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Signature	Date 10/14/2020
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United States Patent Application

COMBINED DECLARATION AND POWER OF ATTORNEY

Title of Invention: ACTIVE CIRCUIT FOR RFID

As a below named inventor, I hereby declare that:

This declaration is directed to United States application number 13/871,849 filed on 4/26/2013.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the application, including the claims.

I am aware of the duty to disclose to the Office all information known to me to be material to patentability as defined in 37 C.F.R. §1.56

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

I hereby appoint Practitioner(s) associated with the following Customer Number as my attorney(s) or agent(s), with full power of substitution and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith:

Customer Number: 35781

Legal name of inventor: Siva G. Narendra

Signature: _____ Date: 7/18/2013

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Saurav Chakraborty

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Prabhakar Tadepalli

ABSTRACT

A mobile device includes a smartcard controller that does not rely on power received from an interrogating RF field. The mobile device also includes a small inductive device capable of inductive coupling with an RFID reader. The smartcard controller includes circuitry to modulate an impedance of a port coupled to the inductive element when in the presence of an interrogating RF field at substantially 13.56 MHz.

CLAIMS

We claim:

1. A mobile device comprising:

a power source;

a smartcard controller coupled to the power source to receive power;

an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile phone; and

an active transmit driver circuit coupled to the power source to receive power, wherein the active transmit driver circuit effects the transmission of data between the antenna and the NFC reader.

2. The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.

3. The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.

4. The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.

5. The mobile device of claim 1, wherein the antenna includes an inductive element.

6. The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.

7. The mobile device of claim 1 comprising an amplifier coupled to the power source to receive power, wherein the amplifier is further coupled to the antenna.

8. The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna, and provides the amplified signal to the smartcard controller.

9. The mobile device of claim 1, wherein the smartcard controller includes a bridge rectifier.

10. A method of activation, the method comprising:

receiving a communication via a network including a request for activation; and

sending a communication to a mobile device via a network, wherein the communication comprises an activation code provided in response to the request for activation;

wherein verification of the activation code results in activation of a built-in RFID functionality in the mobile device;

wherein the mobile device comprises:

a smartcard controller providing the RFID functionality and coupled to receive power from the mobile device;

an antenna tuned to operate at substantially 13.56 MHz; and

an active transmit driver circuit coupled to receive power from the mobile device;

wherein the activated RFID functionality comprises transmission of data between the antenna and an external RFID reader, the transmission effected by the active transmit driver circuit.

11. The method of claim 10, wherein the RFID functionality is a Near Field Communication (NFC) functionality and the RFID reader is a NFC reader.

12. The method of claim 10, wherein the transmitted data includes ticketing information for a mass transit system.

13. The method of claim 10, wherein the transmitted data includes transaction information for a mobile payment.

14. The method of claim 10, wherein the antenna includes an inductive element.

15. The method of claim 10, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.

16. The method of claim 10, wherein the mobile device further comprises an amplifier coupled to the antenna and further coupled to receive power from the mobile device, wherein the amplifier operates to amplify a signal received by the antenna.

17. A method of near field communication between a mobile device and an NFC reader, the method comprising:

coupling a smartcard controller and an active transmit driver to a power source of the mobile device;

providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;

coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and

driving the transmission of data by the active transmit driver circuit from the antenna to the NFC reader.

18. The method of claim 17 further comprising:
amplifying a signal received from the antenna; and
providing the amplified signal to the smartcard controller.

19. The method of claims 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.

20. The method of claims 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.

UNITED STATES PATENT APPLICATION

for

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

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METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

CLAIM FOR PRIORITY

[0001] This application is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 16/791,609, filed February 14, 2020, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 16/393,275, filed April 24, 2019, now issued on March 31, 2020 as U.S. Patent No. 10,607,129, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/904,328, filed on February 24, 2018, now issued on June 11, 2019 as U.S. Patent No. 10,318,855, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/338,436, filed October 30, 2016, now issued on February 27, 2019, as U.S. Patent No. 9,904,887, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 14/517,585, filed October 17, 2014, now issued on November 08, 2016, as U.S. Patent No. 9,489,608, which is a continuation of, and claims priority to U.S. Patent Application No. 14/460,647, filed August 15, 2014, now issued on January 20, 2015, as U.S. Patent No. 8,937,549, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 13/871,849, on April 26, 2013, now issued on October 21, 2014, as U.S. Patent No. 8,866,614, which is a continuation of, and claims the benefit of priority to, U.S. Patent Application No. 13/038,341, filed March 01, 2011, now issued on May 28, 2013, as U.S. Patent No. 8,451,122, which is a continuation-in-part of, and claims the benefit of priority to U.S. Patent Application No. 12/188,346, filed August 08, 2008, now issued on June 14, 2011, as U.S. Patent No. 7,961,101 and which are incorporated by reference in their entirety.

FIELD

[0002] The present invention relates generally to contactless communications devices, and more specifically to contactless smartcard devices.

BACKGROUND

[0003] RFID "tags" can be separated into two broad categories: active tags and passive tags. Active tags are characterized by a local power source such as a battery. Active tags

generally transmit information by broadcasting on an RF carrier frequency of choice using a locally generated RF carrier. Active tags are typically used to transmit over long distances, often referred to as "far field communications" (FFC). Antennas used with active RFID tags tend to be large to allow for the communications over long distances.

