such as due to variations in the LED power, the width of the LED active layer band gap and the thickness of the luminescent material" (*id.*, 3:15-20) and is applicable to an OLED as a radiation source (*id.*, 5:28-29). Therefore, a POSITA would have found the above configuration of *Hack*'s device to be beneficial and predictable for improving uniformity and reliability of *Hack*'s OLEDs that provide backlighting. (Ex. 1002, ¶131.)

A POSITA would have had a reasonable expectation of success implementing the above configuration of *Hack*'s device. (Ex. 1002, ¶132.) For example, "dop[ing]" a lens with a material in the context of an LED system was known (Ex. 1015, ¶[0059]; *see also id.*, ¶¶[0049]-[0050]; Ex. 1009, ¶[0042]), and so was the use of phosphor for converting light received from an LED to a different color (Ex. 1045, 12:4-11; Ex. 1009, ¶[0042]), so a POSITA would have found the above configuration to be predictable and feasible.[15] (Ex. 1002, ¶132.) Moreover, a POSITA would have known that implementing a lens as in limitation 3(e) (e.g., a lens over a backlight OLED, in the combined *Hack-Siwinski-Srivastava* device) would have been achievable and straightforward, because as discussed above in this section, *Srivastava* explains that its lens can be implemented over an OLED. (Ex. 1052, 5:29-30 ("[T]he radiation source may comprise ... an **organic light emitting diode (OLED)**."); Ex. 1002, ¶132.) A POSITA would have had the skill to achieve a working combined *Hack-Srivastava* device compatible with the operation of *Hack*'s device, including making any necessary technical adaptations regarding implementing such a lens. (Ex. 1005, claims 13-14; Ex. 1002, ¶132.) The above configuration would have been a mere combination of known components and technologies, to produce predictable results. (Ex. 1002, ¶132.) *KSR*, 550 U.S. at 416.

**f) wherein the apparatus is portable.**

*Hack* discloses this limitation for the reasons discussed above regarding limitation 1(f). (Section IX.A.1(f); Ex. 1002, ¶133.)

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[15] Exhibits 1009 and 1015 are cited to demonstrate state of the art. (Ex. 1002, ¶132.)

### 2. Claim 4

#### a) The apparatus of claim 3, wherein the particles change a color of the light from the plurality of LEDs.

The *Hack*-*Siwinski*-*Srivastava* combination discussed above for claim 3 discloses or suggests this limitation. (Section IX.B.1(e); Ex. 1002, ¶¶134-135.) For example, *Srivastava* discloses phosphor particles that change a color of light from an OLED (e.g., *Hack*'s OLEDs in the combined *Hack*-*Srivastava* device) as shown below in Figure 1 of *Srivastava*, and it would have been obvious to modify *Hack*'s device to include this feature, to provide uniformity of backlighting in *Hack*'s device. (Section IX.B.1(e); Ex. 1002, ¶134.)

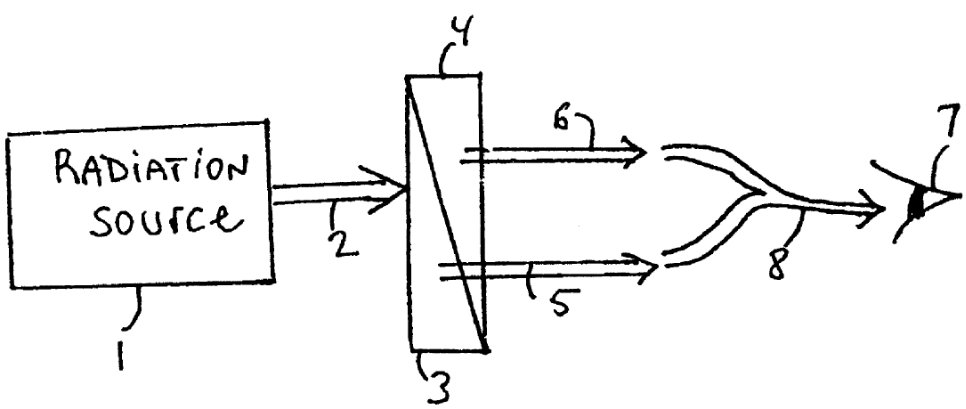


**FIGURE 1**

(Ex. 1052, FIG. 1 (showing that phosphors 3, 4 emit different color light than the radiation 2 emitted by radiation source 1; *see also id.*, 2:65-67, 4:25-37; Ex. 1002, ¶134.)

A POSITA would have had a reasonable expectation of success implementing the above modification, at least for the reasons discussed above regarding limitation 3(e) and also because such a technique for changing light color using phosphor particles was well known. (Ex. 1009, ¶[0033]; Ex. 1002, ¶135.)[16] Thus, the above modification would have been within the capabilities of a POSITA and would have been predictable and feasible. (Ex. 1002, ¶135.)

#### 3. Claim 5

##### a) The apparatus of claim 3, wherein the apparatus is configured for use in telecommunications.

*Hack* discloses this limitation for the reasons discussed above regarding claim 2. (Section IX.A.2; Ex. 1002, ¶136.)

#### 4. Claim 6

##### a) The apparatus of claim 5, wherein the apparatus is a signal output device.

*Hack* discloses this limitation. (Ex. 1002, ¶137.) For instance, as discussed above for limitation 1(c), *Hack*'s "device 100 includes radio transceiver means 104, such as an antenna, for example, for **transmitting output** radio **signals**." (Ex. 1005, ¶[0035]; Section IX.A.1(c).) Therefore, device 100 ("the apparatus"), which transmits output signals, is a *signal output* device. (Ex. 1002, ¶137.)

[16] Exhibit 1009 demonstrates state of the art. (Ex. 1002, ¶135.)

### C. Ground 3: Claim 7 Is Obvious Over *Hack, Logan*, *Siwinski*, and *Srivastava*

#### 1. Claim 7

##### a) An apparatus comprising:

*Hack* discloses a communications device 100 ("apparatus"), as discussed above for the preamble of claim 1. (Section IX.A.1(a); Ex. 1002, ¶¶138-139; *see also infra* Sections IX.C.1(b)-(g).)

##### b) an LED circuit comprising a plurality of LEDs;

##### c) a data receiver, wherein the data receiver is configured to receive data from an antenna;

*Hack* discloses these limitations for the reasons discussed above regarding limitations 3(b) and 3(c). (Sections IX.B.1(b)-(c) (identical to limitations 7(b)-(c)); *see also* Sections IX.A.1(b)-(c); Ex. 1002, ¶140.)

##### d) a first circuit comprising at least one diode coupled to the antenna;

While *Hack* does not explicitly disclose a first circuit comprising at least one diode coupled to *Hack*'s antenna 104 ("the antenna") (Ex. 1005, ¶[0035]), it would have been obvious in view of *Logan* to implement this feature. (Ex. 1002, ¶¶141-146.) *Logan* relates to wireless transmission of data using antennas, and thus a POSITA would have found *Logan* to be a relevant resource to consult when implementing *Hack*'s device, which similarly includes an antenna for wireless communications. (Ex. 1010, Title, Abstract ("data is transmitted across a panel/bulkhead (14) by means of a … magnetic coupling between a pair of transmission and receiving coils"), 1:2-5, 1:10-12; Ex. 1002, ¶141.)

*Logan* discloses with reference to Figure 2 a circuit comprising an indicator LED 20 coupled to a receiver coil 16 at a receiver. (Ex. 1010, 4:12-14; Ex. 1002, ¶142.) For example, Figure 2 shows a closed path including well-known circuit symbols depicting the receiver's components, and a POSITA would have understood that electric current flows through indicator LED 20 to cause it to emit light, and a circuit is needed for such current to flow. (Ex. 1002, ¶142.)

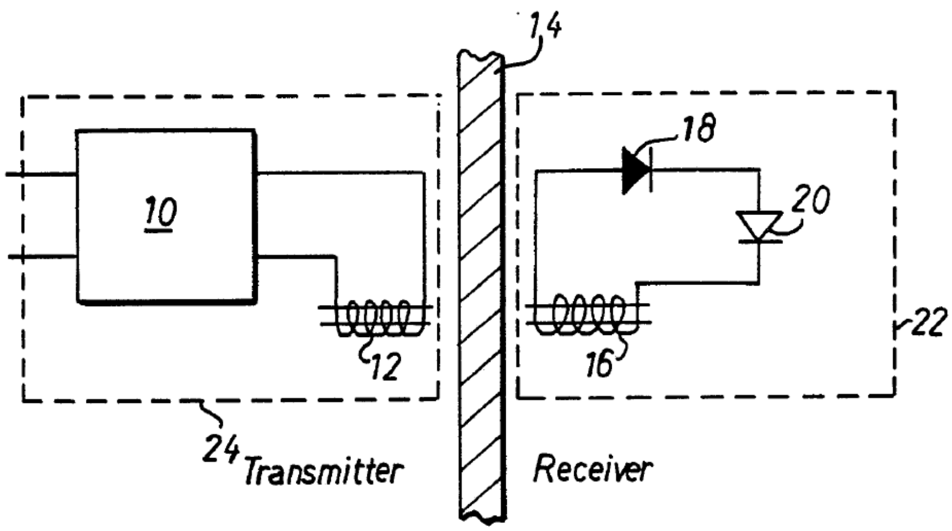


Fig 2

(Ex. 1010, FIG. 2.)

