

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GOOGLE LLC,
Petitioner

v.

TELCOM VENTURES LLC,
Patent Owner

Patent No. 10,219,199

**DECLARATION OF DR. SANDEEP CHATTERJEE
IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,219,199**

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- iii) [1.b] “in response to at least the proximity condition having been satisfied between the smartphone and the entity, establishing a wireless short-range communications link between the smartphone and the entity to provide by the smartphone, using the first air interface, information to the entity and to receive by the smartphone information from the entity;” 36
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I, Sandeep Chatterjee, declare as follows:

I. INTRODUCTION

1. I have been retained as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“PTO”) regarding U.S. Patent No. 10,219,199 (“the ’199 patent”) (EX1001).¹ I have been asked to consider whether prior art references disclose or suggest the features recited in claims 1-19 (“the challenged claims”) of the ’199 patent. My opinions are set forth below.

II. BACKGROUND AND QUALIFICATIONS

2. My qualifications are stated more fully in my curriculum vitae, which is attached as EX1003. Below is a summary of my education, work experience, and other qualifications.

3. I am the Chief Executive Officer of Experantis LLC (“Experantis”), a technology consulting company. Previously, I was the Co-founder, Executive Vice President and Chief Technology Officer of SourceTrace Systems, Inc., a technology and services company enabling the delivery of secure remote electronic services over landline and wireless telecommunications networks.

¹ In this Declaration, I refer to exhibits that I understand are to be attached to the petition for *Inter Partes* Review of the ’199 patent.

4. I received my Bachelor's degree in Electrical Engineering and Computer Science from the University of California, Berkeley in 1995. I received my Master's degree in Computer Science from the Massachusetts Institute of Technology (MIT) in 1997, and my Doctorate in Computer Science from MIT in 2001. I received a certificate of completion for an executive education program on global leadership from Harvard University in 2011.

5. My doctoral dissertation at MIT, entitled "Composable System Resources for Networked Systems," involving networked and distributed computer systems and architectures, was selected as one of the top inventions in the history of MIT's Laboratory for Computer Science. This invention is showcased in a time capsule at the Museum of Science in Boston, Massachusetts. Other recipients of this honor include Bill Gates, the founder of Microsoft, and Tim Berners-Lee, the inventor of the World Wide Web.

6. As part of applications of my doctoral research, I developed hardware and software systems for intelligent environments within homes and offices. Some of these devices included televisions, digital picture frames, refrigerators and children's toys. The distributed computing system of these intelligent environments included distributed data storage and retrieval.

7. In 2011, I was named a Young Global Leader. This honor, bestowed each year by the World Economic Forum, recognizes and acknowledges the top

leaders—all below the age of 40—from around the world for their professional accomplishments, commitment to society, and potential to contribute to shaping the future of the world. In 2016, I was appointed to the World Economic Forum's expert network as an expert in technology and innovation.

8. From 1997, I was the Entrepreneur-in-Residence at FidelityCAPITAL, the venture capital arm of Fidelity Investments. In 1999, I founded and served as President and Chief Technology Officer (CTO) of Satora Networks, which developed tools and technologies for building appliances and services for the Internet using wireless and other technologies to extend it beyond the desktop.

9. In 2001, I joined Bluestone Software's Mobile Middleware Labs as a Senior Engineer developing applications and systems infrastructure for enterprise Java/J2EE, Web services, and enterprise mobile solutions. After the completion of Hewlett-Packard's (HP) acquisition of Bluestone, I became a Senior Member of the Technical Staff at HP's Middleware Division. I was responsible for architecting and developing the company's next-generation Web services platform for enterprise as well as mobile environments, known as the Web Services Mediator.

10. I was part of the Expert Group that developed the JSR-00172 J2ME (Java 2 Platform, Micro Edition) Web Services Specification, the worldwide

industry standard for mobile Web services. I am the co-author, with James Webber, of the book “Developing Enterprise Web Services: An Architect’s Guide” (published by Prentice-Hall in 2004). This book has been adopted by over 100 universities and colleges around the world, and has been translated or reprinted in a number of countries around the world.

11. I have significant experience in developing complex computing systems. For example, through a contract between HP and the United States Agency for International Development (USAID), I architected and led the development of one of the first mobile banking solutions. This system enabled customers to use their mobile phones and other wireless handsets to connect with the core banking systems of banks and other financial institutions, and perform transactions without having to travel to bank branches. This system supported many banking transactions, including deposits, withdrawals, loan applications, loan disbursements and loan repayments.

12. Later, after SourceTrace Systems’ acquisition of this technology, I led the expansion of this solution into multiple countries and into multiple industries. Banks and other financial services companies utilized this technology to make their tellers more efficient, to provide self-service ATMs within branches, and to provide remote access to banking services. Additionally, through our licensing agreement with Telefonica, one of the largest cellular and telecommunications

companies in the world, this solution was deployed in various other industries, including logistics and asset management and customer relationship management. Bloomberg Television selected and featured this technology and the company I co-founded to commercialize this technology on Bloomberg TV's "Bloomberg Innovators" program.

13. I have been a retained expert witness for various disputes that involved significant technology issues, and I have been qualified as a technology expert by U.S. District and State Courts, including in California, Delaware, Florida and Texas in technology areas that are relevant to this case, including but not limited to: computer software systems, distributed computing systems, and mobile and wireless systems. I have previously testified through declaration or expert report, at deposition, and at trial in numerous intellectual property and commercial litigation matters, including for patent litigation, copyright and trade secret misappropriation litigation, and contract dispute cases. I have submitted more than one hundred and ninety expert declarations and expert reports, testified at deposition more than ninety times, and testified at trial or at hearings at least seventeen times. I have been identified as one of the top 1000 patent professionals in the world, and I am listed in the IAM Patent 1000, which identifies the world's leading patent litigation and prosecution attorneys, as well as damages and technology expert witnesses.

14. Experantis is being compensated for my time on this matter at my standard hourly rate and reimbursed for any expenses that I incur related to my work in this matter. Neither Experantis nor I have any financial interest in the outcome of this matter, and Experantis will be paid for my time regardless of the outcome of this matter.

III. MATERIALS REVIEWED

15. The opinions contained in this Declaration are based on the documents I reviewed, my professional judgment, as well as my education, experience, and knowledge regarding systems and processes in the field of graphics interface technology.

16. In forming my opinions expressed in this Declaration, I reviewed the following materials:

Declaration of Dr. Sandeep Chatterjee
U.S. Patent No. 10,219,199

EX1001	U.S. Patent No. 10,219,199 to Karabinis et al. (“the ’199 patent”)
EX1004	Prosecution History of U.S. Patent App. No. 15/800,885
EX1005	U.S. Patent Application Publication No. 2009/0170483 A1 to Barnett et al. (“Barnett”)
EX1006	International Patent Publication No. WO 2006/087503 A1 to Waters et al. (“Waters”)
EX1008	International Patent Publication No. WO 2006/094048 A2 to Morrison (“Morrison”)
EX1022	U.S. Patent No. 7,881,665 to Symons (“Symons”)
EX1023	U.S. Patent No. 9,301,337 to Brown et al. (“Brown”)
EX1024	U.S. Patent No. 8,249,500 to Wilson (“Wilson”)
EX1025	U.S. Patent No. 7,400,903 to Shoemake et al. (“Shoemake”)
EX1026	U.S. Patent Application Publication No. 2007/0286147 A1 to Wang et al. (“Wang”)
EX1029	U.S. Patent Application Publication No. 2007/0026893 A1 to Sakamoto et al. (“Sakamoto”)

I also considered any other documents and materials I refer to in this Declaration.

17. My opinions contained in this declaration are based on the documents I reviewed and my knowledge and professional judgment. My opinions have also been guided by my appreciation of how a person of ordinary skill in the art would have understood the state of the art, the prior art, and the claims and the specification of the ’199 patent at the time of the alleged invention, which I discuss below.

18. I have been asked to consider that the time of the alleged invention of the '199 patent was around 2008 (including and up to November 4, 2008), which corresponds to the filing date of the earliest application associated with the '199 patent. (EX1001, Cover.)

19. Based on my experience and expertise, it is my opinion that certain references disclose and/or suggest all the features recited in challenged claims of the '199 patent, as I discuss in detail below.

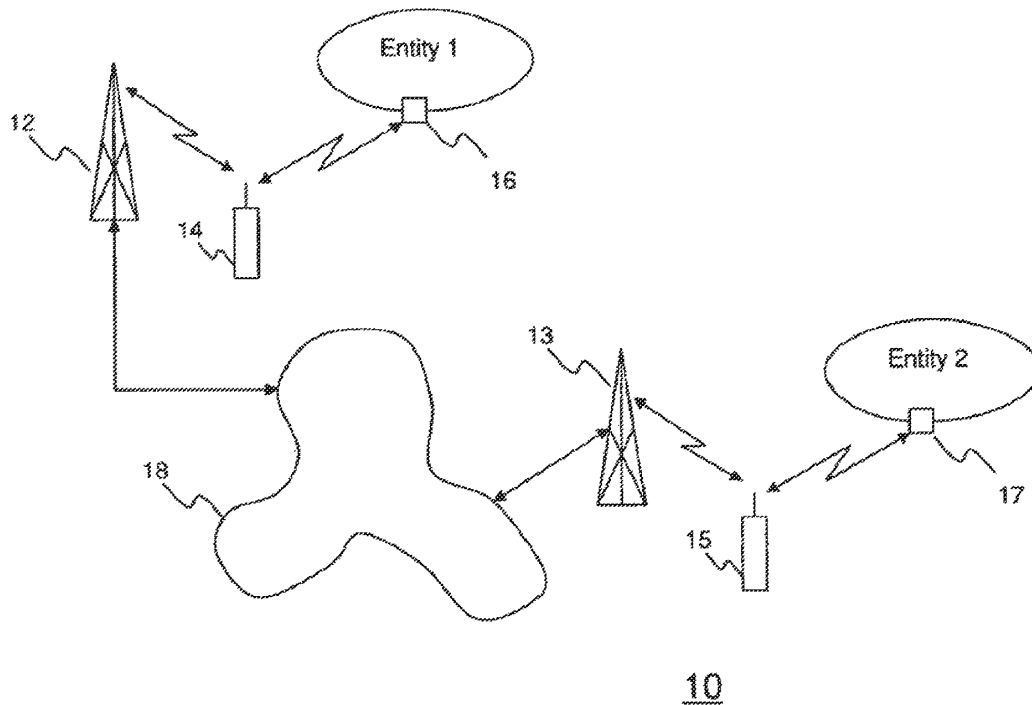
IV. PERSON OF ORDINARY SKILL IN THE ART AND THE TIME OF THE ALLEGED INVENTION

20. I am familiar with the level of ordinary skill in the art regarding the '199 patent as of around November 4, 2008. Considering the '199 patent, the technology, the educational level and experience of workers in the field relating to the patent, and problems and solutions in that field, and drawing on my own experience, I believe a person of ordinary skill in the art at the time of the alleged invention (around November 4, 2008) would have had an undergraduate degree in electrical engineering, computer engineering, computer science or a related field along with two years of work experience in the field of mobile communication applications. More education can supplement practical experience and vice versa.

21. My opinions in this Declaration regarding the '199 patent and the prior art (including the state of the art) are from the perspective of one of ordinary skill in the art as I defined above, during the relevant timeframe (e.g., the time of the alleged invention), which I discussed above as being around November 4, 2008.

V. OVERVIEW OF THE '199 PATENT

22. The '199 patent “relates to systems, devices and/or methods that may be used to provide an adaptive enablement of one or more communications modes based upon having satisfied a proximity criterion.” (EX1001, 1:18-21.) The '199 patent describes a system containing what it refers to as a first device 14, a second device 15, an entity 1 and entity 2, and a communications system 18, among other components. (*Id.*, 8:65-10:35.) The '199 patent explains that the devices 14 and 15 may be mobile devices such as a mobile phone. (*Id.*, 3:5-14.) Entity 1 and entity 2 may be “a person, an animal, a vehicle..., a building..., a product that is for sale, a store that sells one or more products, a check-out counter in a store, a shopping cart that may be used by a customer to carry one or more products selected by the customer for purchase, one or more locations in time and/or space, a geographic area and/or a multi-dimensional region in time and/or space.” (*Id.*, 3:43-51.) The communications system 18 may be, for example, a wireless communications system that wirelessly communicates with the first and second devices. (*Id.*, 12:10-14.)



(*Id.*, FIG. 1.)

23. The '199 patent broadly describes communication features between these devices and entities. For example, “a method in a system 10 is provided comprising: detecting that a proximity criterion is satisfied between a first device 14, such as a mobile subscriber device, and Entity 1; and enabling a mode of the first device and/or a mode of a second device 15 responsive to the detecting.” (*Id.*, 8:67-9:6.) “In one particular embodiment, a mobile subscriber device 14 linked to a communications system 18 via base station 12 can enable a function when the device 14 comes within a proximity of Entity 1.” (*Id.*, 9:10-13.)