[0004] Passive tags are not powered. Passive tags derive the energy needed to power the tag from an interrogating RF field, and use that energy to transmit response codes by modulating the impedance that the antenna presents to the interrogating field, thereby modulating the signal reflected back to the reader antenna. Passive tags are typically used to transmit over short distances, often referred to as "near field communications" (NFC). For example, passive tags operating at 13.56 MHz are typically designed to communicate with RFID readers a few centimeters away.

[0005] Passive tags are typically connected to "loop antennas." One example of a loop antenna is shown in U.S. Patent No. 6,568,600, issued to Carpier et al. on May 27, 2003 (the '600 patent). The device described in the '600 patent is recognizable as a "credit card sized" passive RFID card (more specifically, a card that conforms to ISO 7816 size requirements). The loop antenna is necessarily large because passive tags are powered using energy received by the antenna from signals transmitted by the RFID reader.

[0006] Figure 12 shows a power supply voltage developed over time by rectifying a voltage induced in a loop antenna in the presence of an interrogating RF field. Once the power supply voltage reaches a critical value, the tag is powered up and can operate. As the antenna size is reduced, it takes longer for the power supply voltage to reach the critical value, and the tag operation may not meet response time specifications. Below a certain antenna size, the power supply voltage may never reach the critical value, and the tag may never power up.

[0007] Antenna design for RFID applications is described in a Microchip Technology, Inc. application note entitled "Antenna Circuit Design for RFID Applications" by Youbok Lee, Ph.D., published in 2003 (no month given). Dr. Lee's application note describes in great detail how to determine size requirements for a passive RFID tag antenna to operate at 13.56 MHz. On page 5 of the application note, Dr. Lee shows that the optimum radius of the loop antenna coil is equal to 1.414 times the required read range. This analysis confirms that for a read range on the order of a few centimeters, a credit card sized loop antenna can be made near optimal.

[0008] Passive tags are seeing widespread use in many applications. For example, mobile device manufacturers are embedding passive RFID tags in mobile devices for NFC applications. Example mobile applications include, but are not limited to, ticketing and mobile payments. U.S. Patent No. 7,333,062 issued to Leizerovich et al. on February 19, 2008 (the '062 patent) shows a mobile phone with an integrated loop antenna for an NFC device. As shown in the '062 patent, the mobile phone provides the real estate necessary to implement a loop antenna at 13.56 MHz.

[0009] There have been attempts to implement passive tags in smaller mobile devices. These attempts have met with limited success due in part to the size of the loop antenna. For example, Figure 13 shows an RFID tag implementation in a secure digital (SD) memory card manufactured by Wireless Dynamics, Inc. of Calgary, Alberta Canada. Card 1300 includes an antenna, but the SD card is significantly oversized as a result. Also for example, U.S. Patent Application Publication No.: US 2006/0124755 A1 shows a memory card having a passive tag, but the card must be inserted into a slot to access a loop antenna on a different device. In this implementation, mobile device real estate is still relied upon for loop antenna implementation. It can be seen, therefore, that the size of antennas are proving to be a barrier to further miniaturization of passive RFID tags.

[0010] Figure 14 shows a prior art smartcard controller and antenna in combination. Smartcard controller 330 includes a contactless interface that includes two pads 1472 and 1474 intended for connection to a coil (antenna 1480). Smartcard controller 330 also includes bridge rectifier 1420 to rectify an alternating voltage present on pads 1472 and 1474 when antenna 1480 is inductively coupled to another device and in the presence of an interrogating RF field. Capacitor 1440 is typically tuned to create a resonant circuit at the frequency of interest (e.g., 13.56 MHz). When antenna 1480 is a large loop antenna, then bridge rectifier 1420 provides power to internal circuits as shown in Figure 12. Demodulator 1430 demodulates data present in the interrogating RF field, and load modulation driver circuit 1410 modulates an impedance seen by the device presenting the interrogating RF field when the coil (antenna 1480) is inductively coupled to a separate device that is presenting the interrogating RF field. This creates a half-duplex communications path between the device presenting the interrogating RF field and smartcard controller 330. Examples of smartcard controllers are the "SmartMX" controllers sold by NXP Semiconductors N.V. of Eindhoven, The Netherlands.

[0011] A need exists for a small footprint RFID tag that does not rely on an external device to house an antenna. A need also exists for a memory card compatible RFID tag that is compatible with standard memory card slots on mobile devices.