Receiver coil 16 is an antenna, e.g., because it receives electromagnetic radiation and converts it to electrical signals. (Ex. 1010, 3:19-25 (disclosing that transmitter coil 12 "create[s] an alternating electrogmagnetic flux[, which] penetrates through a panel/bulkhead 14 and induces an E.M.F. in a receiver coil 16," and that "[t]he transmitter current may be modulated in order to convey information to a demodulator in the receiver."); Ex. 1002, ¶143.) *Logan*'s indicator LED 20 is a light emitting diode, which is an instance of a diode. (Ex. 1002, ¶143.) Thus, *Logan* discloses a circuit comprising at least one diode coupled to an antenna. (*Id.*)

In light of *Logan*'s disclosures, a POSITA would have been motivated, and found it predictable, to configure *Hack*'s device 100 to include a first circuit comprising at least one diode coupled to *Hack*'s antenna. (*Id.*, ¶144.) The use of LEDs was well known before the alleged invention of the '466 patent. Indeed, the '466 patent acknowledges that LEDs were well known. (Ex. 1001, 1:60-3:36; Ex. 1002, ¶144.) Moreover, the use of LEDs as indicators (e.g., to indicate activity by an antenna) was well known. (Ex. 1013, 3:25-29, 4:16-23, 7:13-15, 7:29-30, FIGS. 3A-3B; Ex. 1053, 14:16-23, 16:49-54, 17:7-14, 17:28-31; Ex. 1002, ¶144.)[17]

For the foregoing reasons, and also because *Logan* describes an indicator LED related to activity (e.g. reception of power/data) by an antenna, a POSITA would have found it predictable and straightforward to configure *Hack*'s device 100 to include an indicator LED ("at least one diode") that provides an indicator light when a certain operation, function, or the like occurs in the typical operation of the device,

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[17] Exhibits 1013 and 1053 demonstrate state of the art. (Ex. 1002, ¶144.)

such as when a component of the device is activated for use and thus "on," etc. (Ex. 1002, ¶145.) Furthermore, given that *Logan* discloses an indicator LED coupled to its receive *antenna*, a POSITA would have found it predictable to implement an indicator LED coupled to *Hack*'s antenna, e.g., to provide a light indicating when the antenna is transmitting or receiving data. (*Id.*)

Given such features would have involved the use of known technologies and techniques, a POSITA would have had the skill, motivation, and a reasonable expectation of success in implementing such features. (*Id.*, ¶146.)

**e) a second circuit configured to detect touch via capacitive sensing, the touch being of a person; and**

*Hack*-*Logan*-*Siwinski* discloses or suggests this limitation for similar reasons as explained above regarding limitation 3(d) in Ground 2. (Section IX.B.1(d); Ex. 1002, ¶147.) The analysis for limitation 3(d) explains how the disclosures/suggestions in *Hack*-*Siwinski* and the state of the art would have motivated a POSITA to configure *Hack*'s touch screen as a capacitive touch screen with associated circuitry. (Ex. 1058, 1:44-50, FIGS. 3A, 9, 2:17-37, 5:53-4; Ex. 1002, ¶147; *see also* Ex. 1048, ¶[0037]; Ex. 1049, ¶¶[0011]-[0013], FIGS. 1, 8, 9 ¶¶[0014], [0036], [0041] [0052], [0064]; Ex. 1050, ¶¶[0107], [0116], [0132] (all demonstrating state of the art).) For similar reasons, in light of *Siwinski* and the state of the art, a POSITA would have had the same motivation, knowledge, skill, and expectation of success in implementing such a modification as discussed for the

*Hack-Siwinski* combination for limitation 3(d) in Section IX.B.1(d) for the *Hack-Logan-Siwinski* combination discussed here for limitation 7(e) (which recites similar features). (Ex. 1002, ¶147.) *KSR*, 550 U.S. at 416.

**f) a lens doped with particles configured to receive and transmit light from the plurality of LEDs; and**

*Hack-Srivastava* discloses or suggests this limitation for the reasons discussed above regarding limitation 3(e). (Section IX.B.1(e); Ex. 1002, ¶148.) The analysis for limitation 3(e) explains how the disclosures/suggestions in *Hack* in light of *Srivastava* and the state of the art would have motivated a POSITA to implement a "lens..." as recited in limitation 3(e), which is identical to limitation 7(f). (Section IX.B.1(e).) For similar reasons, in light of *Srivastava* and the state of the art, a POSITA would have had the same motivation, knowledge, skill, and expectation of success in implementing such a modification as discussed for the *Hack-Siwinski-Srivastava* combination for claim 3 as for the *Hack-Logan-Siwinski-Srivastava* combination discussed here for limitation 7(f). (Ex. 1002, ¶148.) *KSR*, 550 U.S. at 416.

**g) wherein the apparatus is portable.**

*Hack* discloses this limitation, for the reasons discussed above for the preamble of claim 1 and limitation 1(f). (Sections IX.A.1(a), (f); Ex. 1002, ¶149.)

### D. Ground 4: Claim 8 Is Obvious Over *Hack*, *Logan*, *Siwinski*, *Srivastava*, and *Gleener*

#### 1. Claim 8

##### a) The apparatus of claim 7 further comprising: an adjustable capacitor coupled to the antenna, wherein the adjustable capacitor is configured to tune the antenna.

While *Hack*-*Logan*-*Siwinski*-*Srivastava* does not explicitly disclose the features recited in claim 8, it would have been obvious in view of *Gleener* to implement such features, for similar reasons as explained above regarding limitation 1(d) in Ground 1.[18] (Section IX.A.1(d); Ex. 1002, ¶¶150-151.) The analysis for limitation 1(d) explains how the disclosures/suggestions in *Hack* in light of *Gleener* and the state of the art would have motivated a POSITA to configure *Hack*'s device to include an adjustable capacitor coupled to *Hack*'s antenna, wherein the adjustable capacitor is configured to tune the antenna. (Ex. 1007, ¶¶[0011]-[0014], [0021]-[0022], [0024]; FIG. 3; Ex. 1002, ¶151.) (*See also* Ex. 1044, 2:62-65, 4:49-55 (demonstrating state of the art).) For similar reasons, in light of *Gleener* and the state of the art, a POSITA would have had the same motivation, knowledge, skill, and expectation of success in implementing such a modification as discussed for the

[18] (*See also* Ex. 1082, 13, 36-37, 57 (PO providing no details how this limitation is met in its contentions); Ex. 1087, 11-12, 34-35, 52 (same).)

*Hack-Gleener* combination for limitation 1(d) in Section IX.A.1(d) for the *Hack-Logan-Siwinski-Srivastava-Gleener* combination discussed here for claim 8 (which recites similar features). (Ex. 1002, ¶151.) *KSR*, 550 U.S. at 416.

### E. Ground 5: Claims 9 and 10 Are Obvious Over *Hack*, *Garcia*, *Cordelli,* and *Perry*

#### 1. Claim 9

##### a) An apparatus comprising:

*Hack* discloses a communications device 100 ("apparatus"), as discussed above for the preamble of claim 1. (Section IX.A.1(a); Ex. 1002, ¶¶152-153; *see also infra* Sections IX.E.1(b)-(g) regarding the remaining elements of this claim.)

##### b) an LED circuit comprising at least one LED;

##### c) a data receiver, wherein the data receiver is configured to receive data from an antenna;

*Hack* discloses these limitations, for the reasons discussed above for limitations 1(b) and 1(c), which are identical to limitations 9(b)-(c). (Sections IX.A.1(b)-(c); Ex. 1002, ¶154.)

##### d) a first transmission conductor configured to wirelessly receive an alternating electromagnetic field that is used to provide power to charge the apparatus;

To the extent *Hack* does not explicitly disclose *a first transmission conductor configured to wirelessly receive an alternating electromagnetic field that is used to provide power to charge Hack*'s device 100 ("apparatus"), it would have been obvious in view of *Garcia* to configure device 100 to implement such features, for the reasons discussed above regarding limitation 1(e). (Section IX.A.1(e); Ex. 1002, ¶155.)

**e) a second transmission conductor configured to receive the power from a power source that comprises a transformer, wherein the power source is configured to receive a first AC voltage from an AC mains and to output a relatively constant DC voltage; and**

While *Hack* does not explicitly disclose the features of limitation 9(e), it would have been obvious in view of *Cordelli* to modify *Hack*'s device 100 to include such features. (Ex. 1002, ¶¶156-166.)

At the outset, it was well known to supply AC power (e.g., from AC mains readily available via a wall outlet) via an AC adapter (also referred to as an AC-DC converter) that converts the AC power to DC power, to a portable electronic device such as *Hack*'s device 100. (Ex. 1046, 1:9-28, 1:35-48, FIG. 1; Ex. 1057, 1:10-25, FIG. 1 (showing known AC-DC converter); Ex. 1002, ¶157.)[19] [20] For example, a known, state of the art AC adapter is shown below, with a plug at left (AC input receptacle 52) and a connector 56 at right that supplies DC voltage to an electronic device:

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[19] Exhibits 1046 and 1057 are cited to demonstrate state of the art. (Ex. 1002, ¶157.)

[20] PO has stated in district court that "DC voltage" or "rectified AC voltage" may be provided to LEDs. (*Compare* Ex. 1080, ¶46, *with id.*, ¶58.)