24. The claims of the '199 patent focus on an embodiment in which “the first device and the second device form a part of a communication system

providing communications service to the first device,” where “[t]he second device can be independent of the entity and the entity can be independent of the communications service provided to the first and second device.” (*Id.*, 11:38-47; *see also id.*, claims 1-19.) In particular, the ’199 patent describes “a detector that is configured to enable a mode of a first device (14) and/or to enable a mode of a second device (15) responsive to a detection that a proximity criterion is satisfied between the first device and an entity (Entity 1) and responsive to at least one of a position, velocity and a Time-of-Day.” (*Id.*, Abstract.) The ’199 patent further explains that “the second device is not the entity and is not associated with the entity, and...the entity is not involved in providing a communications service to the first and/or second device.” (*Id.*)

VI. OVERVIEW OF THE PRIOR ART

A. Barnett (EX1005)

25. Barnett discloses a “system and method of communicating shopping information between a consumer and a retailer,” including a “system for enabling a consumer to obtain shopping information from a retailer, and the retailer to obtain information from the consumer, using a communication device, such as a mobile phone.” (EX1005, ¶[0001].) Barnett explains that “a consumer may utilize...a portable communications device 14, such as a mobile phone” (“smartphone”) (*id.*, ¶[0011]), which is “adapted to communicate with a Near Field Communication (NFC) device, a wireless network, such as a Wi-Fi system, and a Bluetooth system, as well as a cellular phone system” (*id.*, ¶[0012]). Barnett describes that the “mobile phone 14 combines the functions of a Wi-Fi device, a contact-less credit card, and a cell phone.” (*Id.*, ¶[0012].)

26. Barnett explains that a store may have “stand-alone NFC-enabled devices 34 [which] are used to identify products to NFC-enabled devices.” (EX1005, ¶[0023].) As shown in Figure 1 below, a consumer may place their “NFC-enabled mobile phone 14” (in red below) “proximate to the product identifier 34” (in yellow below) so that “information is extracted from the product identifier 34 and transmitted to, and stored within, the NFC-enabled mobile phone 14 in a manner similar to a bar code reader.” (*Id.*, ¶[0023].) For example, the

consumer may “retrieve and store information” such as “the identity of the product” (*id.*, ¶[0033]), which may further include “the name of the produce and the price of the product, as well as technical information about the product, such as the specifications” (*id.*, ¶[0023]).

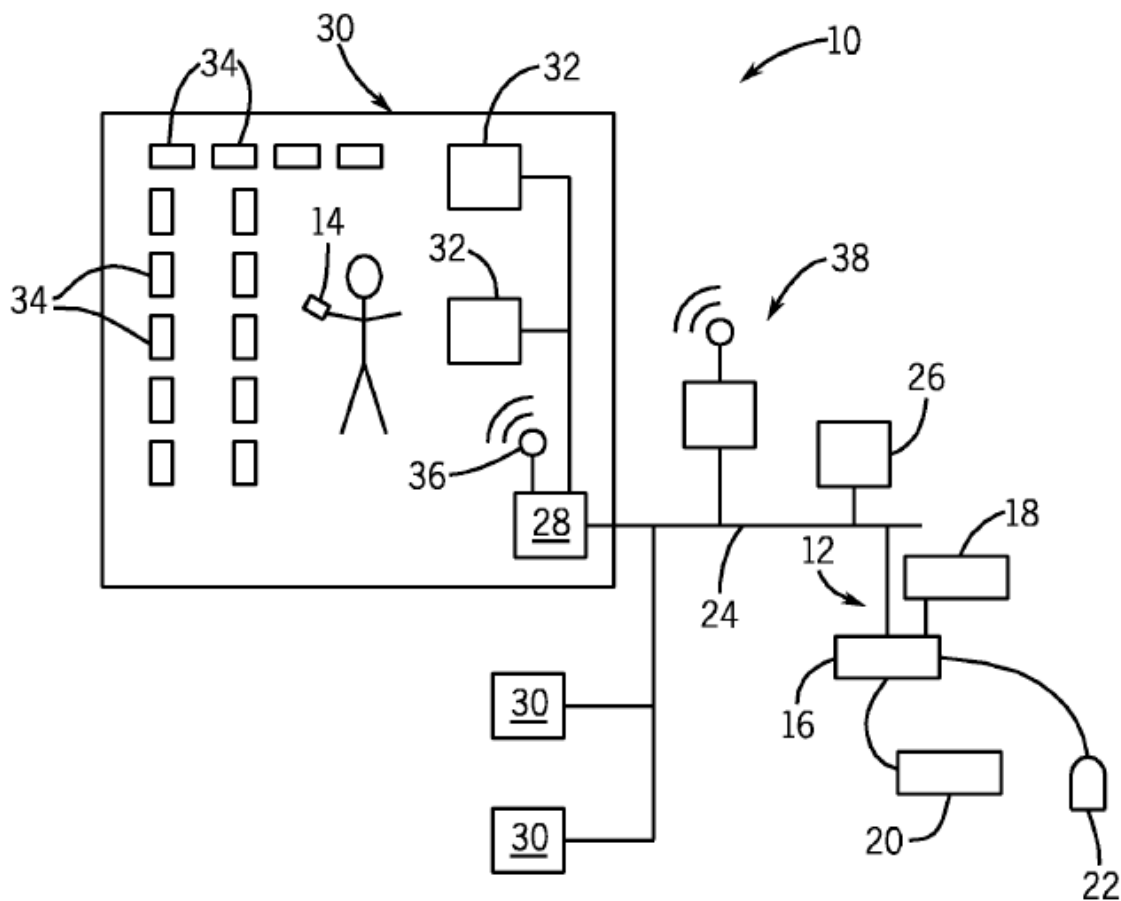


FIG. 1

(*Id.*, FIG. 1.)

27. Barnett also explains that “[w]ithin the store 30 are a series of displays 32 that are connected to the store computing system 28.” (EX1005, ¶[0021].) These “displays 32” may be “NFC-enabled displays that can interact with a NFC-enabled mobile phone 14 using device-to-device communication.” (*Id.*) “Alternatively, the displays 32 may be Bluetooth-enabled communications devices” such that “when a Bluetooth-enabled mobile phone is located near the display 32, information is transmitted between the Bluetooth-enabled mobile phone 14 and the display 32.” (*Id.*, ¶[0022].)

28. Barnett explains that the NFC displays 32 have multiple purposes. First, Barnett discloses that after retrieving product identity information from devices 34, a “consumer may then place the mobile phone 14 proximate to a NFC-display 32 which reads the product identity information from the mobile phone 14 and retrieves additional information regarding the product to the consumer.” (EX1005, ¶[0033].) The NFC display 32 may also be used to enable Wi-Fi communication in a consumer’s mobile phone so that the consumer can obtain additional information from the retailer. (*Id.*, ¶¶[0016] (“The system 10 is adapted to provide information to a consumer’s mobile phone 14 within a store without requiring the consumer to incur a mobile phone usage charge. That is, instead of using the data connection on a cellular carrier, the consumer uses a Wi-Fi network inside the store that has a connection to the Internet.”), [0026] (“The store’s Wi-Fi

system can be used to retrieve more information about products using the information on the NFC tag located near the product....The consumer may use the mobile phone 14 to access the websites hosted by the central computing system 26 and/or the store computing systems 28, or any other website.”), [0035]

(“[I]nformation to enable the consumer to use the store’s Wi-Fi system 36 may be retrieved from the NFC-enabled display 32. In this embodiment, all of the information needed to automatically configure the mobile phone 14 to use the store[’]s Wi-Fi system 36 is provided to the mobile phone 14 via the NFC-enabled display 32.”).)

29. Barnett explains that a display 32, as shown in Figure 3 below, may also “us[e] the NFC interface...to complete the transaction using the cell phone as a credit card, debit card, or electronic purse.” (*Id.*, ¶[0040]; *see also id.*, ¶[0037] (“The consumer can use the cell phone as a credit card to complete the purchase process by using a NFC-enabled payment register.”).) As shown in Figure 3 below, “[t]he NFC-enabled display 32 has an NFC interface 58” “that is adapted to transmit data between the mobile phone 14 and the display 32.” (*Id.*, ¶[0038].) For example, Barnett discloses that “the mobile phone 14 may be programmed to provide a specific credit card number when the mobile phone 14 is used in making purchases in a specific store.” (*Id.*, ¶[0032].)

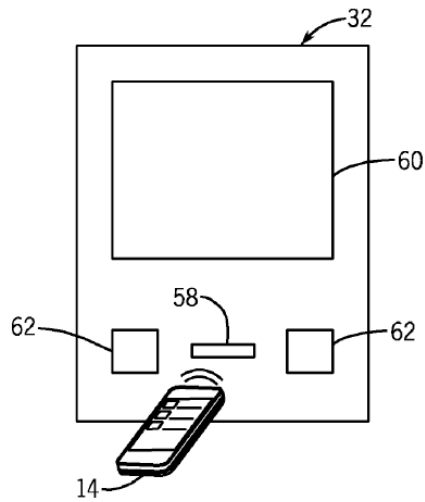


FIG. 3

(*Id.*, FIG. 3.)

30. Barnett discloses that transmission of data between the consumer's phone and the NFC display 32 via NFC interface 58 may occur when devices are within "a short distance, such as a decimeter." (EX1005, ¶[0013].)

B. Waters (EX1006)

31. Waters discloses a system/method of performing a financial transaction using an NFC-enabled mobile device. For example, Waters discloses a "mobile terminal 1" such as a "handheld mobile telephone" (EX1006, 4), which includes a "near field or RFID tag 41" (*id.*, 8). Waters discloses that the near field tag of the mobile terminal may be used to conduct various transactions, such as paying for public transport, making a toll fee payment, or paying for a school lunch. (*Id.*, 1 ("Near field or RFID tags are known. Such tags may be incorporated into smart cards or other devices for use in obtaining entry to buildings or as

electronic tickets for use of public transport or toll fee payment.”), 11 (“In the second example, a user wishes to use the near field tag 41 of the mobile terminal 1 to pay for travel by public transport (for example on the London Underground), where entry barriers are equipped with a suitable near field tag reader.”), 11 (“A similar arrangement could be used, for example, to enable a school child to pay for their lunch using the near field tag 41.”).) Waters discloses that the near field tag is able to “exchange information with a tag reader when the two are brought into close proximity.” (*Id.*, 9.)

32. Waters additionally discloses that “the mobile telecommunication device is operable to selectively enable the near field communication device.” (EX1006, 4.) Waters explains that “[t]he near field tag 41 may be selectively enabled and disabled in order to reduce the opportunity to obtain information from the near field tag 41 by an unauthorised reader.” (*Id.*, 13.) For example, Waters discloses various types of sensors that can be used to activate the near field/RF tag, such as a light sensor, pressure sensor (in combination with a fingerprint or skin resistance sensor), or heat sensor. (*Id.*, 15-16.)

33. With respect to a light sensor, Waters explains that “a photodiode (a sensor that modifies an electric current when exposed to a light source) could be built into the casing of the mobile terminal 1 and act as a switch to activate or deactivate the RF tag 41.” (EX1006, 15.) “The RF tag 41 is controlled by the photo

diode so that the RF tag 41 is *only enabled* when the mobile terminal 1 is exposed to light,” and is otherwise disabled (e.g., if the mobile terminal is an opaque case or user’s pocket). (*Id.*) Waters discloses that the “photodiode may be sensitive to a particular frequency range—for example visible light, infra red or ultra violet,” and “[t]he tag reader may be provided with a light emitter that emits light at this frequency, in order to activate the tag.” (*Id.*)

34. Waters discloses that a “pressure sensor on the casing of mobile terminal 1” may “act[] as a switch” instead of the light sensor, where the near field/“RF tag 41 is *only enabled* when the user physically presses the pressure sensor,” and is otherwise disabled (e.g., when in a case or user’s pocket). (EX1006, 15.) Such a “pressure sensor may be combined with [a] fingerprint scanner 45” so that “[t]he combined sensor detects, not only that pressure is applied, but also that an authorized person is pressing the sensor.” (*Id.*; *see also id.*, 14 (“[T]he mobile terminal 1 may incorporate a fingerprint reader 45. The fingerprint reader 45 scans the fingerprint of the user when the user’s finger is placed on the reader 45 and compares it to the user’s fingerprint stored in the memory of the mobile terminal 1 or the SIM 15. If the fingerprints are determined to match, the message is sent from the SIM 15, via link 43, to the RF tag 41.”).)