[0012] Brief Description of the Drawings

[0013] Figure 1 shows a mobile computing device and a small RFID card compatible with a memory card slot;

[0014] Figure 2 shows a block diagram of a mobile computing device;

[0015] Figures 3A-3B show block diagrams of memory card compatible RFID cards with integrated inductive elements;

[0016] Figure 4 shows a memory card compatible RFID card with an integrated inductive element;

[0017] Figure 5 shows a data portion of a memory card write command;

[0018] Figures 6-11 show flowcharts of methods in accordance with various embodiments of the present invention;

[0019] Figure 12 shows a power supply voltage developed over time by rectifying a voltage induced in a loop antenna in the presence of an interrogating RF field;

[0020] Figure 13 shows a prior art RFID tag implementation in a secure digital (SD) memory card;

[0021] Figure 14 shows a prior art smartcard controller and antenna in combination;

[0022] Figure 15 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and a single antenna in accordance with various embodiments of the present invention;

[0023] Figure 16 shows frequency spectrum used in RFID communications;

[0024] Figure 17 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0025] Figure 18 shows frequency spectrum used in RFID communications;

[0026] Figure 19 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0027] Figure 20 shows frequency spectrum used in RFID communications;

[0028] Figure 21 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and a single antenna in accordance with various embodiments of the present invention;

[0029] Figure 22 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0030] Figure 23 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0031] Figure 24 shows a smartcard controller with a pad to provide digital data output;

[0032] Figure 25 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and a single antenna in accordance with various embodiments of the present invention;

[0033] Figure 26 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0034] Figure 27 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0035] Figure 28 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and a single antenna in accordance with various embodiments of the present invention;

[0036] Figure 29 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0037] Figure 30 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0038] Figures 31-34 show performance enhancing application specific integrated circuits (ASICs) coupled to various smartcard controllers in accordance with various embodiments of the present invention;

[0039] Figure 35 shows a memory card with integrated smartcard controller, performance enhancement circuits and antennas in accordance with various embodiments of the present invention;

[0040] Figure 36 shows a memory card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention;

[0041] Figure 37 shows a subscriber identity module (SIM) card with integrated smartcard controller, performance enhancement circuits and antennas in accordance with various embodiments of the present invention;

[0042] Figure 38 shows a subscriber identity module (SIM) card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention; and

[0043] Figure 39 shows a mobile device with a smartcard controller, enhancement circuits, and antenna(s).

[0044] Description of Embodiments

[0045] In the following detailed description, reference is made to the accompanying drawings that show, by way of illustration, various embodiments of an invention. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. It is to be understood that the various embodiments of the invention, although different, are not necessarily mutually exclusive. For example, a particular feature, structure, or characteristic described in connection with one embodiment may be implemented within other embodiments without departing from the spirit and scope of the invention. In addition, it is to be understood that the location or arrangement of individual elements within each disclosed embodiment may be modified without departing from the spirit and scope of the invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims, appropriately interpreted, along with the full range of equivalents to which the claims are entitled. In the drawings, like numerals refer to the same or similar functionality throughout the several views.

[0046] Figure 1 shows a mobile computing device and a small RFID card compatible with a memory card slot. Mobile computing device 110 is shown as a mobile phone in Figure 1, but this is not a limitation of the present invention. For example, mobile computing device 110

may be a personal digital assistant (PDA), a smartphone, a mobile phone, a handheld computer, a desktop computer, or any other device capable of operating as described herein.

[0047] Mobile computing device 110 includes memory card slot 112. Memory card slot 112 is a slot capable of accepting RFID card 120. For example, memory card slot 112 may have physical dimensions compatible with RFID card 120, and may have a communications interface that operates using a protocol compatible with RFID card 120. In some embodiments of the present invention, memory card slot 112 is a memory card slot designed to accept and communicate with memory cards. As used herein, the term "memory card slot" refers to any add-on slot capable of accepting a card having memory accessible by a mobile computing device such as that shown in Figure 1. For example, a memory card slot may be compatible with an industry standard communications protocol, or may be compatible with a widely accepted communications protocol that is not necessarily formally documented as an industry standard. Examples include slots that are compatible with the Multimedia Memory Card (MMC) protocol, Memory Stick DUO protocol, secure digital (SD) protocol, and Smart Media protocol. The foregoing list is meant to be exemplary, and not exhaustive. Memory card slot 112 may be compatible with many memory card slot protocols other than those explicitly listed above without departing from the scope of the invention. Further, in some embodiments, memory card slot 112 accepts a subscriber identity module (SIM) card. Memory card slot 112 may be exposed on an edge of mobile computing device 110 as shown, or may be behind a cover. For example, memory card slot 112 may be behind a battery cover, behind a battery, or anywhere else on mobile computing device 110.

[0048] RFID card 120 includes electrical contacts 122 as part of a host interface that communicates with memory card slot 112. For example, electrical contacts 122 may provide connectivity compliant with a communications protocol for memory cards. RFID card 120 includes RFID functionality, and may also include memory accessible by mobile computing device 110. For example, in some embodiments, RFID card 120 includes a smartcard controller and an inductive element capable of interacting with an NFC reader (e.g., an ISO 14443 compliant interface). In other embodiments, RFID card 120 does not include memory accessible by mobile computing device 110. RFID card 120 may include functionality beyond memory and RFID. Electrical contacts 122 may also be compliant with a smartcard "contact" interface (e.g., ISO 7816).