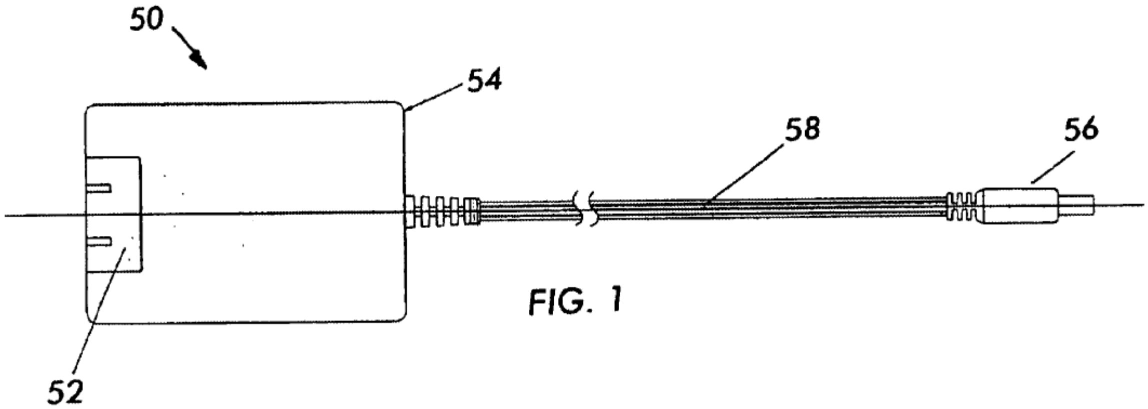


FIG. 1

(Ex. 1046, FIG. 1 (demonstrating known AC adapter); Ex. 1002, ¶157.)

Armed with such knowledge of the state of the art, a POSITA would have looked to *Cordelli*—which, like *Hack*, describes a portable device—and found teachings leading the POSITA to modify the combined *Hack-Garcia* device in the manner described above. (Ex. 1002, ¶158.) *Cordelli* describes a "system which allows [users] of multiple electronic computing and communications devices to power these devices with a single, small, lightweight supply, customized for the power requirements of their particular set of devices." (Ex. 1047, ¶[0003].) *Cordelli* discloses a power supply that charges an electronic device (e.g., a portable device such as a laptop computer) using a "commonly available AC" power source. (Ex. 1055, ¶[0003]; *see also id.*, Title, Abstract, ¶¶[0003]-[0005], [0008], [0014], [0041], [0045]-[0046], FIGS. 1A (below), 1B, 6; Ex. 1002, ¶158.)

For example, *Cordelli* discloses that its system supplies power to a "laptop computer" 101 or "portable printer" 102, shown in Figure 1A. (Ex. 1055, ¶[0041].)

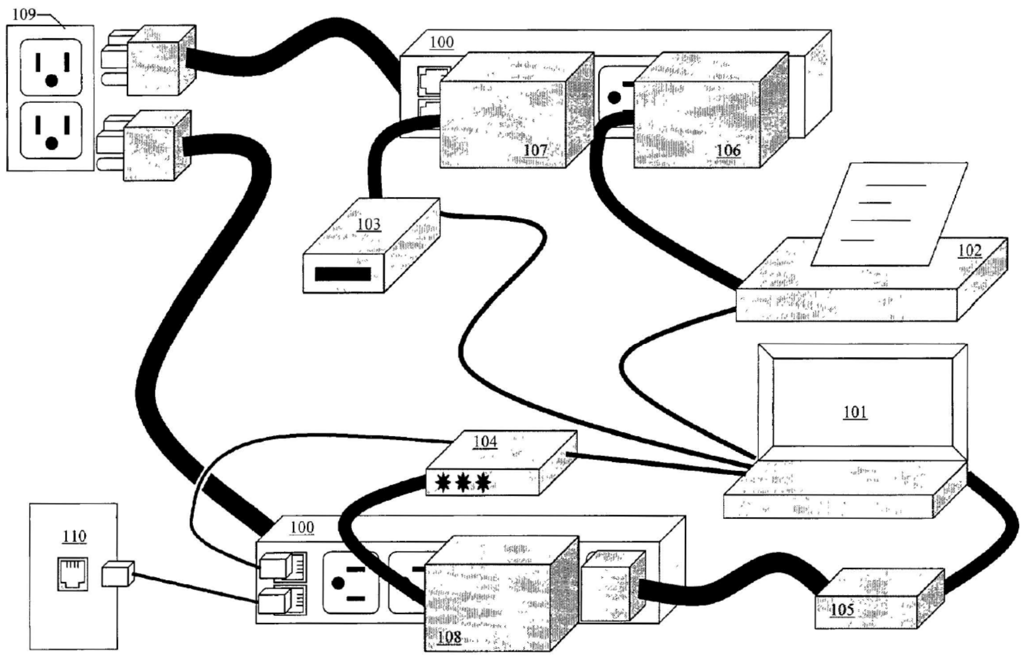

FIG. 1A

(*Id.*, FIG. 1A.)

Therefore, a POSITA would have had reason to consult the teachings of *Cordelli*, which describes a power supply for powering a portable device such as a laptop computer, printer, or other types of portable electronic computing and communications devices, when implementing *Hack*'s portable communications device 100 that includes a battery. (Ex. 1005, Title, Abstract, ¶¶[0003], [0029], [0053], [0055]; Ex. 1002, ¶159.) For example, *Cordelli* explains that "[e]lectronic appliances, devices, computers and computer peripherals are becoming smaller and more portable every day" and "[m]any of these types of equipment are powered by internal batteries … with an external power supply providing recharging current to said batteries," so a POSITA would have found *Cordelli* to be relevant regarding powering *Hack*'s hand-held device containing a rechargeable battery. (Ex. 1055, ¶[0004]; *see also* Ex. 1005, ¶¶[0053], [0055]; Ex. 1002, ¶159.)

*Cordelli* discloses that it was known that portable electronic appliances "are powered by an external power supply providing, via a simple transformer circuit, a low-level AC voltage source, which is internally rectified and filtered by the equipment to create the required DC voltage or voltages for device operation." (Ex. 1055, ¶[0004]; *see also id.*, ¶¶[0005], [0014]; Ex. 1002, ¶160.) *Cordelli* also discloses a system including portable devices (e.g., "laptop computer," "portable printer") "connected via external power supplies" to an "available mains AC outlet (109)" as shown above in Figure 1A. (Ex. 1055, ¶[0041]; *see also id.*, FIGS. 1A, 1B.)

*Cordelli* discloses "power supplies (105-108) of the 'wall wart' or 'table-top' style" that are described in *Cordelli*'s background section as being known. (*Id.*, ¶[0041].) Thus, *Cordelli* discloses an electronic device (e.g., laptop computer) that is configured to receive power from power supply 105 (bottom right in Figure 1A) ("a power source"), wherein the power supply is configured to receive an AC voltage ("first AC voltage") from an AC mains. (Ex. 1002, ¶161.) *Cordelli* further discloses that its power supply ("power source") comprises a transformer and is configured to output a relatively constant voltage.[21] (*Id.*) For example, *Cordelli* explains that its power supply "provid[es], **via a simple transformer circuit, a low-level AC voltage** source, which is internally rectified and filtered by the equipment to create the required DC voltage or voltages for device operation." (Ex. 1055, ¶[0004].) *Cordelli* discloses that "[m]ost of these [known power] supplies … comprise an AC/DC transformation circuit followed by a DC/DC conversion circuit," where "[t]he AC/DC circuit generally consists of an **AC power transformer**, a rectifier for changing the AC into DC and a large 'filter' capacitor to **smooth the output into a relatively 'flat' DC level**" and "[t]he DC/DC conversion circuit may consist of a 'linear' regulator and additional 'filter' capacitor for converting the DC voltage from the AC/DC circuit down to **the desired DC output level** and further **smoothing out the 'ripple'** in the signal." (*Id.*)

In light of *Cordelli*'s disclosures in context of a POSITA's knowledge of the state of the art, a POSITA would have been motivated, and found obvious, to modify *Hack*'s device in the manner described above in this section (i.e., to implement the features of limitation 9(e)). (Ex. 1002, ¶162.) For example, an electronic device such as *Hack*'s device 100 would beneficially have been equipped with AC-to-DC

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[21] Petitioner reserves the right to pursue invalidity of the challenged claims under 35 U.S.C. § 112 in other proceedings.

conversion circuitry, to enable it to use readily available AC power (e.g., standard line voltage from a wall outlet) to recharge *Hack*'s battery. (Ex. 1046, 1:9-24; Ex. 1057, 1:10-13; Ex. 1002, ¶162.) Because it was known that "AC adapters [that] convert AC voltage … from a standard wall outlet to a DC voltage … which is useable by an electronic device …. generally include … a rectifier circuit," a POSITA would have found it predictable to implement a rectifier (like described in *Cordelli*) for such AC-to-DC conversion, and would have known that outputting a *relatively constant* DC voltage via such rectification would have been appropriate and predictable to implement, e.g., for ensuring a reliable, stable supply of power. (Ex. 1046, 3:5-15; Ex. 1002, ¶162.) Using a transformer would have been predictable for making use of power from an AC mains, because it was well known that "a transformer … steps the line voltage down" (Ex. 1046, 1:20-24), which would have been useful because an AC mains provides a relatively high voltage and "DC-powered devices generally operate at a lower voltage (e.g., less than 12 volts) than commercially-supplied AC power (e.g., 120 volts)" (Ex. 1057, 1:10-25).

Indeed, *Cordelli* describes taking into account the power requirements of specific devices to which power is to be supplied, so it would have been desirable and predictable to implement the above modification of *Hack*'s device, to provide an output voltage that is a relatively constant DC voltage appropriate for the modified *Hack* device. (Ex. 1055, ¶[0023]; Ex. 1002, ¶163.)