35. “Alternatively, the pressure sensor could be combined with an electrical resistance meter and used to detect that it is a human hand pressing the

pressure sensor, rather than some other object.” (EX1006, 15.) For example, Waters explains that “a skin resistance sensor may be provided on the casing of the mobile terminal 1 in dependence of the presence of the pressure sensor described above.” (*Id.*, 16.) “The near field tag 41 will *only be operated* when an appropriate resistance, capacitance or inductance is detected, indicating that the user’s hand is touching the sensor.” (*Id.*)

36. “Heat sensors” can similarly be “incorporated in an appropriate position on the casing of the mobile terminal 1” and “configured to detect that the mobile terminal is in a user’s hand by detecting the heat from the hand, and *only enabling* the near field tag 41 when heat from the hand is so detected.” (EX1006, 15-16.)

C. Wang (EX1026)

37. Wang discloses a “method for assigning frequency spectrum bandwidth of a communication system” (EX1026, ¶[0001]), where the method is compatible with “wireless data transmission” (*id.*, ¶[0002]) such as “cellular networking” (*id.*, ¶¶[0006], [0011]).

38. Wang specifically “relates to a method for assigning frequency spectrum bandwidth of a communication system, and especially relates to a method for assigning frequency spectrum bandwidth of an OFDM (Orthogonal Frequency Division Multiplexing) and OFDM (Orthogonal Frequency Division

Multiplexing Access) coexistence system.” (*Id.*, ¶[0001].) Wang explains that OFDM technology is “suitable for wireless data transmission, so it has been used widely as a wireless access method” since the 1960s, and is beneficial because “the modulating mode has very high frequency spectrum utilization efficiency.” (*Id.*, ¶[0002].) In particular, an “OFDM system adopts multi-carrier technique,” where “[o]rthogonality exists among the sub-carriers of the OFDM system, which permits mutual overlap of the frequency spectrum of each sub-carrier, and therefore, compared with the conventional frequency division multiplexing system, the OFDM system could maximize the use of frequency spectrum resources.” (*Id.*, ¶[0003].)

39. Wang explains that OFDMA is similar to OFDM, but “the bandwidth assignment of the OFDMA system is carried out in the two-dimensional interval of time and frequency, and the bandwidth of the OFDM system is only assigned on time dimension.” (*Id.*, ¶[0006].) “Compared with the conventional OFDM system, the bandwidth assignment of the OFDMA system is more flexible and suitable for use in cellular networking, so it is attracting people’s attention more and more.” (*Id.*) Wang explains that these differences in bandwidth assignment can result in a low utilization rate of frequency spectrum in a combined system, and thus discloses an improved OFDM and OFDMA coexistence system featuring an efficient method for assigning the frequency spectrum bandwidth of the system in

order to improve the utilization efficiency of the frequency spectrum. (*Id.*, ¶¶[0007]-[0013].)

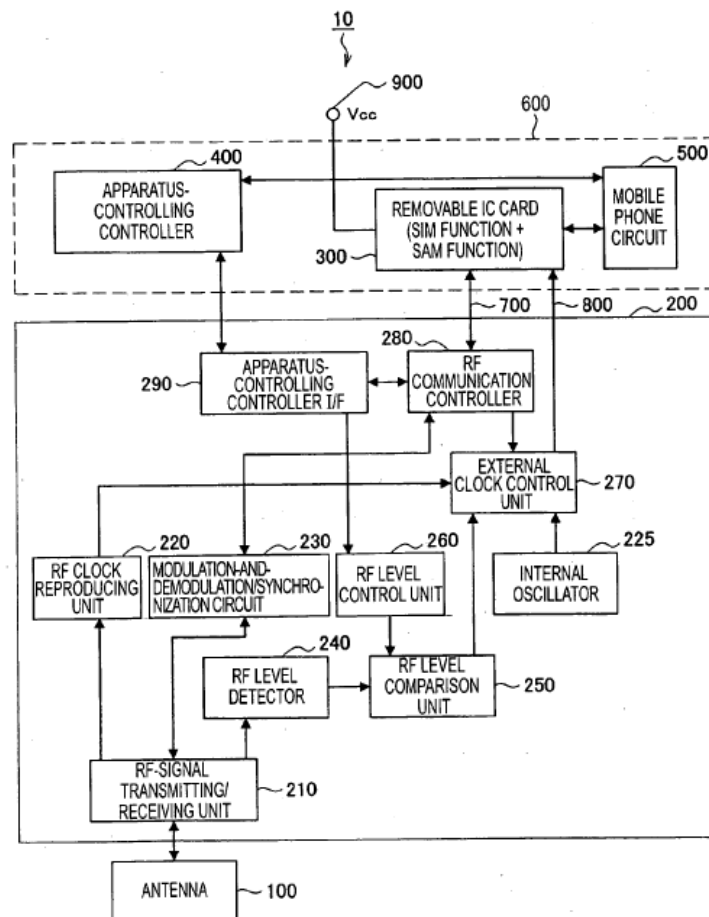
D. Sakamoto (EX1029)

40. Sakamoto discloses “a mobile radio communication device in which an NFC IC card (e.g., a SAM card) is connected to a mobile terminal, including a mobile phone having an IC card such as a SIM card, USIM card, or a flash memory card, the mode of the IC card is automatically initialized after radio communication (NFC communication) with another NFC-equipped apparatus is executed.” (EX1029, ¶[0010]; *see also id.*, ¶¶[0003]-[0004], [0005] (“As described above, the incorporation of the NFC function into radio communication mobile terminals, such as mobile phones and PDAs, can provide communication means that can access network content for payment using credit cards and so on, tickets, and games through a simple operation, i.e., only bringing the NFC-equipped apparatus close.”), [0049].)

41. Sakamoto specifically discloses an NFC-enabled mobile phone with an NFC circuit that includes a signal strength determining means, which is used to measure whether the signal from another nearby NFC-enabled device is strong enough to allow communication between the two NFC-enabled devices. For example, Sakamoto discloses with reference to Figure 2 (reproduced below) that “the circuit configuration of the NFC-equipped apparatus...includes an NFC-side

circuit, which is constituted by an antenna 100 and an NFC circuit (an NFC chip) 200, and a mobile-phone-side circuit 600, which is constituted by a removable IC card 300, an apparatus-controlling controller 400, and a mobile phone circuit 500.”
(*Id.*, ¶[0052], FIG. 2; *see also id.*, ¶¶[0047] (“FIG. 1 is a schematic view showing the configuration of an NFC-function-equipped mobile phone (mobile radio communication device) according to a first embodiment.”), [0048].)

FIG. 2



(*Id.*, FIG. 2.)

42. Sakamoto discloses that “[t]he NFC circuit 200 includes an RF-signal (radio-signal) transmitting/receiving unit 210, an RF-clock reproducing unit 220, a modulation-and-demodulation/synchronization circuit 230, an RF-level detector 240, an RF-level comparison unit (radio-signal strength determining means) 250, an RF level controller (radio-signal strength threshold-value setting means) 260, an external clock control unit 270, an RF communication controller 280, an apparatus-controlling controller I/F (interface) 290, and so on.” (*Id.*, ¶[0054].)

43. Sakamoto discloses measuring the strength of an RF signal received at antenna 100 from another nearby NFC-enabled device using the RF-level detector 240 and RF-level comparison unit (radio-signal strength determining means) 250 to determine whether the two devices are “in close proximity...(e.g., in a near distance in the range of, for example, 10 to 20 cm).” (*Id.*, ¶[0049].) Sakamoto does this by determining whether the measured signal strength is over a certain threshold. (*Id.*, ¶¶[0056]-[0058], [0060], [0075].) For example, Sakamoto discloses that “[t]he RF-level detector 240 is a circuit for converting (averaging) the RF signals, received from the antenna 100 and the RF-signal transmitting/receiving unit 210, into DC-level signals and for outputting the signals to the RF-level comparison unit 250.” (*Id.*, ¶[0056].) “The RF-level comparison unit 250 is a circuit for comparing an RF-signal-strength threshold value set by the RF-level control unit 260 with a present RF level value sent from the RF-level

detector 240 and for outputting a signal indicating which of the values is larger or smaller to the external clock control unit 270,” where “[t]he RF signal strength can be, for example, the voltage value of radio signals.” (*Id.*)

44. Based on this comparison of signal strength, the “NFC circuit 200...determine[s] the presence/absence of RF signal communication (radio signal communication) with another NFC-equipped apparatus.” (*Id.*, ¶[0060].) If the measured signal strength is higher than the threshold value, RF communication between the mobile phone and the nearby apparatus is allowed. (*Id.*, ¶[0075] (“That is, when the present RF signal strength is higher than the RF-level setting value (the threshold value), data communication with the removable IC card 300 is executed as shown in FIG. 10A.”), FIG. 10A; *see also id.*, ¶¶[0009]-[0011], [0057] (“That is, when the present strength of the RF signals received by the antenna 100 and the RF-signal transmitting/receiving unit 210 is higher than an RF level setting value (an RF-signal-strength threshold value), control is executed so as to supply the clock signal to the removable IC card 300.”), [0058], [0060].) Otherwise, communication between the two devices is stopped or not allowed. (*Id.*, ¶¶[0075] (“On the other hand, when the present RF signal strength is lower than the RF-level setting value, the level of the data line to the removable IC card 300 is fixed to the Hi level (see FIG. 10B) or the Low level (see FIG. 10C). As a result, for

example, data generated by noise or the like is prevented from being transmitted to the removable IC card 300.”), [0057]-[0058], [0060].)

VII. CLAIM CONSTRUCTION

45. I understand that when considering the meaning of patent claims, one must consider the language of the claims, the specification, and the prosecution history of the patent. I also understand that claim terms are typically given their ordinary and customary meanings as would have been understood by a person of ordinary skill in the art at the time of the invention for the patent. For the '199 patent, as I explained above in Section IV, the relevant time that I have been asked to consider is around November 4, 2008. For purposes of my opinions in this declaration, I have been asked to consider the challenged claims under their plain and ordinary meanings as understood by a person of ordinary skill in the art at the time of the alleged invention, and I have applied such understandings in my analysis of the '199 patent and the prior art.

**VIII. THE PRIOR ART DISCLOSES OR SUGGESTS THE SUBJECT
MATTER OF CLAIMS 1-19 OF THE '199 PATENT**

46. In my opinion, the prior art I discuss below discloses and/or suggests the limitations of claims 1-19.²

A. Barnett in View of Waters Disclose and/or Suggest Claims 1-2, 4-12, and 14-19

1. Claim 1

- i) [1.pre] **“A method of operating a smartphone to wirelessly provide information to an entity using a first air interface, to wirelessly receive information from the entity using the first air interface; and to wirelessly receive a communications service from a wireless network using a second air interface that differs from the first air interface, wherein the communications service is received by the smartphone from the wireless network absent involving the entity and wherein the entity functions independently of the communications service, the method comprising:”**

47. I understand that this limitation is a preamble of the claim and I have been asked to assume that the preamble of claim 1 is limiting. Under that assumption, it is my opinion that Barnett discloses the limitations therein.

² In this section (Section VIII), I refer to exhibits other than those identified prior art reference(s) that disclose and/or suggest the claimed limitations. Such exhibits reflect the state of the art known to a person of ordinary skill in the art at the time of the alleged invention.

48. Barnett discloses a “system and method of communicating shopping information between a consumer and a retailer,” including a “system for enabling a consumer to obtain shopping information from a retailer, and the retailer to obtain information from the consumer, using a communication device, such as a mobile phone.” (EX1005, ¶[0001].) Barnett explains that “a consumer may utilize...a portable communications device 14, such as a mobile phone” (“smartphone”) (*id.*, ¶[0011]), which is “adapted to communicate with a Near Field Communication (NFC) device, a wireless network, such as a Wi-Fi system, and a Bluetooth system, as well as a cellular phone system” (*id.*, ¶[0012]). Barnett describes that the “mobile phone 14 combines the functions of a Wi-Fi device, a contact-less credit card, and a cell phone” (*id.*, ¶[0012]), and thus a person of ordinary skill in the art would have understood that a consumer’s mobile phone operates as a “smartphone” because it has advanced features beyond the standard calling and texting features of a cellular phone.

49. Barnett explains that a store may have “stand-alone NFC-enabled devices 34 [which] are used to identify products to NFC-enabled devices.” (EX1005, ¶[0023].) As shown in Figure 1 below, a consumer may place their “NFC-enabled mobile phone 14” (in red below) “proximate to the product identifier 34” (in yellow below) so that “information is extracted from the product identifier 34 and transmitted to, and stored within, the NFC-enabled mobile phone

14 in a manner similar to a bar code reader.” (*Id.*, ¶[0023].) For example, the consumer may “retrieve and store information” such as “the identity of the product” (*id.*, ¶[0033]), which may further include “the name of the produce and the price of the product, as well as technical information about the product, such as the specifications” (*id.*, ¶[0023]).