[0049] In various embodiments of the present invention, the RFID functionality in RFID card 120 is accessed by mobile computing device 110 using memory card access commands already defined for use in memory card slot 112. Accordingly, the various embodiments of the present invention enable the implementation of RFID functions beyond memory accesses without defining new commands. In some embodiments, new commands for the RFID card are embedded inside the data bits subsequent to memory card read/write commands. RFID card 120 then decides if the incoming data bits are meant for regular read/write memory functions or for RFID functions. In other words, functions in addition to standard memory card functions may be accessed through commands "hidden" in the data stream that can be exchanged using existing memory card access commands and functions. According to the various embodiments of the invention, both existing memory card functions and RFID functions may be implemented without requiring changes in how the host protocol is built.

[0050] The combination of mobile computing device 110 and RFID card 120 may be used for any purpose. For example, in some embodiments, RFID card 120 may interact with a point-of-sale payment device to effect mobile payments. Also for example, in some embodiments, RFID card 120 may be used in wave-and-pay ticketing in mass transit environments, such as MIFARE.

[0051] Figure 2 shows a block diagram of a mobile computing device. Mobile computing device 110 includes antenna 240, radio circuits 230, processor 210, memory 220, and memory card slot 112. In some embodiments, mobile computing device 110 is a mobile phone, or includes mobile phone functionality. For example, antenna 240 and radio circuits 230 may be utilized to communicate with a cellular telephone network. Further, in some embodiments, mobile computing device 110 is a wireless local area network (WLAN) or wireless wide area network (WWAN) device. For example, antenna 240 and radio circuits 230 may be utilized to communicate with a wireless access point. In some embodiments, antenna 240 and radio circuits 230 are omitted, and mobile computing device 110 does not utilize wireless connectivity.

[0052] Processor 210 represents a processor capable of communicating with the other blocks shown in mobile computing device 110. For example, processor 210 may be a microprocessor, a digital signal processor (DSP), a microcontroller, or the like. Further, processor 210 may be formed from state machines or other sequential logic. In operation, processor 210 may read instructions from memory 220 and perform actions in response thereto.

For example, processor 210 may execute program instructions that influence communications between mobile computing device 110 and a device coupled to memory card slot 112.

[0053] Memory card slot 112 is described above with reference to Figure 1. Memory card slot 112 includes circuitry compatible with RFID card 120. Mobile computing device 110 may communicate with RFID card 120 by using a standard set of memory card access commands. For example, processor 210 may use memory card write commands to write to memory in RFID card 120, and may use memory card read commands to read from memory in RFID card 120. Mobile computing device 110 may also communicate with RFID card 120 using an ISO 7816 compatible interface or the like. For example, when RFID card 120 is a SIM card, mobile computing device 110 may communicate with a smartcard controller within the SIM card.

[0054] Mobile computing device 110 may access the RFID functionality in RFID card 120 using "hidden" commands embedded in memory card access commands. For example, a memory card write command may include a unique data string to identify the memory card write command as a command to be diverted for purposes other than a memory write. In addition, the sector address provided with the memory card write command may be set to a particular address value to further identify the memory card write command as a command to be diverted. In addition to specific address/data values to identify the memory card access command as a command to be diverted for a purpose other than a memory access, the memory access command may include data bits to further specify the type and function of hidden command. Example formats of hidden commands are described further below. In some embodiments, a read command is issued right after a write command to enable data flow from the non-memory card functions to the host, where the write command's data had the hidden commands. The combination of a memory card write command and a memory card read command can be used in this manner to form a hidden read command.

[0055] In some embodiments, memory card slot 112 is powered down after periods of inactivity to save power. For example, memory card slot 112 may be powered up when processor 210 issues a memory card write or read command, but may then be powered down to save power. When memory card slot 112 is powered down, any device coupled to the memory card slot is also powered down. For example, if RFID card 120 (Figure 1) is coupled to the

memory card slot, then RFID card 120 is powered down when memory card slot 112 is powered down.

[0056] In various embodiments of the present invention, processor 210 executes software resident in memory 220 to maintain power to memory card slot 112 (and to RFID card 120). For example, periodic hidden commands may be sent to RFID card 120 for the purpose of keeping power applied while RFID card 120 is expected to be providing RFID functionality. Also for example, a hidden command may be sent to RFID card 120 for the purpose of cycling power to a smartcard controller resident on the card. These hidden commands are described further below with respect to later figures.

[0057] Figure 3A shows a block diagram of a memory card compatible RFID card with an integrated inductive element. RFID card 300 represents possible embodiments of RFID card 120 (Figure 1). RFID card 300 includes host interface 310, memory card controller 340, memory 360, smartcard controller 340, program memory 332, and small inductive element 350. RFID card 300 is capable of communicating with a memory card slot in a mobile computing device. Further, RFID card 300 does not require memory card slots to implement extended input/output functions. For example, and not by way of limitation, in SD and micro SD embodiments, RFID card 300 is operable in any SD or microSD memory card slot, and does not require a secure digital input output (SDIO) memory card slot.

[0058] Host interface 310 includes electrical contacts to interface with a memory card slot. For example, host interface 310 includes contacts such as contacts 122 (Figure 1). Also for example, in some embodiments, host interface 310 includes recessed electrical contacts. Host interface 310 may also include circuitry such as drivers, receivers, terminations, and the like.