Moreover, it was well known to use AC power from AC mains to power a handheld device (like *Hack*'s handheld device), so a POSITA would have found the above modification to be feasible. (Ex. 1002, ¶164.) For example, it was known to use "[p]ower adapters for mobile computers, **cell phones**, game systems, as well as many other applications comprised of an input side DC or AC connection, and/or a transformer, and/or AC to DC electronics, or other appropriate electronics for filtering, etc.," and a POSITA would have therefore found the above modification of *Hack*'s handheld device to be feasible and straightforward, with a reasonable expectation of success. (Ex. 1015, ¶[0005]; *see also id.*, ¶[0014] ("adapter for ... cell phones"), FIGS. 2-3 (showing power adapter); Ex. 1002, ¶164.)[22]

A POSITA would further have recognized that implementing a *second transmission conductor* configured to receive the power from a power source as in limitation 9(e) would have been predictable, desirable, and expected, e.g., because a conductor was known as a fundamental component in electrical engineering that conducts current (and power, which is expressed mathematically as the product of current and voltage), so a POSITA would have found it predictable and expected to implement a conductor to receive power. (Ex. 1002, ¶165.) A POSITA would have further found it predictable to use a *second* transmission conductor for receiving

[22] Exhibit 1015 demonstrates state of the art. (Ex. 1002, ¶164.)

power from the power source comprising a transformer, because that is a different source of power than the power that is wirelessly received by the first transmission conductor of the modified *Hack-Garcia* device for limitation 9(d). (*Id.*)

A POSITA would have found the above configuration to be straightforward and would have had a reasonable expectation of success implementing it. (*Id.*, ¶166.) For example, a POSITA would have been skilled at circuit design and with implementing conductors, transformers, and power conversion like described above. (*Id.*) Indeed, such a configuration would have been a mere combination of known components and technologies, according to known methods, to produce predictable results. (*Id.*) *KSR*, 550 U.S. at 416.

**f) a circuit configured to sense whether the power is provided by the first transmission conductor or the power source; and**

To the extent *Hack-Garcia-Cordelli* does not explicitly disclose a circuit configured in the manner recited in limitation 9(f), it would have been obvious in view of *Perry* to implement such features. (Ex. 1002, ¶¶167-171.) *Perry* relates to a "portable data collection device" 10 (shown in, e.g., Figures 1 and 3 of *Perry*) that includes a processor, memory, antenna, communications circuitry, and touch screen, and thus is similar to *Hack*'s portable communications device 100, which includes similar components. (Ex. 1012, FIG. 8, 5:12-15; *see also id.*, 1:10-20, 5:32-54, 12:65-13:32, 13:64-14:23; Ex. 1002, ¶167.) Therefore, a POSITA would have found

*Perry* to be a relevant reference to consult when implementing *Hack*'s device 100. (Ex. 1002, ¶167.)

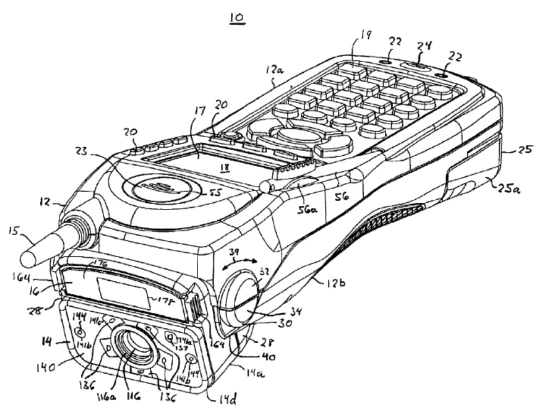


FIG. 1

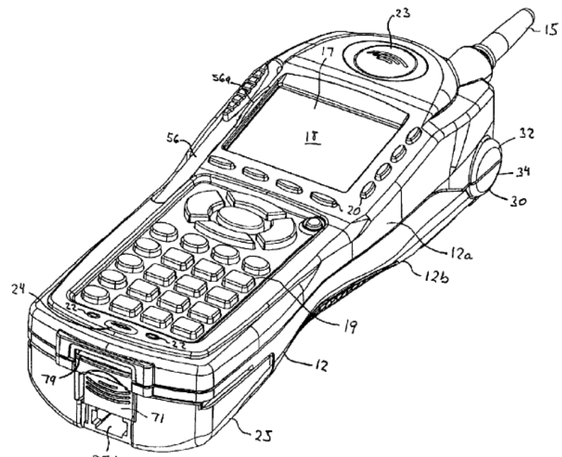


FIG. 3

(Ex. 1012, FIGS. 1, 3.)

Figure 8 of *Perry* shows "a block diagram of the control circuitry of" *Perry*'s device 10. (*Id.*, 4:60-63; *see also id.*, 12:65-15:54; Ex. 1002, ¶168.)

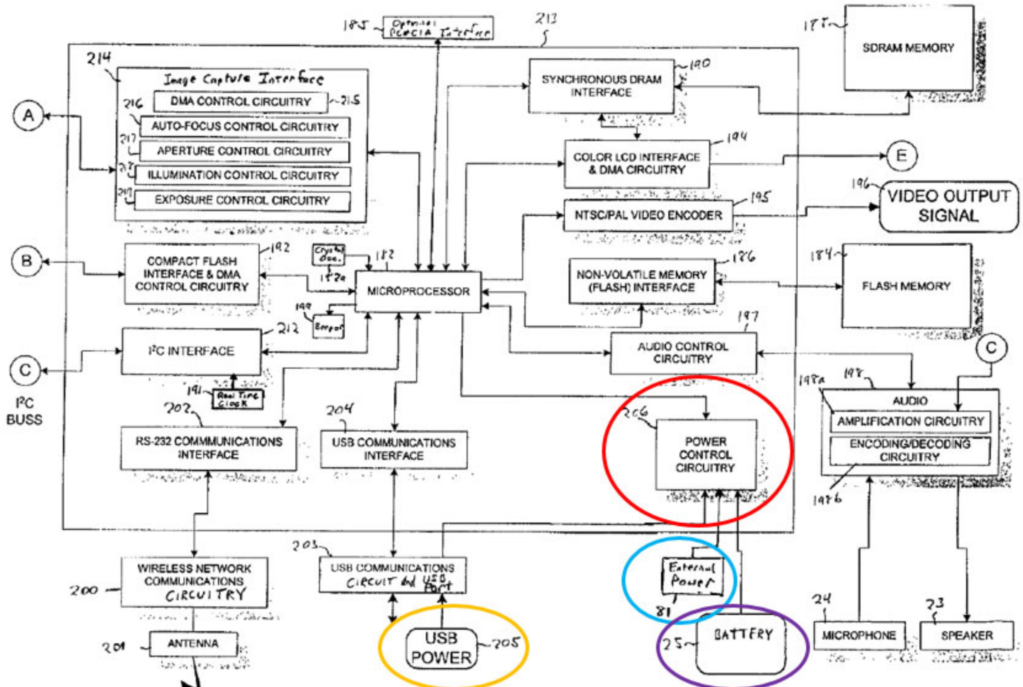

FIG. 8

(Ex. 1012, FIG. 8 (annotated); Ex. 1002, ¶168.)

As shown above in annotated Figure 8, *Perry*'s device 10 includes power control circuitry 206 (red above) that receives power from USB power 205 (orange above), external power 81 (blue above), and/or a battery 25 (purple above). (Ex. 1012, 14:11-15 ("Since USB connections provide power, device 10 may use power 205 supplied via the USB port of the USB communication circuit 203. Power control circuitry 206 **switches between power received from** battery 25, external DC power 81, or via USB port 203.").) A POSITA would have understood that external DC power 81 can be provided by an AC-to-DC converter connected to AC mains, because such converters were well known for leveraging readily accessible AC power from AC mains. (Ex. 1046, 1:5-29; Ex. 1002, ¶169.)[23] Thus, a POSITA would have understood that *Perry* discloses power control circuitry ("a circuit") configured to sense whether power is provided by various possible power sources, including one that can be used to leverage AC mains. (Ex. 1002, ¶169; *see also infra* Section IX.E.2.)

Given that wireless power transfer was known as discussed above (Sections IX.A.1(e), IX.E.1(d)), it would have been predictable to implement a circuit (e.g., similar to the power control circuitry described in *Perry*) configured to sense whether power is provided by the first transmission conductor of the *Hack-Garcia* device (Section IX.E.1(d)) or the power source that receives AC voltage and outputs DC voltage (Section IX.E.1(e)). (Ex. 1002, ¶170.) Indeed, in light of *Perry*'s above-discussed disclosure regarding sensing and switching between various power sources, a POSITA would have known that any power source could similarly be sensed by such a circuit. (Ex. 1002, ¶170.) The above implementation would have predictably enabled appropriate delivery of power to various components of device 100. (*Id.*)

The above implementation would have been within the capabilities of a POSITA, who would have found such an implementation to be simple and would

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[23] Exhibit 1046 demonstrates state of the art. (Ex. 1002, ¶169.)

have had a reasonable expectation of its success. (*Id.*, ¶171.) Sensing when power is or is not received from a power source was well known and predictable. (Ex. 1019, 61:26-31; Ex. 1002, ¶171.)[24]

**g) wherein the apparatus is portable.**

*Hack* discloses this limitation for the reasons discussed above regarding limitation 1(f). (Section IX.A.1(f); Ex. 1002, ¶172.)

**2. Claim 10**

**a) The apparatus of claim 9, wherein the circuit is further configured to switch between the first transmission conductor and the power source.**

*Hack-Garcia-Cordelli-Perry* discloses or suggests this limitation, for similar reasons as discussed above regarding limitation 9(f). (Section IX.E.1(f); Ex. 1002, ¶173.) For example, given that *Perry* discloses that "[p]ower control circuitry 206 **switches between power received from** battery 25, external DC power 81, or via USB port 203," a POSITA would have found it predictable and obvious to configure the circuit of the modified *Hack-Garcia-Cordelli-Perry* device to switch between the first transmission conductor and the power source, e.g., to enable power to be routed and delivered appropriately to components of the modified device. (Ex. 1012, 14:13-15; Ex. 1002, ¶173.) A POSITA would have recognized that *Perry*'s

[24] Exhibit 1019 demonstrates state of the art. (Ex. 1002, ¶171.)

foregoing disclosure informs a POSITA about switching between various elements providing power, and a POSITA would have had the capability and motivation to apply such principles to the combined *Hack*-*Garcia*-*Cordelli*-*Perry* device, to enable components of the combined device to receive power from multiple available sources of power, and would have had a reasonable expectation of success implementing such a configuration. (Ex. 1002, ¶173.)