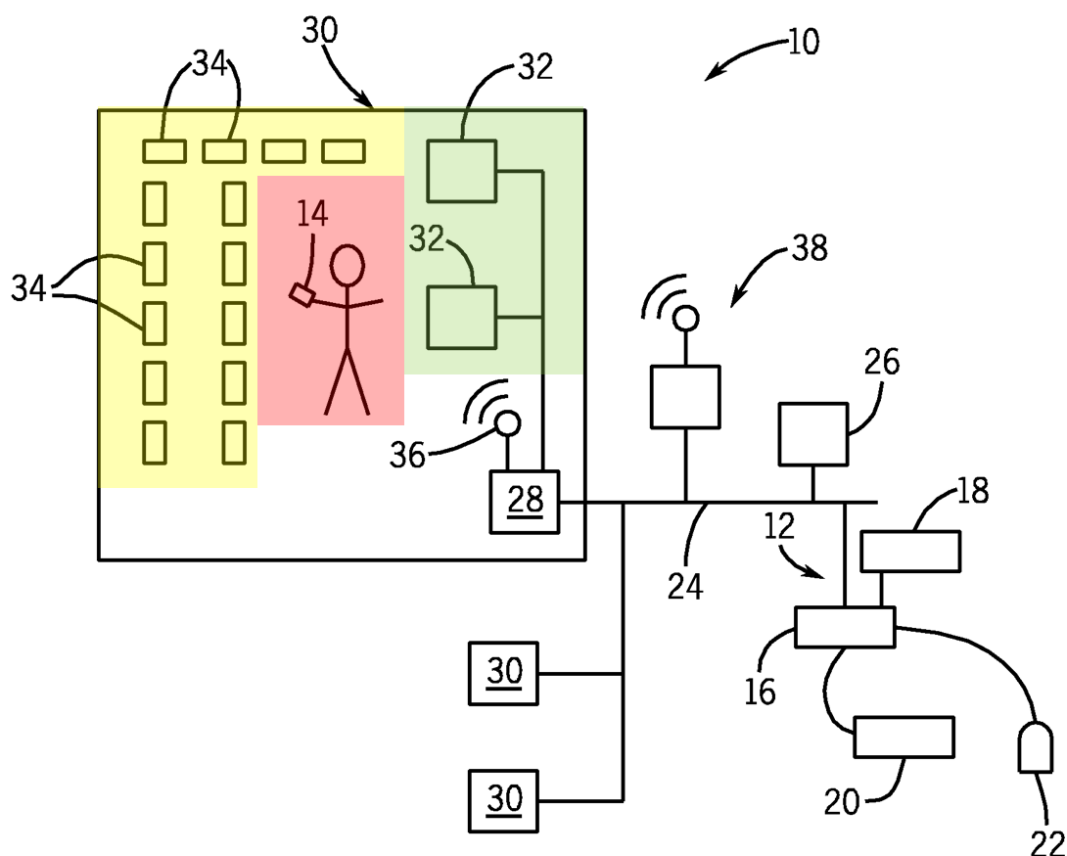
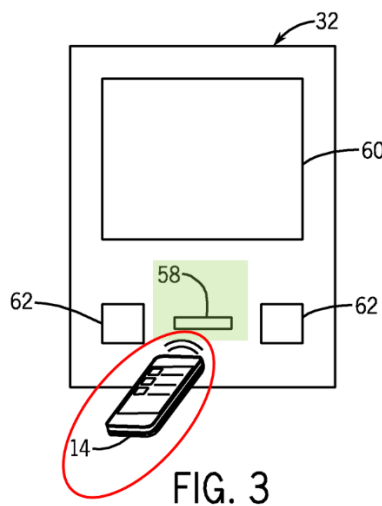


FIG. 1

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

50. Barnett also explains that “[w]ithin the store 30 are a series of displays 32 that are connected to the store computing system 28.” (EX1005, ¶[0021].) These “displays 32” (in green above) may be “NFC-enabled displays that can interact with a NFC-enabled mobile phone 14 using device-to-device communication.” (*Id.*) “The NFC-enabled display 32,” as shown in Figure 3 below, “has an NFC interface 58” (in green) “that is adapted to transmit data between the mobile phone 14 and the display 32.” (*Id.*, ¶[0038].) For example, Barnett discloses that “the mobile phone 14 may be programmed to provide a specific credit card number when the mobile phone 14 is used in making purchases in a specific store.” (*Id.*, ¶[0032].)



(*Id.*, FIG. 3 (annotated).) Barnett discloses that transmission of data between the consumer’s phone (in red above) and the NFC display 32 via NFC interface 58 (in

green above) may occur when devices are within “a short distance, such as a decimeter.” (EX1005, ¶[0013].)

51. Barnett explains that the NFC displays 32 have multiple purposes. First, Barnett discloses that after retrieving product identity information from devices 34, a “consumer may then place the mobile phone 14 proximate to a NFC-display 32 which reads the product identity information from the mobile phone 14 and retrieves additional information regarding the product to the consumer.” (EX1005, ¶[0033].) For example, the “information received from the retailer may include product information, such as the shopping list,” “the location within the store 30 of the products on the shopping list,” and “[p]romotional information, such as discounts.” (*Id.*, ¶[0031].) This information may be sent to and “displayed...on...the mobile phone 14.” (*Id.*, ¶[0034].)

52. Second, “[t]he mobile phone 14 may be programmed to be in an operating mode to learn about the current store using the NFC display 32.” (*Id.*, ¶[0031].) “For example, the mobile phone 14 may send a query to the NFC-enabled display 32 to inform the mobile phone 14 the identity of the retailer and the location of the retailer’s store,” where the information returned to the phone “may be used to configure the mobile phone 14 as a loyalty card for the specific retailer.” (*Id.*) In addition, “[t]he information received from the NFC-enabled display 32 may be used to configure the mobile phone 14 for the specific retailer

and/or the specific store,” so that “the mobile phone 14 may be programmed to provide a specific credit card number when the mobile phone 14 is used in a specific store.” (*Id.*, ¶[0032].) Barnett also discloses that configuration “[i]nformation to enable the consumer to use the store’s Wi-Fi system 36 may be retrieved from the NFC-enabled display 32,” such that “all of the information needed to automatically configure the mobile phone 14 to use the store[’]s Wi-Fi system 36 is provided to the mobile phone 14 via the NFC-enabled display 32.” (*Id.*, ¶[0035].)

53. Third, “[t]he display [32], using the NFC interface, may be used to complete the transaction using the cell phone as a credit card, debit card, or electronic purse.” (EX1005, ¶[0040]; *see also id.*, ¶[0037] (“The consumer can use the cell phone as a credit card to complete the purchase process by using a NFC-enabled payment register.”).) When completing a transaction, the mobile phone transmits the credit or debit card information to the NFC display 32, as I discussed above. (*Id.*, ¶[0032].) In addition, “[a]ny promotional or special offers stored in the mobile phone 14 are retrieved from the mobile phone 14 at check-out.” (*Id.*, ¶[0040].)

54. Thus, Barnett discloses “[a] method of operating a smartphone,” e.g., to shop in a store and perform a financial transaction, by wirelessly interacting with an NFC display 32 (“entity”) using NFC communication (“first air

interface”). (See also EX1005, ¶[0038] (discussing NFC communication through NFC interface 58); EX1006, 8-9 (disclosing establishing communications based on “Near Field Communication Interface and Protocol (NFCIP-I)”.) As I discussed above, this method involves wirelessly providing various information (e.g., product identity information, retailer identity/location, credit/debit card number, promotional offers) to the NFC display 32 using NFC (“wirelessly provide information to an entity using a first air interface”), and wirelessly receiving various information (e.g., product information, shopping list, product locations, promotional information, loyalty/credit/debit card configuration information, Wi-Fi configuration information) from the NFC display 32 using NFC communication (“wirelessly receive information from the entity using the first air interface”). As discussed above, the type of information that is wirelessly provided to, or wirelessly received from, the NFC display 32 depends on the purpose of the consumer’s interaction with the NFC display 32 (e.g., the consumer may engage with the NFC display 32 in a product information learning mode, an operating mode, or a payment mode).

55. Barnett also discloses that the smartphone may be operated using various other communication interfaces, including using a cellular communication system (“using a second air interface that differs from the first air interface”) to access the Internet. Barnett explains that the mobile phone “operat[es] with a

cellular network” (EX1005, ¶[0005]) and comprises a “cellular phone system 38 [that] enables the consumer to use the mobile phone as a phone...[and] enables the consumer to use the mobile phone 14 to access the Internet” (*id.*, ¶[0027]). For example, “[i]nformation from the retailer may be provided to the mobile phone 14 via the cellular phone system 38.” (*Id.*, ¶[0027].) Barnett explains that if the cellular phone system is used to access the Internet, the service is provided “using the data connection on a cellular carrier.” (*Id.*, ¶[0016].) Accordingly, Barnett discloses wirelessly receiving cellular service (“and to wirelessly receive a communications service”) from a cellular network (“from a wireless network”) using a cellular communication system (“using a second air interface that differs from the first air interface”). In my opinion, a person of ordinary skill in the art would have understood that the cellular service is received by the phone from the cellular network without involving the NFC display 32 (“wherein the communications service is received by the smartphone from the wireless network absent involving the entity”) and such that the NFC display 32 operates independently of any cellular service (“wherein the entity functions independently of the communications service”) because cellular service does not depend on or involve NFC communications, and Barnett does not disclose any dependence between the cellular communications and NFC communications. (*Id.*; EX1005, ¶¶[0012] (describing the contact-less credit card features (e.g., those involving

communication between a phone and NFC device) and cell phone features of Barnett's mobile phone as distinct identities despite both being present in the same phone), [0041] (describing a "cellular phone capability" and "cellular phone interface" distinct from NFC, Wi-Fi, and Bluetooth capabilities/interfaces); *see also id.*, ¶¶[0005], [0016], [0017], [0027] (additionally describing the cellular communication system without describing any dependence between the cellular and NFC communication systems).)

56. For all of these reasons, and additionally for the reasons I discuss below with respect to limitations [1.a]-[1.g], Barnett discloses "[a] method of operating a smartphone in performing a plurality of financial transactions."

ii) [1.a] "detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity;"

57. Barnett discloses this limitation. As I discussed for limitation [1.pre], Barnett discloses that transmission of data between the consumer's phone and the NFC display 32 via NFC interface 58 may occur when devices are within "a short distance, such as a decimeter." (EX1005, ¶[0013]; *see also id.*, ¶[0038], FIG. 3; Section VIII.A.1.i.) In my opinion, a person of ordinary skill in the art would have recognized that the NFC-enabled mobile phone must therefore detect that it is within a sufficiently short distance of the NFC-enabled display 32's NFC interface in order for the phone to enable transmission/receipt of data between the phone and

NFC display 32 (“detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity”). Indeed, Barnett explains that “a connection through a NFC link indicates that the two devices are in close physical proximity to each other.” (EX1005, ¶[0025], *see also id.*, ¶¶[0031] (“the consumer **places their mobile phone 14 proximate to an NFC-enabled display 32**”), [0032] (“[O]nce this [payment] information is initially programmed into the mobile phone 14, the configuration of the mobile phone 14 as a credit card is done automatically simply by **placing the mobile phone 14 proximate to the NFC-enabled display 32** so that the desired information may be exchanged between the two.”).)

- iii) [1.b] “in response to at least the proximity condition having been satisfied between the smartphone and the entity, establishing a wireless short-range communications link between the smartphone and the entity to provide by the smartphone, using the first air interface, information to the entity and to receive by the smartphone information from the entity;”

58. Barnett discloses this limitation. As I discussed for limitations [1.pre]-[1.a], a consumer’s phone is brought within a certain proximity of the NFC display 32 (“in response to at least the proximity condition having been satisfied between the smartphone and the entity”) to establish an NFC link between the two devices (“establishing a wireless short-range communications link between the smartphone and the entity”) in order transmit information (e.g., product identity information,

retailer identity/location, credit/debit card number, promotional offers), using NFC, from the consumer's phone to the NFC display 32 ("to provide by the smartphone, using the first air interface, information to the entity") and to receive information, using NFC, from the NFC display 32 (e.g., product information, shopping list, product locations, promotional information, loyalty/credit/debit card configuration information, Wi-Fi configuration information) ("receive by the smartphone information from the entity"), depending upon the purpose of the consumer's engagement with the NFC display 32 (e.g., engaging in a product information learning mode, an operating mode, or a payment mode). (*See* Sections VIII.A.1.i-ii.) Barnett describes the "NFC link" between the two devices (EX1005, ¶[0025]) as "short-range high frequency wireless communication...which enables the exchange of data between devices over about a short distance, such as a decimeter" ("wireless short-range communications link between the smartphone and the entity") (*id.*, ¶[0013]).