[0059] In embodiments represented by Figure 3A, memory card controller 340 communicates with the mobile device using memory card access commands. Memory card controller 340 also communicates with memory 360. Memory card controller 340 determines whether each command should result in a memory operation with memory 360, whether a hidden command should be diverted to smartcard controller 330, or whether memory card controller 340 should take action in response to a hidden command. In some embodiments, memory card controller 340 executes instructions that are stored in an internal memory or stored in memory 360. In some embodiments, memory card controller 340 includes special purpose hardware useful to determine whether a command should be diverted. In other embodiments, memory

card controller 340 may be a microcontroller identical in all respects to a controller found in memory cards, except for the program that it executes.

[0060] Memory 360 may be any type of volatile or non-volatile memory. For example, memory 360 may be volatile memory such as static random access memory (SRAM) or dynamic random access memory (DRAM). Also for example, memory 360 may be nonvolatile memory such as NOR FLASH memory or NAND FLASH memory. In various embodiments of the present invention, memory 360 represents memory that is accessed by a mobile computing device using memory card access commands defined for that purpose.

[0061] When RFID card 300 is communicating with a memory card slot in a mobile computing device, the mobile computing device may send a memory card access command in order to access memory 360. Also for example, the mobile computing device may send a memory card access command that contains a hidden command. Memory card controller 340 detects the presence of the hidden command, and diverts all or a portion of the memory access command to smartcard controller 330 using communication bus 342. Communication bus 342 may have any number of conductors and may take any form. For example, communication bus 342 may be a serial port, a parallel port, or may include multiple data conductors, multiple address conductors, and/or conductors to carry control signals such as clock signals. In some embodiments, memory card controller 340 takes one or more actions in response to a hidden command. For example, memory card controller 340 may modify clock signals in response to a hidden command.

[0062] Memory card controller 340 can detect the hidden command in many ways. For example, in some embodiments, the memory card access command may include a specific address value or a specific data value. Memory card controller 340 detects commands that include one or both of the specific address value or specific data value and routes the command appropriately. The specific address value and specific data value used for this purpose are referred to herein as the hidden command address value and the hidden command data value.

[0063] In some embodiments, memory card controller 340 detects the presence of hidden commands based only on the hidden command address value. In these embodiments, memory card controller 340 checks the address value included in a memory card access command, and diverts the command (or takes some other action) if it matches the hidden command address value. In some embodiments, memory card controller 340 detects the presence of hidden

commands based only on the hidden command data value. In these embodiments, memory card controller 340 checks a data value included in the memory card access command, and diverts all or a portion of the command if it matches the hidden command data value. In still further embodiments, memory card controller 340 detects the presence of hidden commands based on both the hidden command address value and the hidden command data value. In these embodiments, memory card controller 340 diverts the command only if both the memory card access address and data match the hidden command address value and data value, respectively.

[0064] The hidden command address value and hidden command data value may be specified in many ways. For example, all RFID cards may be issued with fixed values. In these embodiments, each time the RFID functions are accessed, the same hidden command address and/or data value is included in the memory card access command. Also for example, different RFID cards may be issued with unique values. In these embodiments, each RFID card may provide these values to a mobile computing device when queried. Also for example, hidden command address and/or data values may be specified by the mobile computing device. In still further embodiments, hidden command address and data values may be dynamic. The hidden command address and data values may change each time power is applied or on a periodic basis.

[0065] Smartcard controller 330 receives hidden commands diverted by memory card controller 340. Smartcard controller 330 further interprets the hidden commands and performs actions in response thereto. Smartcard controller 330 executes instructions stored in program memory 332. In some embodiments, program memory 332 is embedded in smartcard controller 330, and in other embodiments, program memory 332 is part of memory 360.

[0066] Smartcard controller 330 is a dual interface smartcard controller with one of the interfaces including RFID functionality. In some embodiments, smartcard controller 330 is compatible with passive RFID tag readers in NFC applications. For example, smartcard controller 330 may be a device capable of implementing all or part of the ISO 14443 standard for contactless NFC devices. Also for example, smartcard controller 330 may be a dual interface smartcard controller capable of implementing both ISO 7816 and ISO 14443 standards for contact/contactless requirements. The "SmartMX" family of controllers available from NXP Semiconductors N.V. of The Netherlands are examples of suitable dual interface smartcard controllers. These controllers provide RFID functionality at 13.56 MHz. The various embodiments of the present invention operate at 13.56 MHz, but are not limited to operation at

this frequency. In some embodiments, smartcard controller interoperates with MIFARE systems for ticketing applications.

[0067] Smartcard controller 330 receives power from the host interface. By not receiving power from the interrogating RF field, the necessity of a loop antenna for power generation is negated. Smartcard controller 330 includes a contactless interface that in turn includes antenna port 334. Antenna port 334 includes at least two pads for connection to an antenna, shown as 1742 and 1744 in Figure 14 and later figures. In Figure 3A, antenna port 334 is coupled to small inductive element 350.

[0068] Small inductive element 350 includes a coil wound around a magnetic core. As described with reference to later figures, small inductive element may include one or more coils or antennas. The coil of small inductive element is too small to draw power from the interrogating RF field, but this is not necessary since smartcard controller 330 is powered by the host device through host interface 310. Small inductive element 350 interacts with an antenna in an RFID reader similar to the way that primary and secondary coils in a transformer interact. The RFID reader has a coil resonant at 13.56 MHz functioning as the primary coil of a transformer. Small inductive element 350 functions as the secondary coil of the transformer. Accordingly, the transmitter "sees" the impedance of the secondary coil (small inductive element 350). Smartcard controller 330 is able to modulate reflected RF signals using circuitry to modify the impedance at the antenna port 334.