### F. Ground 6: Claims 11 and 14-16 Are Obvious Over *Hack*, *Zhang*, and *Garcia*

#### 1. Claim 11

##### a) An apparatus comprising:

**an LED circuit having at least one LED;**

*Hack* discloses these limitations, for the reasons discussed above regarding the preamble of claim 1 and limitation 1(b). (Sections IX.A.1(a)-(b); Ex. 1002, ¶¶174-175.)

##### b) a battery;

*Hack* discloses this limitation. (Ex. 1002, ¶176.) For instance, as discussed above for limitation 1(e), *Hack* discloses that device 100 comprises a battery. (Section IX.A.1(e); Ex. 1005, ¶¶[0053] ("battery"), [0055] ("battery").)

##### c) a data receiver, wherein the data receiver is configured to receive data signals from an antenna;

*Hack* discloses this limitation, for the reasons discussed above regarding limitation 1(c). (Section IX.A.1(c); Ex. 1002, ¶177.)

**d) a first circuit, wherein the first circuit is configured to receive DC power and data signals from a transmission conductor; and**

While *Hack* does not explicitly disclose a first circuit configured to receive DC power and data signals from a transmission conductor, it would have been obvious in view of *Zhang* to configure *Hack*'s device 100 ("apparatus") to implement this feature. (Ex. 1002, ¶¶178-183.) As discussed for limitation 1(e), *Hack*'s device includes a rechargeable battery, and as discussed for limitation 1(c), *Hack*'s device includes an antenna for wirelessly receiving data signals. While *Hack* does not explicitly disclose a "first circuit" that is "configured to receive DC power and data signals from a transmission conductor" (e.g., a single wire or similar conductor, to the extent that is required by the claim), it would have been obvious to implement such features in light of the state of the art and *Zhang*. (Ex. 1002, ¶178.)

*Zhang* discloses a configuration for transmitting data over a power line that powers a computer device including a data bus interface unit for exchanging data with a computer and a power line data transceiver unit for communication data and receiving power. (Ex. 1051, Abstract, ¶¶[0007].) While *Zhang* discloses a configuration including a DC/data cable 17 that connects DC output to a network data interface and also to a DC powered computer device 2 (*id.*, FIG. 2A, ¶¶[0018]-[0019]), *Zhang* discloses an arrangement with "reduced wire count" where a DC power and data modulator/demodulator 26 is provided within the computer device 2 that connects to a power network module 1 over a conductor 17, as shown in Figure 2B (below). (*Id.*, ¶[0019].)

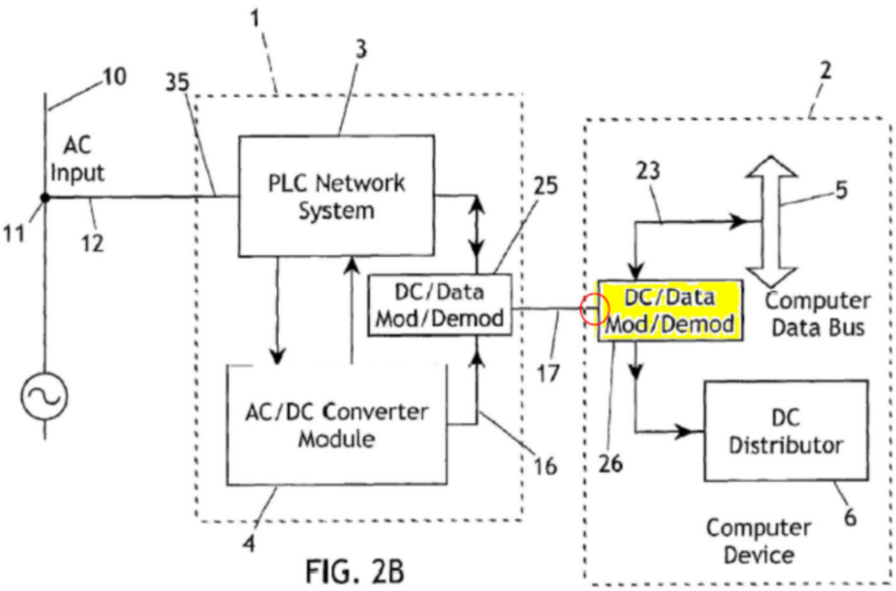


FIG. 2B

(Ex. 1051, FIG. 2B (annotated showing conductor 17 extending into computer device 2 (red)); Ex. 1002, ¶179.)[25]

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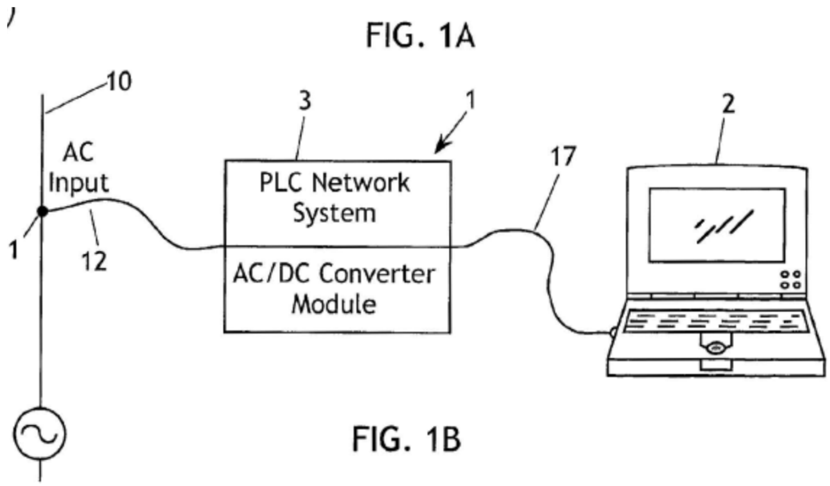
[25] While *Zhang* explains that DC/data cable 17 "may" include two conductors for DC power and at least two conductors for data communications, such arrangement is not required given the conditional description and *Zhang*'s follow-on discussion of Figure 2C, which provides a reduced wire count. (Ex. 1002, ¶179.) The configuration in Figure 2B of *Zhang* is a single conductor configuration that uses the same conductor for both power and data. (*Id.*)




(Ex. 1051, FIG. 1B; *id.*, ¶¶[0010], [0017] ("Alternative[ly], as shown in FIG. 1B, the cable 17 may carry both DC power and data to an appropriately configured port in the computer device").) *Zhang* also explains that the "circuitry of the PLC network system can physically be installed internally in the computer device." (*Id.*, ¶[0033].) (*See also id.*, FIG. 2C, ¶¶[0020] (describing alternate arrangement where cable 17 may be provided with a connector 27' with branches 18, 19 to accommodate various computer device configurations), [0026]-[0032]; claims 1, 2, 9 ("single connector for conducting DC power and system data to the computer device").)

In light of the teachings/suggestions of *Zhang*, a POSITA would have been motivated to configure *Hack*'s device 100 to include an interface that is configured to receive first power and first data to reduce wire count and provide an alternate mechanism for receiving such signals over a wired connection. (Ex. 1002, ¶180.) *Zhang* discloses configurations for providing data communications (and power) for a computer device, which is related to the technical discussions associated with

*Hack*'s device (including use of a rechargeable battery, which requires a power source to recharge it, and data communications) and thus is in the same technical field. Therefore, a POSITA would have had reason to consider *Zhang* when contemplating the implementation of *Hack*'s device as discussed above. (*Id.*) For example, a POSITA would have found it useful to configure *Hack*'s device with a mechanism for recharging *Hack*'s battery, and thus would have found *Zhang* to be a useful reference to consider, particularly because it was well known to supply AC power (e.g., from AC mains readily available via a wall outlet) to an electronic device for powering it, as discussed above for limitation 9(e). (Section IX.E.1(e); Ex. 1002, ¶180.) Upon consideration, a POSITA would have been motivated to modify *Hack*'s device to include an interface that provides a "first" transmission conductor to receive power and data similar to that described by *Zhang*, especially given *Hack* describes a rechargeable battery (which a POSITA would have been compatible with such received power) and also describes receiving data.) (Ex. 1002, ¶180.)

A POSITA would have recognized the desirability of configuring a mechanism that includes a transmission conductor for receiving power and data using AC power input components. (*Id.*, ¶181.) *Zhang* would have provided guidance that would have motivated such a skilled person to design and implement such a component with reduced wire count while providing a way to receive data and power using the AC power components with reduced wire count. (*Id.*; Ex. 1051, ¶[0019].) A POSITA would have recognized, for example, that in a scenario where wireless communication via *Hack*'s antenna is not appropriate or possible (e.g., due to performance concerns regarding wireless communication as opposed to wired communication, or due to security concerns), a wired configuration like discussed above in view of *Zhang* would have been beneficial and promoted reliable operation of *Hack*'s device. (Ex. 1002, ¶181.)

Such a modification would have been within the skills and capabilities of a POSITA, and given the disclosures of *Hack* and *Zhang*, and that the modification would have involved the use of known data/power communication circuit technologies, a POSITA would have had a reasonable expectation of success in implementing it. (*Id.*, ¶182.) For example, a POSITA would have been skilled to consider and appreciate the various ways of providing such a modification while balancing the tradeoffs of additional components, reduced wire count, and other features, such as reduced noise, etc. A POSITA would have found a wired power/data configuration to be a useful supplement to *Hack*'s wireless data reception and rechargeable battery (e.g., a wired configuration would have been a useful way to recharge the battery or operate *Hack's* device when the battery is out of charge). (*Id.*) A POSITA would have recognized that when including such a wired configuration, it would have been predictable and/or desirable to reduce the wire count, e.g., to produce a "lower cost cable" as described in *Zhang* (Ex. 1051, ¶[0019]), to simplify the design in terms of number of parts, and/or to improve reliability. (Ex. 1002, ¶182.)