- iv) **[1.c] “in response to at least the proximity condition having been satisfied between the smartphone and the entity and in response to a physiological parameter, wirelessly providing by the smartphone, using the first air interface, information to the entity and wirelessly receiving by the smartphone, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving by the smartphone the communications service from the wireless network using the second air interface; and”**

59. Barnett in view of Waters discloses and/or suggests this limitation. As I discussed for limitations [1.pre]-[1.a], if the consumer’s phone is brought within a sufficiently short proximity of the NFC display 32 (“in response to at least the proximity condition having been satisfied between the smartphone and the entity”), information (e.g., product identity information, retailer identity/location, credit/debit card number, promotional offers) may be transmitted by the phone to the NFC display 32 using NFC (“wirelessly providing by the smartphone, using the first air interface, information to the entity”) and information (e.g., product information, shopping list, product locations, promotional information, loyalty/credit/debit card configuration information, Wi-Fi configuration information) may be received by the phone from the NFC display 32 using NFC (“wirelessly receiving by the smartphone, using the first air interface, information from the entity”), depending upon the purpose of the consumer’s engagement with the NFC display 32 (e.g., engaging in a product information learning mode, an operating mode, or a payment mode). (See Sections VIII.A.1.i-ii.) As I discussed

for limitation [1.pre], this transmission/receipt of information between the phone and NFC display 32 is independent from the phone receiving cellular service from a cellular network using the cellular communications system (“independently of...receiving by the smartphone the communications service from the wireless network using the second air interface”), and the NFC display 32 is not involved in the receipt of cellular service in any way (“absent involving the entity in, receiving by the smartphone the communications service from the wireless network using the second air interface”). (See Section VIII.A.1.i.)

60. While Barnett does not explicitly disclose that the transmission and receipt of information between the consumer’s phone and NFC display 32 occurs “in response to a physiological parameter,” a person of ordinary skill in the art would have been motivated to implement this feature in view of Waters, such that NFC capabilities are enabled in response to a physiological parameter being sensed.

61. Like Barnett, Waters discloses a system/method of performing a financial transaction using an NFC-enabled mobile device. For example, Waters discloses a “mobile terminal 1” such as a “handheld mobile telephone” (EX1006, 4), which includes a “near field or RFID tag 41” (*id.*, 8). Waters discloses that the near field tag of the mobile terminal may be used to conduct various transactions, such as paying for public transport, making a toll fee payment, or paying for a

school lunch. (*Id.*, 1 (“Near field or RFID tags are known. Such tags may be incorporated into smart cards or other devices for use in obtaining entry to buildings or as **electronic tickets for use of public transport or toll fee payment.**”), 11 (“In the second example, a user wishes to use the near field tag 41 of the mobile terminal 1 to **pay for travel by public transport** (for example on the London Underground), where entry barriers are equipped with a suitable near field tag reader.”), 11 (“A similar arrangement could be used, for example, to **enable a school child to pay for their lunch** using the near field tag 41.”).) Waters discloses that the near field tag is able to “exchange information with a tag reader when the two are brought into close proximity.” (*Id.*, 9.) Thus, Waters is similar to Barnett, which discloses a system/method of purchasing products in a store at an NFC-enabled display/register using an NFC-enabled mobile device. (*See* Section VIII.A.1.i.) In other words, both Barnett and Waters relate to conducting financial transactions using a mobile device based at least in part on proximity of the mobile device to a point-of-sale device. In my opinion, a person of ordinary skill in the art would have therefore been motivated to consider the teachings of Waters when implementing Barnett’s system/method.

62. Waters additionally discloses that “the mobile telecommunication device is operable to selectively enable the near field communication device.” (EX1006, 4.) Waters explains that “[t]he near field tag 41 may be selectively

enabled and disabled in order to reduce the opportunity to obtain information from the near field tag 41 by an unauthorised reader.” (*Id.*, 13.) For example, Waters discloses various types of sensors that can be used to activate the near field/RF tag, such as a pressure sensor (in combination with a fingerprint or skin resistance sensor) or heat sensor. (*Id.*, 15-16.) Waters provides this functionality to enhance the device’s security features for conducting financial transactions. (EX1006, Title (“Improved Security for Wireless Communication”), Abstract, 2 (“The present invention, in one aspect, seeks to provide additional or improved security.”), 4, 13-16.)

63. Waters discloses that a “pressure sensor on the casing of mobile terminal 1” may “act[] as a switch,” where the near field/“RF tag 41 is ***only enabled*** when the user physically presses the pressure sensor,” and is otherwise disabled (e.g., when in a case or user’s pocket). (EX1006, 15.) Such a “pressure sensor may be combined with [a] fingerprint scanner 45” so that “[t]he combined sensor detects, not only that pressure is applied, but also that an authorized person is pressing the sensor.” (*Id.*; *see also id.*, 14 (“[T]he mobile terminal 1 may incorporate a fingerprint reader 45. The **fingerprint reader 45 scans the fingerprint of the user when the user’s finger is placed on the reader 45 and compares it to the user’s fingerprint stored in the memory of the mobile**

terminal 1 or the SIM 15. If the fingerprints are determined to match, the message is sent from the SIM 15, via link 43, to the RF tag 41.”.)

64. “Alternatively, the pressure sensor could be combined with an electrical resistance meter and used to detect that it is a human hand pressing the pressure sensor, rather than some other object.” (EX1006, 15.) For example, Waters explains that “a skin resistance sensor may be provided on the casing of the mobile terminal 1 in dependence of the presence of the pressure sensor described above.” (*Id.*, 16.) “The near field tag 41 will ***only be operated*** when an appropriate resistance, capacitance or inductance is detected, indicating that the user’s hand is touching the sensor.” (*Id.*)

65. “Heat sensors” can similarly be “incorporated in an appropriate position on the casing of the mobile terminal 1” and “configured to detect that the mobile terminal is in a user’s hand by detecting the heat from the hand, and ***only enabling*** the near field tag 41 when heat from the hand is so detected.” (EX1006, 15-16.)

66. Accordingly, Waters discloses that “in response to a physiological parameter” being sensed (e.g., a fingerprint matches a certain user and the pressure is actively being applied, a resistance sensor and pressure sensor combination detects that a human hand is actively pressing the sensor, or heat from the user’s hand is actively being applied) by a phone sensor (e.g., fingerprint/pressure sensor,

skin resistance/pressure sensor, or heat sensor) and meeting some criterion, the near field tag is enabled so as to allow for the transmission/receipt of information (e.g., for conducting a transaction) using NFC between a user's phone and an NFC reader ("wirelessly providing by the smartphone, using the first air interface, information to the entity and wirelessly receiving by the smartphone, using the first air interface, information from the entity").

67. In my opinion, a person of ordinary skill in the art would have been motivated to incorporate such a sensing mechanism, similar to that disclosed by Waters, to selectively enable/disable the NFC tag in Barnett's device. Waters explains that the selective enablement/disablement of the near field tag is intended to improve the security of the tag to prevent unauthorized access (e.g., by an unauthorized reader). (EX1006, 9 ("**In order to improve the security of the near field tag**, in the present embodiment, it is proposed to use the SIM 15 of mobile terminal 1 to **control to some extent the operation of the near field tag 41**....In this embodiment, the authentication of the SIM 15 is used to **protect data held by the memory of the near field tag 41 from unauthorised access.**"), 13 ("The **near field tag 41** may be selectively enabled and disabled in order to **reduce the opportunity to obtain information** from the near field tag 41 **by an unauthorised reader.**")). In my opinion, a person of ordinary skill in the art would have understood the benefit of such a security measure in the context of Barnett's

system/method, which as I discussed above, involves a user interacting with many NFC readers/displays in the same store. Barnett explains that these NFC readers are largely unmonitored by retail workers, since the goal of the invention is to reduce the number of higher cost human employees in the store. (EX1005, ¶[0043].) In my opinion, a person of ordinary skill in the art would have understood that the presence of employees provides a security benefit to a store by deterring theft or other unauthorized access to merchandise and store technology. For example, in a store with more employees, a bad actor may be less likely to install a card skimming device or similar unauthorized NFC reader to gain access to customer credit/debit card information. In my opinion, a person of ordinary skill in the art would have thus recognized the importance of implementing security features at each user's mobile phone in an environment with fewer employees, so as to reduce the risk of unauthorized access by an unauthorized NFC reader. Barnett also emphasizes that security is an important feature of mobile phone communication technologies by explaining, for example, the benefits of authentication mechanisms for accessing wireless internet (EX1005, ¶¶[0005], [0012]) and "secure" Bluetooth technologies (*id.*, ¶[0017]). In my opinion, a person of ordinary skill in the art would have thus recognized that communication security is important to the mobile phone and would have been motivated to implement security improvements to the mobile phone's NFC technology, e.g., by

selectively enabling/disabling the NFC tag to prevent access by an unauthorized reader. In my opinion, a person of ordinary skill in the art would have understood that selectively enabling and disabling the NFC tag of a mobile phone would have numerous user experience benefits as well, such as preventing unintended financial transactions or other unintended use of the NFC tag, and helping preserve mobile phone battery by disabling the NFC tag when it is not needed.

68. In my opinion, a person of ordinary skill in the art would have also had a reasonable expectation of success combining the teachings of Barnett and Waters. As I discussed above, both references are in the same field of art. Moreover, Barnett suggests that its system/method is flexible and modifications to the NFC-enabled mobile phone are contemplated. (EX1005, ¶[0044].) In my opinion, a person of ordinary skill in the art would have had the skill to implement and reasonable expectation of success in achieving such a modification because it would have involved a combination of known technologies (e.g., known system/method for performing financial transactions using an NFC-enabled mobile phone (Barnett)) according to known methods (e.g., known methods of selectively enabling and disabling NFC tags in mobile phones for use in financial transactions (Waters)) to yield the predictable result of a modified Barnett-Waters system/method that implements a sensing mechanism in each user's phone to selectively enable and disable the phone's NFC tag such that sensing a value of a

physiological parameter and determining that it meets some criterion is required in order to activate the NFC tag used to interact with an NFC reader (e.g., to conduct financial transactions or otherwise transmit/receive information) in the store.

- v) **[1.d] “wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity,”**

69. Barnett discloses this limitation. As I discussed for limitation [1.pre], Barnett discloses that the user’s smartphone may wirelessly receive, using the phone’s cellular communication system, the cellular service from the cellular network (“wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network”). (See Section VIII.A.1.i.) As I discussed, the phone’s receiving of the cellular service does not involve the NFC display 32 (“absent involving the entity”), does not involve the phone providing any information to the NFC display 32 in order to receive the cellular service (“absent providing by the smartphone information to the entity”), and does not involve the phone receiving any information from the NFC display 32 in order to receive the cellular service (“absent receiving by the smartphone information from the entity”), because the cellular service operates completely independent of the NFC display 32. (*Id.*)

- vi) [1.e] **“wherein the wireless short-range communications link used by the first air interface is based upon unlicensed frequencies,”**

70. Barnett discloses this limitation. For example, in my opinion, a person of ordinary skill in the art would have understood that the NFC link used by the NFC system (“wireless short-range communications link used by the first air interface”) would have used unlicensed frequencies (“based upon unlicensed frequencies”), as those were standard features of near field communication. (*See, e.g.,* EX1006, 8-9 (describing a mobile terminal that communicates “wirelessly” using a “near field or RFID tag 41” which “operates in [an] unregulated RF band” in which “[n]o licenses are required for the use of the near field devices in this RF band”).)

- vii) [1.f] **“wherein the second air interface uses a wireless communications link that is based upon licensed frequencies, and”**

71. Barnett discloses this limitation. For example, in my opinion, a person of ordinary skill in the art would have understood that the cellular communications system (“second air interface”) would have wirelessly connected to the cellular network (“uses a wireless communications link”) using licensed frequencies (“based upon licensed frequencies”), as these were standard features of cellular communication. (*See, e.g.,* EX1025 (1:43-47 (**“Mobile wireless telephony is generally carried out over so-called ‘licensed’ frequencies.** These licensed

frequencies refer to frequency bands in the overall spectrum that are regulated by a government entity, for example the Federal Communications Commission in the United States....Typically, mobile telephone communications are carried out over paired (uplink and downlink) frequencies within the licensed band.”.)

viii) [1.g] “wherein the first air interface is not involved in providing the communications service to the smartphone.”

72. Barnett discloses this limitation. As I discussed for limitation [1.pre], the NFC communication system is completely independent from the cellular service and is not involved in providing the cellular service to the consumer’s phone (“wherein the first air interface is not involved in providing the communications service to the smartphone”). (See Section VIII.A.1.i.)