[0069] Small inductive element 350 can be made very small. For example, in some embodiments, RFID card 120 is a miniSD card, microSD card, or SIM card, and small inductive element 350 is small enough to be completely contained in the miniSD, microSD, or SIM form factor. A specific embodiment of a small inductive element in a memory card form factor is described below with reference to Figure 4.

[0070] In various embodiments of the invention, memory card controller 340 and smartcard controller 330 are implemented in many different ways. For example, in some embodiments, the various components are implemented in hardware. In these embodiments, the various components may be implemented as separate integrated circuits, or in a combined integrated circuit. Also for example, in some embodiments, the various components may be implemented in software, or in a combination of hardware and software. In some embodiments, RFID card 300 may include a microprocessor, and the components may be implemented as

software modules running on the microprocessor. In other embodiments, RFID card 300 may include multiple processors, and the components may be implemented as software modules distributed across the multiple processors.

[0071] Figure 3B shows a block diagram of a memory card compatible RFID card with an integrated inductive element. RFID card 302 represents possible embodiments of RFID card 120 (Figure 1). RFID card 302 includes host interface 310, memory card controller 340, memory 360, smartcard controller 340, program memory 332, and small inductive element 350, all of which are described above with reference to Figure 3A. RFID card 302 is capable of communicating with a memory card slot in a mobile computing device. Further, RFID card 302 does not require memory card slots to implement extended input/output functions. For example, and not by way of limitation, in SD and microSD embodiments, RFID card 302 is operable in any SD or microSD memory card slot, and does not require a secure digital input output (SDIO) memory card slot.

[0072] In embodiments represented by Figure 3B, smartcard controller 330 receives power from memory controller 340. In these embodiments, memory controller 340 has direct control over the power provided to smartcard controller 330. Memory controller 340 may apply and/or remove power from smartcard controller 330 in response to commands received over the host interface. For example, memory controller 340 may receive a hidden command to reset smartcard controller 330 by causing a reboot through a power cycle.

[0073] Figure 4 shows a memory card compatible RFID card with an integrated inductive element. RFID card 120 is shown in an SD card form factor, although this is not a limitation of the present invention. For example, other form factors within the scope of the present invention include, but are not limited to, microSD form factors and SIM card form factors. RFID card 120 includes electrical contacts 122, memory card controller 340, smartcard controller 330, memory 360, magnetic core 450, and coil 452, all affixed to circuit board 402.

[0074] Magnetic core 450 and coil 452 implement small inductive element 350 (Figures 3A, 3B). As can be seen in Figure 4, the small inductive element fits entirely within the memory card form factor. The small inductive element does not provide power generation for smartcard controller 330, and so does not need to be made large for that purpose.

[0075] Figure 5 shows a data portion of a memory card write command. Included are hidden command data value 510, status field 520, password field 530, device ID 532, command

index 540, and hidden command related data 550. In the example of Figure 5, the data portion is 512 bytes in length, although this is not a limitation of the present invention. Any amount of data may be included in the write command, and each field shown in Figure 5 may be any length.

[0076] In the example of Figure 5, the hidden command data value is 256 bits long, although any length may be used without departing from the scope of the present invention. In some embodiments, hidden command data value 510 is used to identify a memory write command as a hidden command. When a write command is received having data in the first 256 bits that match the hidden command data value, the command is identified as one to be diverted to the smartcard controller. As described above, a hidden command address value may be used in conjunction with, or instead of, a hidden command data value to identify the memory write command as a hidden command.

[0077] The remaining fields have significance when the memory write is a hidden command. For example, if the first 256 bits do not match the hidden command data value (or if the write address does not match the hidden command address value, or both) then the remaining bits in the data field are to be treated as data in a normal memory write command. In contrast, when the memory write is a hidden command, the remaining fields are used to further interpret the hidden command.

[0078] Memory card controller 340 (Figures 3, 4) inspect the hidden command data value 510, status field 520, and possibly password field 530 and device ID 532. In some embodiments, if the command is identified as a hidden command, memory card controller 340 forwards the password 530, command index 540, and related data 550 to smartcard controller 330. In other embodiments, memory card controller 340 may directly take actions based on the hidden command.

[0079] Status field 520 may include any information relating to the status of the hidden command. For example, status field 520 may include one or more bits to signify to memory card controller 340 whether the host (mobile computing device) is expecting the smartcard controller to return data in response to the hidden command. For example, when status field 520 signifies a write, memory card controller 340 forwards the password, device ID, command index, and related data without expecting to return any data to the host. Also for example, when status field 520 signifies a read, memory card controller 340 forwards the password, device ID, command index, and related data with the expectation that smartcard controller 330 will provide data to be

sent to the host in response to a memory card read command. The combination of a memory card write command followed shortly thereafter by a memory card read command may be used to provide "read" functionality to the smartcard controller. Read operations from the smartcard controller are described further below with reference to Figure 8.