In certain exemplary ways, a POSITA may have considered the use of components similar to or based on functionalities similar to *Zhang*'s PLC network system that is incorporated entirely into *Hack*'s device as contemplated by *Zhang* (Ex. 1051, ¶[0033]) or may have been configured to provide an interface circuitry internal to the device that communicates with external components that operated similar to or was based on functionalities similar to *Zhang*'s PLC network system (*e.g., id.*, FIGS 1B, 2B, ¶¶[0024]-[0033]). (Ex. 1002, ¶183.) In any of these or other configurations, the modification would have included a transmission conductor from which "DC power and data signals" are received, like that recited in limitation 11(d). (*Id.*) The combined *Hack*-*Zhang* device includes a "first circuit" configured as claimed in limitation 11(d), because power must flow in an electrical circuit. (*Id.*) A POSITA would have been capable of implementing such a circuit, because a POSITA was skilled in circuit design. (*Id.*)

**e) a second circuit, wherein the second circuit has at least one transmission conductor and an inductor, and wherein the second circuit is configured to receive power wirelessly; and**

While *Hack* does not explicitly disclose a *second circuit, wherein the second circuit has at least one transmission conductor and an inductor, and wherein the* *second circuit is configured to receive power wirelessly*, it would have been obvious in view of *Garcia* to configure *Hack*'s device 100 ("apparatus") to implement such features. (Ex. 1002, ¶¶184-186.) As discussed above for limitation 1(e), it would have been obvious in view of *Garcia* to configure *Hack*'s device 100 to implement a transmission conductor configured to wirelessly receive an alternating electromagnetic field that is used to provide power. (Section IX.A.1(e).) As also discussed for limitation 1(e), *Garcia* discloses (by its incorporation of *DeMuro*) a transmission conductor (blue below) coupled to a coil (red below) that wirelessly receives a magnetic flux signal. (*Id.*)

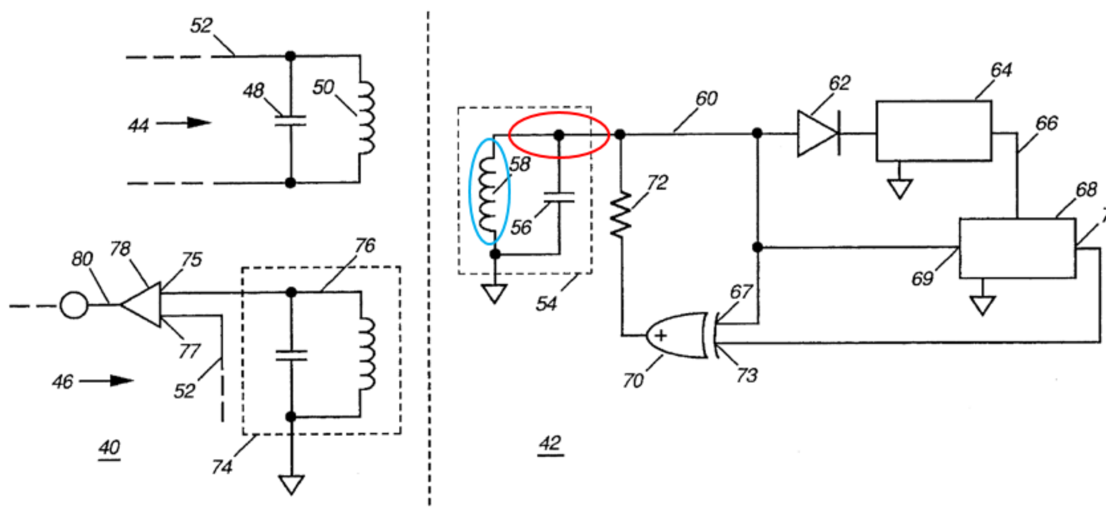



**FIG. 2**

(Ex. 1014 (*DeMuro*), FIG. 2 (annotated); Ex. 1002, ¶184.)

The above coil disclosed in *Garcia* is an inductor. (Ex. 1047, 9:61-10:4 ("a receiver coil (i.e.[,] an inductor)"); Ex. 1002, ¶185.)[26] Thus, *Garcia* discloses a circuit that comprises a transmission conductor and an inductor and that is configured to receive power wirelessly, and in light of *Garcia*'s disclosure, a POSITA would have found it predictable to modify *Hack*'s device 100 to include a second circuit that has at least one transmission conductor and an inductor and that is configured to receive power wirelessly. (Ex. 1002, ¶185.)

A POSITA would have found the above modification to be predictable, feasible, and reasonably likely to be successful for at least the reasons discussed above regarding limitation 1(e) (Section IX.A.1(e)), and also because a POSITA would have been skilled at circuit design and thus would have been capable of implementing a circuit with such features and functionality. (Ex. 1002, ¶186.) For example, a POSITA would have been capable of implementing circuitry including a transmission conductor and an inductor, e.g., using known integrated circuit design principles, in a manner compatible with and consistent with the structure and operation of *Hack*'s device 100. (*Id.*) Indeed, a POSITA would have known that integrated circuits (ICs) were commonly used for implementing various types of circuits in a small form factor, and such a skilled person would have been able to

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[26] Exhibit 1047 demonstrates state of the art. (Ex. 1002, ¶185.)

implement in *Hack*'s device a second circuit as recited in limitation 11(e), particularly given that the device already includes circuitry. (*Id.*) Additionally, as discussed for limitation 1(e), *Hack* contemplates that its device may have various arrangements and sizes (Ex. 1005, ¶[0103]) and thus a POSITA would have found it predictable to enlarge *Hack*'s device if needed to accommodate the above implementation, in light of the desirability of wirelessly receiving power. (Ex. 1002, ¶186.) Accordingly, a POSITA would have been capable of implementing any needed circuitry or components for achieving a working system with the above configuration regarding the claimed "second circuit…" and would have had a reasonable expectation of its successful operation. (*Id.*)

**f) wherein the apparatus is portable.**

*Hack* discloses this limitation for the reasons discussed above regarding limitation 1(f). (Section IX.A.1(f); Ex. 1002, ¶187.)

**2. Claim 14**

**a) The apparatus of claim 11, wherein the at least one LED includes at least one organic light emitting diode.**

*Hack* discloses this limitation for the reasons discussed above regarding limitation 1(b). (Section IX.A.1(b); Ex. 1005, ¶¶[0063]-[0064], [0066]; [0071]-[0072]; Ex. 1002, ¶188.)

### 3. Claim 15

#### a) The apparatus of claim 11 further comprising: a switch.

To the extent *Hack-Zhang-Garcia* does not explicitly disclose a switch, it would have been obvious in view of the state of the art and the disclosures of *Hack-Zhang-Garcia* to implement this feature. (Ex. 1002, ¶¶189-191.) The ’466 patent does not describe any criticality associated with the use of a "switch" in the claimed apparatus and claim 15 does not provide any details regarding how such a generic "switch" relates to any other claimed features. (Ex. 1001, 29:11-30:5 (claim 11).) A switch was a well-known mechanism to control circuits and related features, and indeed it was known that switches were widespread in electronic devices across various contexts, including communications devices like *Hack*'s device 100, for selectively routing electrical current (i.e., switching a conductive path). (Ex. 1002, ¶189.) For example, *Sanford* describes the state of the art knowledge of a common usage of a switch, such as using a switch 235 to selectably route current from one of two possible circuit nodes to an OLED, as shown below in Figure 2 of *Sanford*:

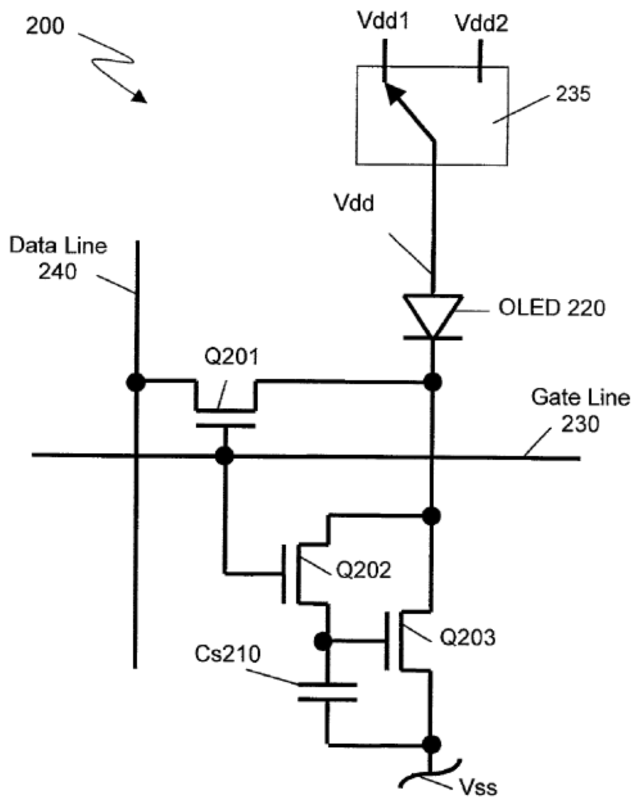



FIG. 2

(Ex. 1056, FIG. 2 (showing switch 235 at top right).)[27]

Consistent with known switch operations, switch 235 "operates to apply or direct a first signal (Vdd1) to an anode terminal of OLED 220 when setting a state of pixel circuit 200, and to apply a second signal (Vdd2) to the anode terminal when viewing the state," where "'[s]etting' a state' refers to writing data to pixel circuit 200, and 'viewing the state' refers to observing the illumination of OLED 220." (*Id.*,

[27] Exhibit 1056 demonstrates state of the art. (Ex. 1002, ¶189.)