2. Claim 2

i) [2.pre] “The method of claim 1,”

[2.a] “wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity and wirelessly receiving by the smartphone, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving by the smartphone the communications service from the wireless network using the second air interface is performed over a first time interval;”

[2.b] “wherein said wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity is performed over a second time interval; and”

[2.c] “wherein the first and second time intervals are non-overlapping with one another.”

73. Barnett discloses this limitation. As I discussed for limitation [1.c], Barnett discloses “wirelessly providing by the smartphone, using the first air interface, information to the entity and wirelessly receiving by the smartphone, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving by the smartphone the communications service from the wireless network using the second air interface” because the consumer’s phone may be used to transmit information (e.g., product identity information, retailer identity/location, credit/debit card number, promotional

offers) to the NFC display 32 using NFC, and may be used to receive information (e.g., product information, shopping list, product locations, promotional information, loyalty/credit/debit card configuration information, Wi-Fi configuration information) from the NFC display 32 using NFC. (See Section VIII.A.1.iv.) As I discussed for limitation [1.pre], this transmission and receipt of information happens while the consumer is shopping in a store (“performed over a first time interval”). (See Section VIII.A.1.i.)

74. As I discussed for limitation [1.d], Barnett discloses “wirelessly receiving by the smartphone, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing by the smartphone information to the entity, and absent receiving by the smartphone information from the entity” because the user’s smartphone may wirelessly receive, using the phone’s cellular communication system, the cellular service from the cellular network, where the cellular service operates completely independently of the NFC display 32 or any communication between the consumer’s phone and the NFC display 32. (See Section VIII.A.1.v.)

75. Barnett discloses that the consumer’s phone may be operate such that the cellular-enabled phone does not use the cellular service while shopping in the store. In particular, Barnett explains that “[t]he system 10 is adapted to provide information to a consumer’s mobile phone 14 within a store without requiring the

consumer to incur a mobile phone usage charge.” (EX1005, ¶[0016].) “That is, instead of using the data connection on a cellular carrier, the consumer uses a Wi-Fi network inside the store that has a connection to the Internet.” (*Id.*) In my opinion, a person of ordinary skill in the art would have thus understood that Barnett’s system/method allows for a consumer to shop in a store where cellular service is either unavailable (e.g., due to the building’s location, construction, etc.) or turned off by a user (e.g., to prevent mobile phone usage charges), while still allowing the consumer to use their cellular-enabled phone outside of the store. In such a scenario, the consumer may transmit/receive information between the consumer’s phone and the NFC display 32 while shopping in the store (“performed over a first time interval”), and may use the phone to receive cellular service while outside the store (“performed over a second time interval”), and the time inside and outside the store do not overlap (“wherein the first and second time intervals are non-overlapping with one another”).

3. Claim 4: “The method of claim 1, wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on receiving a short-range signal from the entity over the first air interface.”

76. Barnett discloses this limitation. As I discussed for limitation [1.a], in order for transmission/receipt of information between a consumer’s phone and an NFC display 32 to occur, the consumer’s NFC-enabled mobile phone be brought

within proximity of the NFC display 32 in a store (“detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity”).

(See Section VIII.A.1.ii.) Indeed, as I discussed, Barnett discloses that transmission of data between the phone and the NFC display 32 occurs only when the two devices are within a short distance (e.g., a decimeter). (*Id.*; EX1005, ¶[0013].) In my opinion, a person of ordinary skill in the art would have understood that the detection that the proximity condition is satisfied occurs at least in part (e.g., in the payment context, where the mobile phone sends information via NFC to the NFC display 32) based on the mobile phone sensing that the NFC display is emitting a short-range RF signal over the NFC interface (“based, at least in part, on receiving a short-range signal from the entity over the first air interface”). (See, e.g., EX1005, ¶[0014] (explaining that the mobile phone’s NFC tag may act as a “passive tag, allowing a NFC terminal to read the information stored in the mobile phone 14”); EX1006, 9 (“The [near field tag] reader may emit an RF signal to supply power to the [near field] tag to communicate with it if the tag is ‘passive.’”).)

4. **Claim 5: “The method of claim 4, wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on a measurement of signal strength of the short-range signal.”**

77. Barnett discloses and/or suggests this limitation. As I discussed for claim 4, the detection that the proximity condition (e.g., devices within a decimeter) is satisfied occurs at least in part based on the mobile phone sensing that the NFC display is emitting a short-range RF signal over the NFC interface. (See Section VIII.A.3.) In my opinion, a person of ordinary skill in the art would have understood that the strength of the RF signal received by a phone would have depended on the proximity between the phone and the NFC display 32. Furthermore, a person of ordinary skill in the art would have recognized that a phone would not have been able to detect a signal from the NFC display 32 unless the signal is sufficiently strong (i.e., if the devices are within a sufficiently close distance, e.g., a decimeter). Thus, a person of ordinary skill in the art would have understood that the ability of the phone to detect that it is within sufficient proximity to the NFC display (“wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity”) would have been based on whether the phone is able to detect a sufficiently strong signal (“based, at least in part, on a measurement of signal strength of the short-range signal”).

78. To the extent Barnett does not explicitly disclose this limitation, a person of ordinary skill in the art would have been motivated to implement the Barnett system/method such that the user's phone performs a "measurement of signal strength of the short-range signal" in order to determine whether the proximity condition between the phone and NFC display is satisfied. In my opinion, a person of ordinary skill in the art would have understood that testing the strength of an RF signal was known in the art at the time of the alleged invention. (*See, e.g.*, EX1022, 7:50-51 ("testing the strength of the RF signal generated by a sample NFC communicator"); EX1023, 17:43-55 (describing an NFC communicator with a "signal strength determiner...coupled to the antenna...to capture a sampled measurement of the strength of an incoming RF signal"); EX1024, 5:45-51 (describing NFC device sensors which measure the strength of a generated magnetic field).) In my opinion, a person of ordinary skill in the art would have understood that measuring the signal strength of the short-range RF signal would have provided enhanced accuracy and reliability by ensuring that the phone does not proceed with transmitting/receiving information over an NFC connection unless the quality of the connection between the devices is sufficiently strong. In my opinion, a person of ordinary skill in the art would have also recognized that measuring the signal strength would have provided for improved security and efficiency because the risk of a dropped NFC connection in the middle

of a transaction would have decreased if a connection is not established unless the measured signal is sufficiently strong.

79. In my opinion, a person of ordinary skill in the art would have had the skill to implement and reasonable expectation of success in achieving such a modification because it would have involved a combination of known technologies (e.g., known systems/methods for transmitting/receiving information using NFC (Barnett)) according to known methods (e.g., known methods of measuring RF signals generated by NFC devices (state of the art)) to yield the predictable result of a modified Barnett system/method that detects that a proximity condition is satisfied between the phone and NFC display by measuring whether the RF signal generated by the NFC display is sufficiently strong (“wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on a measurement of signal strength of the short-range signal”).

5. Claim 6

i) [6.pre] “The method of claim 1,”

[6.a] “wherein a value of the physiological parameter is provided by using a sensor of the smartphone.”

80. The Barnett-Waters combination discloses and/or suggests this limitation. As I discussed for limitation [1.c], in the Barnett-Waters combination, a physiological parameter is sensed (e.g., a fingerprint matches a certain user and the

pressure is actively being applied, a resistance sensor and pressure sensor combination detects that a human hand is actively pressing the sensor, or heat from the user's hand is actively being applied) by a phone sensor (e.g., fingerprint/pressure sensor, skin resistance/pressure sensor, or heat sensor) ("wherein a value of the physiological parameter is provided by using a sensor of the smartphone") in order to determine whether the value of the parameter satisfies a certain criterion, thereby enabling the NFC tag. (See Section VIII.A.1.iv.)

6. Claim 7

- i) **[7.pre] "The method of claim 1, wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity comprises:"**

[7.a] "being proximate to a specific location within a store, then detecting a short-range signal being transmitted from said specific location within the store, and then performing a transaction to pay for one or more items."

81. Barnett discloses this limitation. As I discussed for limitation [1.pre], Barnett's system/method involves the consumer's phone wirelessly providing various information (e.g., product identity information, retailer identity/location, credit/debit card number, promotional offers), via NFC, to an NFC display 32 in a store ("wirelessly providing by the smartphone, using the first air interface, information to the entity"). (See Section VIII.A.1.i.) As I discussed for limitations [1.pre]-[1.a], this information is provided (e.g., to complete a transaction) when a

consumer first brings the phone within a certain proximity of an NFC display 32 within the store (“being proximate to a specific location within a store”). (See Sections VIII.A.1.i-ii.) As I discussed for claim 4, the consumer’s phone detects that the proximity condition is satisfied by detecting a short-range RF signal transmitted from the NFC display 32 (“then detecting a short-range signal being transmitted from said specific location within the store”). (See Section VIII.A.3.) As I discussed for limitation [1.pre], Barnett explains that by bringing the consumer’s phone in proximity to an NFC display 32, the phone may be used to purchase items in a store and complete the transaction (“and then performing a transaction to pay for one or more items”) by providing credit/debit card information via NFC to the NFC display 32. (See Section VIII.A.1.i.)

7. Claim 8

i) [8.pre] “The method of claim 1,”

[8.a] “wherein the entity comprises a check-out counter in a store, and”

82. Barnett discloses this limitation. For example, as I discussed for limitation [1.pre], the NFC display 32 (“entity”) may function as an NFC-enabled payment register in a store for completing a purchase (“comprises a check-out counter in a store”). (See Section VIII.A.1.i; EX1005, ¶¶[0037], [0040].)

ii) **[8.b] “wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity comprises:”**

(1) **[8.b.i] “performing a financial transaction to pay for one or more items.”**

83. Barnett discloses these limitations. As I discussed for limitation [1.pre], Barnett explains that a consumer’s phone may be used to purchase items in a store and complete the transaction (“performing a financial transaction to pay for one or more items”) at an NFC display 32 by providing credit/debit card information via NFC to the NFC display 32 (“wherein said wirelessly providing by the smartphone, using the first air interface, information to the entity comprises: performing a financial transaction to pay for one or more items”). (See Section VIII.A.1.i.)

8. **Claim 9: “The method of claim 1, wherein establishing the wireless short-range communications link between the smartphone and the entity is performed in response to the physiological parameter.”**

84. The Barnett-Waters combination discloses and/or suggests this limitation. As I discussed for limitation [1.b], the NFC link established between the consumer’s phone and the NFC display 32 is a “wireless short-range communications link between the smartphone and entity.” (See Section VIII.A.1.iii.) As I discussed for limitation [1.c], in the Barnett-Waters combination, the NFC link is only established if a physiological parameter is sensed and meets

some criterion (e.g., a fingerprint matches a certain user and the pressure is actively being applied, a resistance sensor and pressure sensor combination detects that a human hand is actively pressing the sensor, or heat from the user's hand is actively being applied) ("in response to the physiological parameter"), thereby enabling the near field tag while the value of the parameter meets the criterion.

(See Section VIII.A.1.iv.)

9. Claim 10

i) [10.pre] "A system comprising:"

85. I understand that this limitation is a preamble of the claim and I have been asked to assume that the preamble of claim 10 is limiting. Under that assumption, it is my opinion that Barnett discloses the limitations therein. As I discussed for limitation [1.pre], Barnett discloses a "system" of devices interacting within a store shopping experience, including features for allowing a consumer's mobile phone to interact with various NFC-enabled product identifiers 34 and NFC displays 32 to transmit/receive information about products and conduct financial transactions. (See Section VIII.A.1.i.)

ii) [10.a] "a smartphone that is configured to perform operations comprising:"

86. Barnett discloses this limitation. As I discussed for limitation [1.pre], Barnett discloses a mobile phone ("smartphone") with "smart" features to perform the functions of a Wi-Fi device, a contact-less credit/debit card, and a cell phone.

(*See* Section VIII.A.1.i.) As I discussed for limitation [1.pre], the phone (“smartphone”) is configured such that, in response to a consumer bringing the phone within a short distance of the NFC interface of the NFC-enabled display 32, the phone performs operations to transmit and receive information between the phone and NFC display (“configured to perform operations”), including the operations recited in the limitations below. (*Id.*; *see also infra* Sections VIII.A.9.iii-ix.)

- iii) **[10.b] “detecting by the smartphone that a proximity condition is satisfied between the smartphone and an entity;”**

87. Barnett discloses this limitation for the same reasons as I discussed for limitation [1.a]. (*See* Section VIII.A.1.ii.)

- iv) **[10.c] “in response to at least the proximity condition having been satisfied between the smartphone and the entity, establishing a wireless short-range communications link between the smartphone and the entity to provide by the smartphone, using a first air interface, information to the entity and to receive by the smartphone information from the entity;”**

88. Barnett discloses this limitation for the same reasons as I discussed for limitation [1.b]. (*See* Section VIII.A.1.iii.)