[0080] Password field 530 includes a password to allow smartcard controller 330 to authenticate the host to the RFID card. In some embodiments, every hidden command includes a password. Each time the password, device ID, command index, and related data is diverted to the smartcard controller, the password is checked to authenticate the host to the RFID card.

[0081] Device ID 532 uniquely identifies the host (mobile computing device). The device ID may be checked by the smartcard controller to ensure that the RFID card is inserted in the host to which it is authenticated. Some embodiments of the present invention enforce a unique host/card pairing using the device ID, and other embodiments allow smartcard controller functions to be accessed by any host.

[0082] Command index 540 identifies the type of hidden command. The number of possible hidden commands is limited only by the number of bits allocated thereto. Any number of bits may be allocated to command index 540 without departing from the scope of the present invention. Hidden command related data 550 may be utilized differently for each type of hidden command. Any number of bits may be used for hidden command related data 550.

[0083] The data shown in Figure 5 is provided as an example, and the data field of a memory card access command may include more or fewer data fields than those shown in Figure 5. The present invention is not limited by the number or content of the fields in a memory card access command.

[0084] Figure 6 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 600 may be used by a mobile computing device to communicate with an RFID card in a memory card slot. In some embodiments, method 600, or portions thereof, is performed by a mobile computing device with a memory card slot, and in other embodiments, method 600, or portions thereof, is performed by software. The various actions in method 600 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 6 are omitted from method 600.

[0085] Method 600 begins at 610 in which a data pattern and an address value are received from an RFID card in a memory card slot. The data pattern corresponds to the hidden command data value, and the address value corresponds to the hidden command address value. In some embodiments, the mobile device only receives the data value and in other embodiments, the mobile device only receives the address value. In some embodiments, the actions of 610 may occur once when the RFID card is first inserted in the memory card slot. The mobile computing device may then use the address and data values each time it creates a hidden command. In other embodiments, the actions of 610 may occur each time the RFID card is inserted in the memory slot. In still further embodiments, the actions of 610 may occur periodically. Each time the actions 610 occur, the data pattern may be the same or different, and the address value may be the same or different.

[0086] At 620, a data field of a memory card access command is populated with the data pattern to cause the command to be diverted to a smartcard controller on the RFID card. For example, the data pattern may be written to the data field as the hidden command data value 510 (Figure 5).

[0087] At 630, an address field of the memory card access command is populated with the address value to further cause the command to be diverted to the smartcard controller. In some embodiments, only one of 620 or 630 is utilized. In these embodiments, the presence of a hidden command is signified by the data pattern alone, or the address value alone.

[0088] At 640, the data field of the memory card access command is populated with a command string to specify a purpose other than a memory card access. For example, the command string may be written to the data field as the command index 540 for the smart card controller. This command may be used for any purpose. For example, one or more hidden commands may have as a sole purpose keeping power provided to the memory card slot so that the RFID card continues to receive power.

[0089] At 650, the data field of a memory card access command is populated with a password to authenticate access to the RFID card coupled to the memory card slot. In some embodiments, a password is included in the data field for every hidden command. In other embodiments, a password is only included at the beginning of an exchange.

[0090] At 660, the memory card access command is sent to the RFID card coupled to the memory card slot. For example, a mobile computing device (110, Figures 1, 2) may send the

memory card access command to an RFID card (120, Figures 1, 3, 4) in a memory card slot (112, Figures 1, 2). The RFID card includes a memory card controller (340, Figure 3) to divert the command (or take some other action) based on the data fields populated in method 600.

[0091] Figure 7 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 700 may be used by an RFID card in a memory card slot. In some embodiments, method 700, or portions thereof, is performed by a memory card controller within a memory card compatible RFID card, and in other embodiments, method 700, or portions thereof, is performed by software. The various actions in method 700 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 7 are omitted from method 700.

[0092] Method 700 begins at 710 in which a memory card access command is received from a mobile computing device via a host interface. The actions of 710 correspond to an RFID card in a memory card slot of a mobile computing device receiving a memory card access command.

[0093] At 720, the memory card controller checks criteria in the memory card access command to determine if the memory card access command should be diverted to a smartcard controller resident on the RFID card. The criteria may be one or both of a hidden command data value, a hidden command address value, or both. If there is a criteria match at 730, then a hidden command is present, and at least a portion of the memory card access command is diverted at 740. If there is not a criteria match, then no hidden command is present, and a memory access is performed at 750.

[0094] Figure 8 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 800 may be used by an RFID card in a memory card slot. In some embodiments, method 800, or portions thereof, is performed by a memory card controller within an RFID card, and in other embodiments, method 800, or portions thereof, is performed by software. The various actions in method 800 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 8 are omitted from method 800.

[0095] Method 800 begins at 810 in which a memory card write command is received from a mobile computing device via a host interface. If the memory card write command is

determined to be a hidden command, processing continues with 840; otherwise, a memory write is performed at 830.