¶[0032].) Thus, "[t]hrough switch 235, Vdd is set low, i.e., to Vdd1, for writing data into circuit 200 and set high, i.e., to Vdd2, for presenting or viewing the data in circuit 200." (*Id.*) A POSITA would have known of several ways to implement a switch, including using a transistor, which is a device at the heart of electronics. (*Id.*; *see also id.*, ¶[0042]; Ex. 1002, ¶190.)

Thus, in light of the knowledge of a POSITA in context of the disclosures of *Hack-Zhang-Garcia*, it would have been obvious to implement a switch in the combined *Hack-Zhang-Garcia* apparatus discussed for claim 11, e.g., to provide versatility in controlling signals in the apparatus and/or controlling one or more circuit components in the combined device. (Ex. 1002, ¶191.) For example, as discussed above and demonstrated by *Sanford*, it was known to use a switch to control current in an OLED driver circuit, e.g., to control current to an OLED, which a POSITA would have found relevant for *Hack*'s device, which includes OLEDs. (Ex. 1005, ¶¶[0014], [0063]-[0064], [0066]; Ex. 1002, ¶191.) A POSITA would have been aware of benefits in using a switch in such systems (including the known use to control signals to OLED display components) and thus would have been motivated to configure the combined apparatus to use a switch to provide similar functionality. (Ex. 1002, ¶191.) Thus, a POSITA would have found it obvious to use such known design concepts in implementing the above-discussed modified *Hack* device, and would have recognized the benefit of being able to control circuit functionality using a switch. (Ex. 1002, ¶191.) Given the disclosures of *Hack-Zhang-Garcia* and the knowledge of a POSITA regarding a switch, a POSITA would have had a reasonable expectation of success in implementing such a modification, which would have involved the use of known technologies and techniques to produce the predictable result of controlling one or more circuits and features in a selectable manner. (*Id.*) *KSR*, 550 U.S. at 416.

**4. Claim 16**

**a) The apparatus of claim 15, wherein the switch is a three-way switch.**

*Hack-Zhang-Garcia* discloses or suggests this limitation. (Ex. 1002, ¶¶192-193.) Claim 16 recites a "three-way switch" without providing any details or context regarding it or how it relates to any other claimed features. (Ex. 1001, 30:15-16 (claim 16).) Nor does the '466 patent associate any criticality with respect to the use of a three-way switch, especially in the claimed apparatus. (*See generally id.*) Three-way switches were known mechanisms to control circuits and related features, including components of portable devices. (Ex. 1002, ¶192; *see, e.g.*, Ex. 1021, FIG. 15D, ¶[0075]; Ex. 1020, FIG. 8, ¶¶[0009], [0048].)[28] Thus, in light of the knowledge of a POSITA, it would have been obvious to implement a three-way switch in *Hack*'s modified device to provide versatility in controlling one or more circuit components

[28] Exhibits 1020 and 1021 demonstrate the state of the art. (Ex. 1002, ¶192.)

in the modified device. For example, a POSITA would have found it obvious to use various known design concepts in implementing the above-discussed modified *Hack* device, and would have recognized the benefit of being able to control functionality from two different points in the device, as provided by a three-way switch. (Ex. 1002, ¶192.) Accordingly, a POSITA would have been motivated to consider and use three-way switch design concepts known in the art (as demonstrated above) to implement the control of certain circuits/features provided by the combined *Hack-Zhang-Garcia* device. (*Id.*)

Given the disclosures of *Hack-Zhang-Garcia* and the knowledge of a POSITA of such switch control circuits, a POSITA would have had a reasonable expectation of success in implementing such a modification, which would have involved the use of known technologies and techniques to produce the predictable result of controlling one or more circuits and features from different points in the circuitry of the modified device. (*Id.*, ¶193) *KSR*, 550 U.S. at 416.

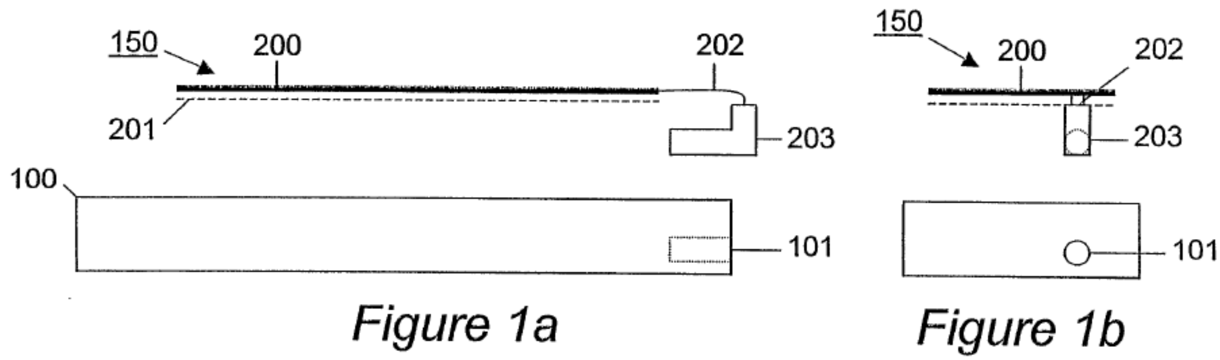
### G. Ground 7: Claims 12 and 13 Are Obvious Over *Hack*, *Zhang*, *Garcia*, and *Beart*

#### 1. Claim 12

##### a) The apparatus of claim 11 wherein the second circuit further comprises: a capacitor coupled to the inductor.

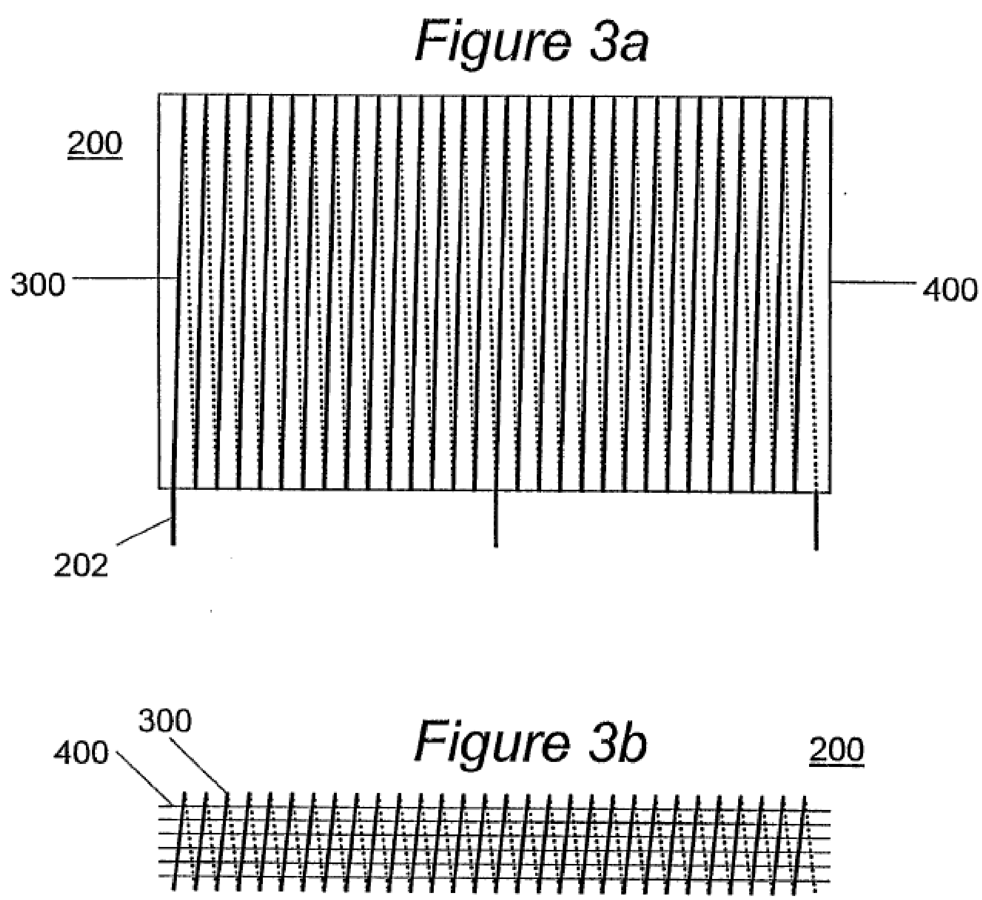
To the extent *Hack-Zhang-Garcia* does not explicitly disclose that the second circuit (discussed above for limitation 11(e)) comprises a capacitor coupled to the inductor of the combined *Hack*-*Zhang*-*Garcia* device (discussed above for limitation 11(e)), it would have been obvious in view of *Beart* to implement this feature. (Ex. 1002, ¶¶194-200.) *Beart* relates to adapting portable electrical devices (e.g., hand-held communication devices such as mobile telephones, personal digital assistants, or palmtop computers) to receive power wirelessly, and thus a POSITA would have had reason to consider the teachings of *Beart* when implementing *Hack*'s hand-held, portable communication device 100. (Ex. 1013, Title, Abstract, 1:5-13, 2:6-14, 6:8-16; Ex. 1002, ¶195.) For example, given that *Beart* discloses a technique that "enables users to add wireless power transfer capability to their existing portable devices easily," a POSITA would have found *Beart* to be a useful reference to consult in the context of implementing *Hack*'s device 100. (Ex. 1013, 2:16-17; Ex. 1002, ¶195.)