- v) **[10.d] “in response to at least the proximity condition having been satisfied between the smartphone and the entity and in response to a physiological parameter, wirelessly providing, using the first air interface, information to the entity and wirelessly receiving, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving a communications service from a wireless network using a second air interface that differs from the first air interface; and”**

89. The Barnett-Waters combination discloses and/or suggests this limitation for the same reasons as I discussed for limitation [1.c]. (*See* Section VIII.A.1.iv.)

- vi) **[10.e] “wirelessly receiving, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing information to the entity, and absent receiving information from the entity,”**

90. Barnett discloses this limitation for the same reasons as I discussed for limitation [1.d]. (*See* Section VIII.A.1.v.)

- vii) **[10.f] “wherein the wireless short-range communications link used by the first air interface is based upon unlicensed frequencies,”**

91. Barnett discloses this limitation for the same reasons as I discussed for limitation [1.e]. (*See* Section VIII.A.1.vi.)

viii) **[10.g] “wherein the second air interface uses a wireless communications link that is based upon licensed frequencies, and”**

92. Barnett discloses this limitation for the same reasons as I discussed for limitation [1.f]. (*See* Section VIII.A.1.vii.)

ix) **[10.h] “wherein the first air interface is not involved in providing the communications service to the smartphone.”**

93. Barnett discloses this limitation for the same reasons as I discussed for limitation [1.g]. (*See* Section VIII.A.1.vii.)

10. Claim 11: “The system according to claim 10, further comprising the entity.”

94. Barnett discloses this limitation. As I discussed for limitation [10.pre], Barnett’s system for shopping with a mobile phone in a store comprises the NFC display 32 (“further comprising the entity”). (*See* Section VIII.A.9.i; *see also generally* Sections VIII.A.9.i-ix.)

11. Claim 12

i) [12.pre] “The system of claim 10,”

[12.a] “wherein said wirelessly providing, using a first air interface, information to an entity and wirelessly receiving, using the first air interface, information from the entity independently of, and absent involving the entity in, receiving a communications service from a wireless network using a second air interface that differs from the first air interface is performed over a first time interval;”

[12.b] “wherein said wirelessly receiving, using the second air interface, the communications service from the wireless network absent involving the entity, absent providing information to the entity, and absent receiving information from the entity is performed over a second time interval; and”

[12.c] “wherein the first and second time intervals are non-overlapping with one another.”

95. Barnett discloses these limitations for the same reasons as I discussed for limitations [2.pre]-[2.c]. (*See* Section VIII.A.2.i.)

12. Claim 14: “The system of claim 10, wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and an entity is based, at least in part, on receiving a short-range signal from the entity over the first air interface.”

96. Barnett discloses this limitation for the same reasons as I discussed for claim 4. (*See* Section VIII.A.3.)

- 13. Claim 15: “The system of claim 14, wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and an entity is based, at least in part, on a measurement of signal strength of the short-range signal.”**

97. Barnett discloses this limitation for the same reasons as I discussed for claim 5. (*See* Section VIII.A.4.)

14. Claim 16

- i) [16.pre] “The system of claim 10,”**
[16.a] “wherein a value of the physiological parameter is provided by using a sensor of the smartphone.”

98. The Barnett-Waters combination discloses and/or suggests these limitations for the same reasons as I discussed for limitations [6.pre]-[6.a]. (*See* Section VIII.A.5.i.)

15. Claim 17

- i) [17.pre] “The system of claim 10, wherein said wirelessly providing, using the first air interface, information to the entity comprises:”**
[17.a] “being proximate to a specific location within a store, then detecting a short-range signal being transmitted from said specific location within the store, and then performing a transaction to pay for one or more items.”

99. Barnett discloses these limitations for the same reasons as I discussed for limitations [7.pre]-[7.a]. (*See* Section VIII.A.6.i.)

16. Claim 18

i) [18.pre] “The system of claim 10,”

[18.a] “wherein the entity comprises a check-out counter in a store, and”

100. Barnett discloses these limitations for the same reasons as I discussed for limitations [8.pre]-[8.a]. (*See* Section VIII.A.7.i.)

ii) [18.b] “wherein said wirelessly providing, using the first air interface, information to the entity comprises:”

(1) [18.b.i] “performing a financial transaction to pay for one or more items.”

101. Barnett discloses these limitations for the same reasons as I discussed for limitations [8.b]-[8.b.i]. (*See* Sections VIII.A.7.ii-ii.(1).)

17. Claim 19: “The system of claim 10, wherein establishing the wireless short-range communications link between the smartphone and the entity is performed in response to the physiological parameter..”

102. The Barnett-Waters combination discloses and/or suggests this limitation for the same reasons as I discussed for claim 9. (*See* Section VIII.A.8.)

B. Barnett In View of Waters and Wang Discloses And/Or Suggests Claims 3 and 13

1. Claim 3

i) [3.pre] “The method of claim 1,”

[3.a] “wherein the wireless short-range communications link that is based upon unlicensed frequencies is further based upon a Time Division Duplex (TDD) protocol, and”

103. The Barnett-Waters combination discloses and/or suggests these limitations. As I discussed for limitation [1.e], Barnett’s NFC communication uses unlicensed frequencies. (See Section VIII.A.1.vi.) While NFC communication does not use unlicensed frequencies based upon a Time Division Duplex protocol, a person of ordinary skill in the art would have further been motivated to implement the Barnett-Waters system/method in view of Barnett such that the communication between a consumer’s mobile phone and the point-of-sale terminal/payment register display occurs via Bluetooth instead of NFC. In my opinion, a person of ordinary skill in the art would have understood that Bluetooth provides a “wireless short-range communications link that is based upon unlicensed frequencies [and] is further based upon a Time Division Duplex (TDD) protocol” as these were standard features of Bluetooth communication. (EX1005, ¶[0017] (“Bluetooth is an industrial specification for **wireless** personal area networks (PANs). Bluetooth provides a way to connect and exchange information between devices...over a

secure, **globally unlicensed short-range radio frequency.**”); EX1008, 48:5-6

(“Bluetooth technology provides the effect of full duplex transmission through the use of a **Time-Division Duplex (TDD) scheme.**”).)

104. In particular, Barnett explains that a consumer’s mobile phone may also be “adapted to communicate with...a Bluetooth system” in addition to NFC. (EX1005, ¶[0012].) Barnett discloses that instead of the displays 32 (used as point-of-sale terminals) being NFC-enabled displays, “[a]lternatively, the displays 32 may be Bluetooth-enabled communications devices” such that “when a Bluetooth-enabled mobile phone is located near the display 32, information is transmitted between the Bluetooth-enabled mobile phone 14 and the display 32.” (*Id.*, ¶[0022].) Barnett discloses that Bluetooth is beneficial because it “provide[s] low-rate mesh networking, allowing low-cost devices to form networks within the retail environment.” (EX1005, ¶[0017].) In my opinion, a person of ordinary skill in the art would have thus been motivated to consider Bluetooth instead of or in addition to NFC when implementing the communication features between a mobile phone and point-of-sale terminal in the Barnett-Waters system/method. In my opinion, a person of ordinary skill in the art would have also understood that Bluetooth would have been beneficial in stores where a longer communication range is desired (e.g., up to 10 meters), or where faster data transfer speeds are desired.

105. In my opinion, a person of ordinary skill in the art would have also had a reasonable expectation of success in implementing the Barnett-Waters system/method in view of Barnett in this manner because it would have involved an implementation that Barnett already suggests is feasible—using Bluetooth instead of NFC to perform transactions using mobile phones at point-of-sale terminals. In my opinion, a person of ordinary skill in the art would have had the skill to implement and reasonable expectation of success in achieving such a modification because it would have involved a combination of known technologies (e.g., known systems/methods for performing financial transactions using an NFC- or chip-enabled mobile phone (Barnett, Waters)) according to known methods (e.g., known methods of using Bluetooth instead of NFC for mobile phone transactions at point-of-sale terminals (Barnett)) to yield the predictable result of a modified Barnett-Waters system/method that further uses Bluetooth (which is a “wireless short-range communications link that is based upon unlicensed frequencies [and] is further based upon a Time Division Duplex (TDD) protocol,” as I discussed above) communication instead of NFC.

- ii) **[3.b] “wherein the second air interface that uses a wireless communications link that is based upon licensed frequencies is further based upon an Orthogonal Frequency Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol.”**

106. Barnett in view of Waters and Wang discloses and/or suggests this limitation. As I discussed for limitation [1.f], Barnett discloses that the consumer phone’s cellular communication system is a “second air interface that uses a wireless communications link that is based upon licensed frequencies.” (*See* Section VIII.A.1.vii.) While neither Barnett nor Waters explicitly discloses that the cellular communication system is “further based upon an Orthogonal Frequency Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol,” a person of ordinary skill in the art would have been motivated to further modify the Barnett-Waters system/method in view of Wang to implement this feature.

107. Like Barnett and Waters, Wang discloses methods compatible with cellular networking. Wang discloses a “method for assigning frequency spectrum bandwidth of a communication system” (EX1026, ¶[0001]), where the method is compatible with “wireless data transmission” (*id.*, ¶[0002]) such as “cellular networking” (*id.*, ¶¶[0006], [0011]). Thus, Wang is similar to Barnett, which as I discussed for limitation [1.pre], discloses a method for using a mobile phone as a contact-less credit card, where the phone is also adapted to operate as a cell phone,

using a cellular communication system to connect to a cellular network. (*See* Section VIII.A.1.i.) Wang is also similar to Waters, which discloses that its mobile terminal may be “registered with...[a] cellular telecommunications network.” (EX1006, 4.) In my opinion, a person of ordinary skill in the art would have therefore been motivated to consider the teachings of Wang when implementing the cellular communication system of the Barnett-Waters system/method.

108. Wang specifically “relates to a method for assigning frequency spectrum bandwidth of a communication system, and especially relates to a method for assigning frequency spectrum bandwidth of an OFDM (Orthogonal Frequency Division Multiplexing) and OFDM (Orthogonal Frequency Division Multiplexing Access) coexistence system.” (EX1026, ¶[0001].) Wang explains that OFDM technology is “suitable for wireless data transmission, so it has been used widely as a wireless access method” since the 1960s, and is beneficial because “the modulating mode has very high frequency spectrum utilization efficiency.” (*Id.*, ¶[0002].) In particular, an “OFDM system adopts multi-carrier technique,” where “[o]rthogonality exists among the sub-carriers of the OFDM system, which permits mutual overlap of the frequency spectrum of each sub-carrier, and therefore, compared with the conventional frequency division multiplexing system, the OFDM system could maximize the use of frequency spectrum resources.” (*Id.*, ¶[0003].) Wang explains that OFDMA is similar to OFDM, but “the bandwidth

assignment of the OFDMA system is carried out in the two-dimensional interval of time and frequency, and the bandwidth of the OFDM system is only assigned on time dimension.” (*Id.*, ¶[0006].) “Compared with the conventional OFDM system, the bandwidth assignment of the OFDMA system is more flexible and suitable for use in cellular networking, so it is attracting people’s attention more and more.” (*Id.*) Wang explains that these differences in bandwidth assignment can result in a low utilization rate of frequency spectrum in a combined system, and thus discloses an improved OFDM and OFDMA coexistence system featuring an efficient method for assigning the frequency spectrum bandwidth of the system in order to improve the utilization efficiency of the frequency spectrum. (*Id.*, ¶¶[0007]-[0013].)

109. Because Barnett, Waters, and Wang each describe features (e.g., cellular networking) that are reasonably pertinent to a problem the ’199 patent purports to address (e.g., integration of cellular communication systems in a multi-function mobile phone), Barnett, Waters, and Wang are all analogous art. Thus, a person of ordinary skill in the art would have looked to Wang when considering and implementing Barnett-Waters system/method.

110. In particular, a person of ordinary skill in the art would have been motivated to implement Barnett’s cellular communication system such that it implements an OFDM and OFDMA coexistence protocol, similar to that disclosed

by Wang. In my opinion, a person of ordinary skill in the art would have been motivated to implement OFDM/OFDMA in order to improve frequency spectrum utilization efficiency and maximize the use of frequency spectrum resources, as I discussed above. (*Id.*; EX1026, ¶¶[0002]-[0003].) In my opinion, a person of ordinary skill in the art would have recognized the benefits of also implementing OFDMA protocol in addition to OFDM protocol to provide a more flexible and suitable method of bandwidth assignment for cellular networking (like that disclosed by Barnett), and to increase compatibility by supporting both OFDM and OFDMA techniques at the same time, thus providing greater flexibility in implementation. (EX1026, ¶¶[0006]-[0007]) In my opinion, a person of ordinary skill in the art would have recognized that improving the cellular communication system features in the Barnett-Waters system/method, such as by implementing an OFDM/OFDMA protocol, would have also improved the overall efficiency, reliability, and performance of the consumer's mobile phone by improving one of the primary communication methods (cellular communication) available to the consumer.