*Beart* discloses with reference to Figures 1A and 1B (below) an apparatus 150 that includes a "power-connector 203 capable of being plugged-in to" a power connector 101 of a device 100 (e.g., mobile handset). (Ex. 1013, 10:27-11:5; Ex. 1002, ¶196.)



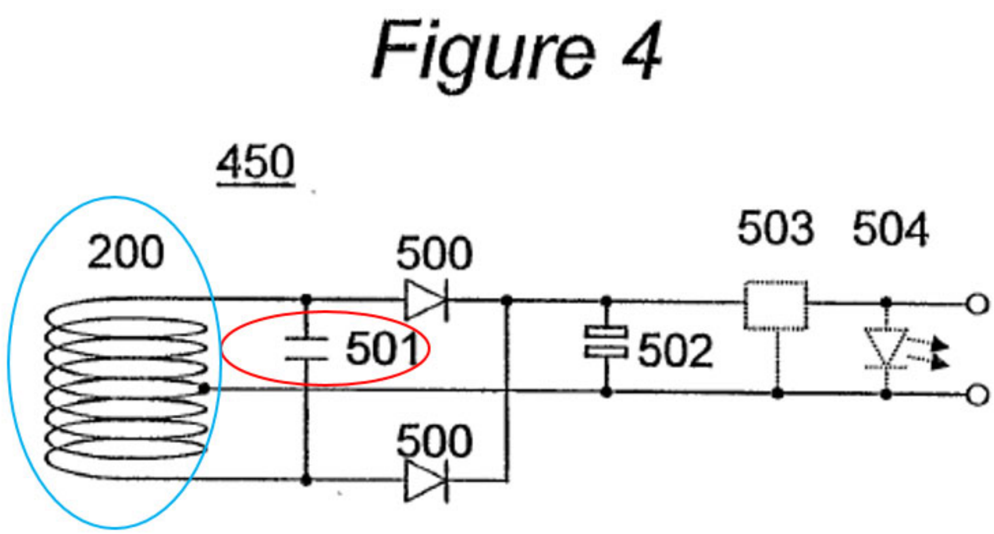

(Ex. 1013, FIGS. 1A-1B.)

*Beart*'s apparatus 150 includes a "power-receiving element 200," shown in more detail in Figures 3A and 3B (below). (*Id.*, 11:2-5; Ex. 1002, ¶197.)




(Ex. 1013, FIGS. 3A-3B.)

Figures 3A and 3B of *Beart* show that power-receiving element 200 includes a coil 300 used for induction-based power reception. (*Id.*, 11:28-12:12, 12:16-18 (describing the "inductance" of the coil); Ex. 1002, ¶198.) Figure 4 of *Beart* (annotated below) "shows circuitry 450 capable of converting the alternating current delivered by the power receiving element into power suitable for use in" device 100. (Ex. 1013, 12:14-16.) As shown in Figure 4, a capacitor 501 (red below) is coupled to the coil of power-receiving element 200 (blue below).




(Ex. 1013, FIG. 4 (annotated); Ex. 1002, ¶198.) *Beart* explains that "capacitor 501 **tunes the coil, which allows increased power transfer**." (Ex. 1013, 12:16-17.)

In light of *Beart*'s disclosures, a POSITA would have been motivated to implement a capacitor coupled to the inductor of the combined *Hack*-*Zhang*-*Garcia* device. (Ex. 1002, ¶199.) For example, *Beart*'s disclosure pertains to wireless reception of power using electromagnetic induction, and that its teachings relating to the coil (inductor) of power-receiving element 200 are applicable to the coil (inductor) of the combined *Hack*-*Zhang*-*Garcia* device, including with respect to tuning the coil, as described in *Beart*. (*Id.*) Given that *Beart* explains that coupling a capacitor 501 to the coil as shown in Figure 4 "allows increased power transfer," a POSITA would have sought to similarly couple a capacitor to the inductor of the combined *Hack*-*Zhang*-*Garcia* device. (*Id.*)

A POSITA would have found the above implementation to be straightforward, as it involved basic circuit design principles familiar to a POSITA, and indeed would have been a mere combination of known components and technologies, according to known methods, to produce predictable results. (*Id.*, ¶200.) *KSR*, 550 U.S. at 416. For example, it was well known to use an inductor-capacitor (LC) circuit in a wireless receiver, so a POSITA would have found the above implementation to be feasible and predictable. (Ex. 1053, FIG. 17, 23:48-51.)[29] Therefore, a POSITA would have had a reasonable expectation of success regarding such an implementation. (Ex. 1002, ¶200.)

[29] Exhibit 1053 demonstrates state of the art. (Ex. 1002, ¶200.)

#### 2. Claim 13

##### a) The apparatus of claim 12, wherein the inductor and the capacitor are configured to tune the second circuit.

*Hack-Zhang-Garcia-Beart* discloses or suggests this limitation. (Section IX.G.1; Ex. 1002, ¶201.) As discussed above for claim 12, it would have been obvious in view of *Beart* to implement a capacitor coupled to the inductor (coil) of the combined *Hack-Zhang-Garcia* device, e.g., because *Beart* explains that including such a coupling "**tunes the coil, which allows increased power transfer**." (Ex. 1013, 12:16-17.) Thus, a POSITA would have understood that the *Hack-Zhang-Garcia-Beart* combination discloses that the inductor and the capacitor are configured to tune the second circuit (of the *Hack-Garcia* combination, discussed above for limitation 11(e)) that includes the inductor, to allow increased power transfer (reception) by the inductor of the second circuit. (Ex. 1002, ¶201.) This would have been a straightforward configuration to implement for the reasons discussed above regarding claim 12, and a POSITA would have had a reasonable expectation of success implementing this configuration, particularly because *Beart* specifically describes "tun[ing]" a receive coil in an inductive wireless power system. (Section IX.G.1; Ex. 1002, ¶201.)

## X. DISCRETIONARY DENIAL IS NOT APPROPRIATE HERE

An evaluation of the factors under *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (Mar. 20, 2020) (precedential), favors institution notwithstanding the concurrent Illinois Litigation (Section II).

The **first *Fintiv* factor** favors institution. Petitioner will seek a stay of the Illinois Litigation upon institution. At minimum, the Board should not speculate regarding the likelihood of stay, particularly because courts routinely issue stays after institution. *Western Digital Corp. et al v. Kuster*, IPR2020-01391, Paper 10 at 8-9 (PTAB Mar. 11, 2021; *Samsung Elec. Am., Inc. v. Snik LLC*, IPR2020-01427, Paper 10 at 10 (PTAB Mar. 9, 2021).

The **second and third *Fintiv* factors** also favor institution. The Illinois Litigation is at an early stage.[30] A trial date has not been set, and there has not been significant resource investment by the court and the parties, particularly compared to the resource expenditures leading up to a trial. (Exs. 1059, 1085.) Moreover, any trial (if it occurs) would likely only occur at least 102 weeks after the service of the complaint—and thus after a final written decision in this IPR. (Ex. 1060, 1-2 (document available at Northern District of Illinois website, estimating "Case Ready for Trial" 102 weeks after complaint served); Ex. 1059, 5 (Dkt. #16 showing summons returned May 19, 2021).)

The **fourth *Fintiv* factor** similarly favors institution. In the Illinois Litigation,

[30] Although PO moved to transfer the Illinois Litigation to Texas, that motion was denied. (Ex. 1084.)

PO has asserted claims 1-3, 5, 7-11, and 13 of the ’466 patent, while this Petition challenges all 16 claims, so the Illinois Litigation will not resolve all disputed validity issues. (Section IX; Ex. 1086, 2-4; Ex. 1087, 2-75.) Furthermore, Petitioner stipulates it will not pursue in the Illinois Litigation invalidity based on any instituted IPR grounds in this proceeding.

Finally, the **sixth *Fintiv* factor** favors institution. Petitioner diligently filed this Petition **within one week of PO’s amended infringement contentions** in the Illinois Litigation (Ex. 1086), with strong unpatentability grounds. (Section IX.) Institution is consistent with the significant public interest against “leaving bad patents enforceable.” *Thryv, Inc. v. Click-To-Call Techs., LP*, 140 S. Ct. 1367, 1374 (2020). Moreover, this Petition is the ***sole*** challenge to the ’466 patent before the Board—a “crucial fact” favoring institution. *Google LLC v. Uniloc 2017 LLC*, IPR2020-00115, Paper 10 at 6 (May 12, 2020).

## XI. CONCLUSION

Accordingly, Petitioner requests institution of IPR for the challenged claims based on the specified grounds.

Respectfully submitted,

Dated: September 7, 2021 By: /Joseph E. Palys/
Joseph E. Palys (Reg. No. 46,508)
Counsel for Petitioner

## CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 10,499,466 contains, as measured by the word-processing system used to prepare this paper, 13,988 words. This word count does not include the items excluded by 37 C.F.R. § 42.24 as not counting towards the word limit.

Respectfully submitted,

Dated: September 7, 2021

By: /Joseph E. Palys/
Joseph E. Palys (Reg. No. 46,508)
Counsel for Petitioner

**CERTIFICATE OF SERVICE**

I hereby certify that on September 7, 2021, I caused a true and correct copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 10,499,466 and supporting exhibits to be served via express mail on the Patent Owner at the following correspondence address of record as listed on PAIR:

K&L Gates LLP-Chicago
P.O. Box 1135
Chicago IL 60690

By: /Joseph E. Palys/
Joseph E. Palys (Reg. No. 46,508)