111. In my opinion, a person of ordinary skill in the art would have had the skill to implement and reasonable expectation of success in achieving such a modification because it would have involved a combination of known technologies (e.g., known system/method for performing integrating a cellular communication

system in a mobile phone (Barnett, Waters)) according to known methods (e.g., known methods of improving cellular networking using OFDM/OFMDA protocol (Wang)) to yield the predictable result of a modified Barnett-Waters system/method that further uses an OFDM/OFDMA protocol for the cellular communication system (“wherein the second air interface...is further based upon an Orthogonal Frequency Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol”).

2. **Claim 13: “The system of claim 10, wherein the second air interface is based upon an Orthogonal Frequency Division Multiplexed (OFDM) and/or Orthogonal Frequency Division Multiple Access (OFDMA) protocol.”**

112. The Barnett-Waters-Wang combination discloses and/or suggests this limitation for the same reasons as I discussed for limitation [3.b]. (*See* Section VIII.B.1.ii.)

C. Barnett In View of Waters and Sakamoto Discloses And/Or Suggests Claims 5 and 15

1. **Claim 5: “The method of claim 4, wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on a measurement of signal strength of the short-range signal.”**

113. Barnett in view of Waters and Sakamoto discloses and/or suggests this limitation.

114. As I discussed above for claim 5 in Section VIII.A.4, the Barnett-Waters combination discloses and/or suggests “detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on a measurement of signal strength of the short-range signal,” as set forth in claim 5. (See Section VIII.A.4.) I have been asked to consider a scenario where the Barnett-Waters combination does not disclose and/or suggest claim 5. Under that scenario, it is my opinion that a person of ordinary skill in the art would have been motivated to further modify the Barnett-Waters system/method in view of Sakamoto to implement the feature set forth in claim 5.

115. Like Barnett and Waters, Sakamoto discloses systems and methods related to performing transactions using NFC. Sakamoto discloses “a mobile radio communication device in which an NFC IC card (e.g., a SAM card) is connected to a mobile terminal, including a mobile phone having an IC card such as a SIM card, USIM card, or a flash memory card, the mode of the IC card is automatically initialized after radio communication (NFC communication) with another NFC-equipped apparatus is executed.” (EX1029, ¶[0010]; see also *id.*, ¶¶[0003]-[0004], [0005] (“As described above, the incorporation of the NFC function into radio communication mobile terminals, such as mobile phones and PDAs, can provide communication means that can access network content for payment using credit cards and so on, tickets, and games through a simple operation, i.e., only bringing

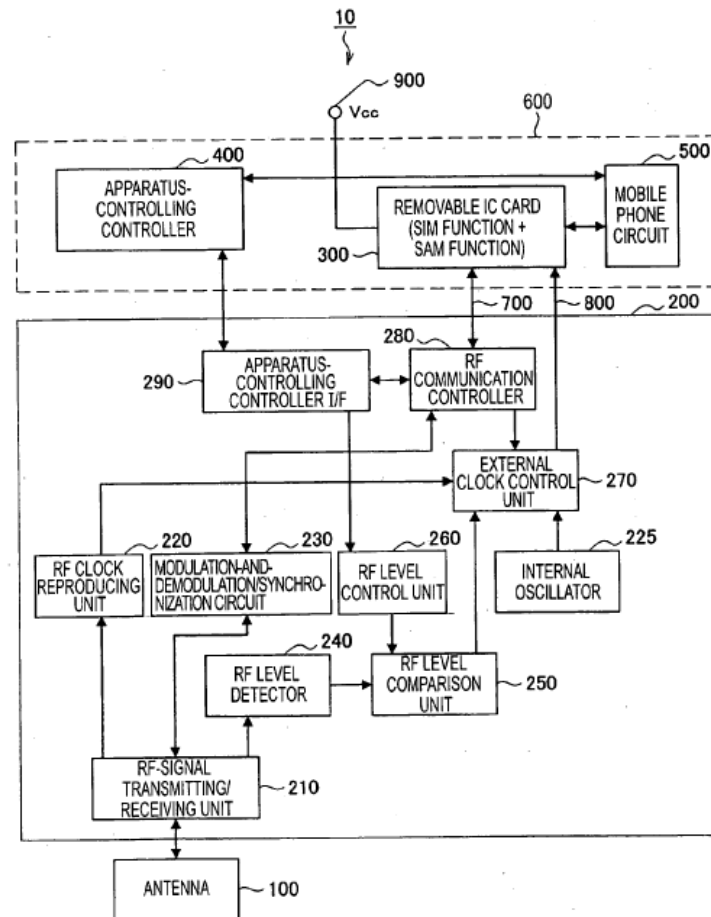
the NFC-equipped apparatus close.”), [0049].) Thus, Sakamoto is similar to Barnett, which as I discussed for limitation [1.pre], discloses a method for using a mobile phone as a contact-less credit card, where the phone is also adapted to operate as a cell phone. (*See* Sections VIII.A.1.i-ii.) Sakamoto is also similar to Waters, which discloses that the near field tag of its mobile terminal may be used to conduct various transactions, such as paying for public transport, making a toll fee payment, or paying for a school lunch. (*See* Section VIII.A.1.iv.) In my opinion, a person of ordinary skill in the art would have therefore been motivated to consider the teachings of Sakamoto when implementing the proposed Barnett-Waters system/method.

116. Sakamoto specifically discloses an NFC-enabled mobile phone with an NFC circuit that includes a signal strength determining means, which is used to measure whether the signal from another nearby NFC-enabled device is strong enough to allow communication between the two NFC-enabled devices. For example, Sakamoto discloses with reference to Figure 2 (reproduced below) that “the circuit configuration of the NFC-equipped apparatus...includes an NFC-side circuit, which is constituted by an antenna 100 and an NFC circuit (an NFC chip) 200, and a mobile-phone-side circuit 600, which is constituted by a removable IC card 300, an apparatus-controlling controller 400, and a mobile phone circuit 500.” (EX1029, ¶[0052], FIG. 2; *see also id.*, ¶¶[0047] (“FIG. 1 is a schematic view

showing the configuration of an NFC-function-equipped mobile phone (mobile radio communication device) according to a first embodiment.”), [0048].)

Sakamoto discloses that “[t]he NFC circuit 200 includes an RF-signal (radio-signal) transmitting/receiving unit 210, an RF-clock reproducing unit 220, a modulation-and-demodulation/synchronization circuit 230, **an RF-level detector 240, an RF-level comparison unit (radio-signal strength determining means) 250, an RF level controller (radio-signal strength threshold-value setting means) 260, an external clock control unit 270, an RF communication controller 280, an apparatus-controlling controller I/F (interface) 290, and so on.**” (*Id.*, ¶[0054].)

FIG. 2



(*Id.*, FIG. 2.)

117. Sakamoto discloses measuring the strength of an RF signal received at antenna 100 from another nearby NFC-enabled device using the RF-level detector 240 and RF-level comparison unit (radio-signal strength determining means) 250 to determine whether the two devices are “in close proximity...(e.g., in a near distance in the range of, for example, 10 to 20 cm).” (EX1029, ¶[0049].)

Sakamoto does this by determining whether the measured signal strength is over a

certain threshold. (*Id.*, ¶¶[0056]-[0058], [0060], [0075].) For example, Sakamoto discloses that “[t]he RF-level detector 240 is a circuit for converting (averaging) the RF signals, received from the antenna 100 and the RF-signal transmitting/receiving unit 210, into DC-level signals and for outputting the signals to the RF-level comparison unit 250.” (*Id.*, ¶[0056].) “The RF-level comparison unit 250 is a circuit for comparing an **RF-signal-strength threshold value** set by the RF-level control unit 260 with a present RF level value sent from the RF-level detector 240 and for outputting a signal indicating which of the values is larger or smaller to the external clock control unit 270,” where “[t]he **RF signal strength can be, for example, the voltage value of radio signals.**” (*Id.*)

118. Based on this comparison of signal strength, the “NFC circuit 200...**determine[s] the presence/absence of RF signal communication (radio signal communication) with another NFC-equipped apparatus.**” (*Id.*, ¶[0060].) If the measured signal strength is higher than the threshold value (“based, at least in part, on a measurement of signal strength of the short-range signal”), RF communication between the mobile phone and the nearby apparatus is allowed (“wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity”). (*Id.*, ¶[0075] (“That is, **when the present RF signal strength is higher than the RF-level setting value (the threshold value), data communication with the removable IC card 300 is**

executed as shown in FIG. 10A.”), FIG. 10A; *see also id.*, ¶¶[0009]-[0011], [0057] (“That is, **when the present strength of the RF signals received by the antenna 100 and the RF-signal transmitting/receiving unit 210 is higher than an RF level setting value (an RF-signal-strength threshold value), control is executed so as to supply the clock signal to the removable IC card 300.”), [0058], [0060].) Otherwise, communication between the two devices is stopped or not allowed. (*Id.*, ¶¶[0075] (“On the other hand, when the present RF signal strength is lower than the RF-level setting value, the level of the data line to the removable IC card 300 is fixed to the Hi level (see FIG. 10B) or the Low level (see FIG. 10C). As a result, for example, data generated by noise or the like is prevented from being transmitted to the removable IC card 300.”), [0057]-[0058], [0060].)**

119. Therefore, Sakamoto discloses detecting whether a proximity condition between its NFC-enabled mobile phone and nearby NFC-enabled apparatus is met (“wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity”) based on measuring whether the strength of a received RF signal from the nearby apparatus is above or below a certain threshold (“based, at least in part, on a measurement of signal strength of the short-range signal”), as set forth in claim 5.

120. In my opinion, a person of ordinary skill in the art would have been motivated to incorporate such a mechanism as taught by Sakamoto in the Barnett-Waters system/method for detecting the proximity condition between the NFC-enabled mobile phone and the NFC-enabled display 32, to avoid situations where the communication may be initiated without a sufficiently strong signal. (*See, e.g.*, EX1029, ¶¶[0075] (describing that because the strength of the signal is taken into account before allowing communication between the devices, **“data generated by noise or the like is prevented from being transmitted to the removable IC card 300.”**), [0012] (similar).) Moreover, a person of ordinary skill in the art would have understood a further advantage of the proposed modification would have been that by discontinuing communication with a device from which a strong signal is not detected, this would free up the mobile phone to communicate with other nearby NFC-enabled devices. (*Id.*, ¶[0076] (“With this arrangement, after the completion of NFC radio communication, **the mobile radio communication device can be automatically put into a state that allows radio communication with another NFC-equipped apparatus.**”); *see also id.*, ¶[0067] (“With this arrangement, when the NFC-equipped apparatus finishes communication (e.g., when the NFC-equipped apparatus is away from a distance that allows radio communication), the SAM function area of the removable IC card is automatically initialized, so that the removable IC card is automatically put into a state that

allows communication with another NFC-equipped apparatus.”).) Indeed, as I discussed above with respect to the Barnett-Waters combination in Section VIII.A.4, it is my opinion that a person of ordinary skill in the art would have understood that measuring the signal strength of the short-range RF signal (and ensuring a sufficiently strong signal as taught by Sakamoto) would have provided enhanced accuracy and reliability by ensuring that the phone does not proceed with transmitting/receiving information over an NFC connection unless the quality of the connection between the devices is sufficiently strong. As I also further discussed above, a person of ordinary skill in the art would have also recognized that measuring the signal strength (as taught by Sakamoto) would have provided for improved security and efficiency because the risk of a dropped NFC connection in the middle of a transaction would have decreased if a connection is not established unless the measured signal is sufficiently strong.

121. In my opinion, a person of ordinary skill in the art would have had the skill to implement and reasonable expectation of success in achieving such a modification because it would have involved a combination of known technologies (e.g., known systems/methods for transmitting/receiving information using NFC (Barnett)) according to known methods (e.g., known methods of measuring RF signals and comparing them to a threshold value to ensure the proximity between devices will lead to a stable connection (Sakamoto)) to yield the predictable result

of a modified Barnett-Waters-Sakamoto system/method that detects that a proximity condition is satisfied between the phone and NFC display by measuring whether the RF signal generated by the NFC display is sufficiently strong (“wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and the entity is based, at least in part, on a measurement of signal strength of the short-range signal”).

2. **Claim 15: “The system of claim 14, wherein said detecting by the smartphone that a proximity condition is satisfied between the smartphone and an entity is based, at least in part, on a measurement of signal strength of the short-range signal.”**

122. The Barnett-Waters-Sakamoto combination discloses and/or suggests this limitation for the same reasons as I discussed for claim 5. (*See* Section VIII.C.1.)

IX. CONCLUSION

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



Dated: August 13, 2025

By: _____

Sandeep Chatterjee