[0096] At 840, the hidden command is diverted to a smartcard controller. In some embodiments, this corresponds to sending command index 540 and hidden command related data 550 (Figure 5) to the smartcard controller. If the hidden command is determined to be a "read" at 850, processing continues at 860; otherwise, the hidden command processing is done. At 860, the memory card controller retrieves non-memory data from the smartcard controller, and at 870, a memory card read command is received from the mobile computing device. At 880, the non-memory data is returned to the mobile computing device.

[0097] Method 800 demonstrates how a mobile computing device can perform a read from a smartcard controller in a memory card compatible RFID card. The mobile computing device issues a memory card write command with a hidden command having a status field designating a read, and then the mobile computing device issues a memory card read command. The processing in the card receives the hidden command, identifies it as a read, and then returns data to the mobile computing device in response to a subsequent memory card read command.

[0098] Figure 9 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 900 may be used by an RFID card in a memory card slot. In some embodiments, method 900, or portions thereof, is performed by a smartcard controller within an RFID card, and in other embodiments, method 900, or portions thereof, is performed by software. The various actions in method 900 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 9 are omitted from method 900.

[0099] Method 900 begins at 910 in which a smartcard controller receives a command from the memory card controller. This command corresponds to a hidden command received by the memory card controller. At 950, the smartcard controller determines whether the command is a "dummy" command used solely for the purpose of maintaining power to the memory card slot. If no, then the smartcard function specified in the command is performed at 930. If yes, then the command is disregarded at 960.

[00100] Method 900 allows a memory card compatible RFID card in a memory card slot to remain powered during periods when the memory card slot in the host device would otherwise remove power to save energy. This is a coordinated effort between software building hidden

commands in a memory card access command, the memory card controller diverting the hidden command to the smartcard controller, and the smartcard controller disregarding the command. According to embodiments represented by Figure 3A, providing power to the RFID card also provides power the smartcard controller, thereby allowing the use of a small inductive device such as those shown in Figures 3 and 4.

[00101] Figure 10 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 1000 may be used by an RFID card in a memory card slot. In some embodiments, method 1000, or portions thereof, is performed by a memory card controller within an RFID card, and in other embodiments, method 1000, or portions thereof, is performed by software. The various actions in method 1000 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 10 are omitted from method 1000.

[00102] Method 1000 begins at 1010 in which a memory card controller receives a hidden command from a mobile computing device. If at 1020, the memory card controller determines that the hidden command is to be diverted to the smartcard controller, then the command is diverted at 1030. In some embodiments, this corresponds to sending command index 540 and hidden command related data 550 (Figure 5) to the smartcard controller. If the command is not to be diverted, then the memory card controller does not divert the command; however, the memory card controller may take other actions at 1040 based on the hidden command. For example, the memory card controller may modify a clock signal provided to the smartcard controller. Also for example, the memory card controller may assert a reset signal to the smartcard controller. Still for example, the memory card controller may cycle power to the smartcard controller. The memory card controller is able to cycle power to the smartcard controller in embodiments represented by Figure 3B.

[00103] Cycling power to the smartcard controller may be a coordinated effort between the hosting computing device and the memory card controller in the RFID card. For example, power to the memory card slot may be maintained by supplying dummy hidden commands to the RFID card as described above with reference to Figure 9. While power is maintained to the memory card slot, hidden commands may be used to cause the memory card controller to cycle power to the smartcard controller.

[00104] Figure 11 shows a method authenticating a mobile computing device to one or more functions in a memory card compatible RFID card. Method 1100 begins at block 1110 in which an activation code is received at an RFID card from a mobile computing device. At 1120, the received activation code is compared to a code stored in the RFID card. If the activation code matches, the RFID card receives a password from the mobile computing device at 1140, and stores the password in the RFID card for later use at 1150. If the activation code does not match, the RFID card determines whether a number of allowable tries has been exceeded at 1160. If the number of allowable tries has been exceeded, the RFID card issuer is contacted at 1170, and if the number of allowable tries has not been exceeded, the method repeats until either the activation code matches or the number of allowable tries has been exceeded.

[00105] Method 1100 may be performed when an RFID card is issued to a user. For example, the RFID card may be a mobile payment card issued by a financial institution. The user may be provided an activation code to "activate" the RFID card. When the user successfully enters the activation code, the user is prompted for a password, and that password is stored for use in future hidden commands.

[00106] In some embodiments, multiple non-memory functions in an RFID card are authenticated using method 1100. For example, each of multiple non-memory functions may have stored activation codes, and each is activated separately. Each of the separately activated functions may have a different password, or the multiple functions may share a password.

[00107] Embodiments described thus far include a power delivery mechanism from the host to the smartcard controller that allow the antenna or coil to be very small. The small antenna or coil allows for higher levels of integration, but may also reduce the maximum distance at which the RFID card will function. For example, referring to Figure 14, the voltage produced by the antenna needs to overcome the diode drops of the bridge rectifier before data can be demodulated within the smartcard controller. As the antenna shrinks in size, the RFID card needs to be closer to the device producing the interrogating RF field in order to produce a large enough voltage to overcome the bridge rectifier diode drops, thereby reducing the maximum usable distance.

[00108] Figure 15 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and a single antenna in accordance with various embodiments of the present invention. Antenna 1542 is a small inductive element as described

above. Capacitor 1544 is in parallel with antenna 1542 and together they form tuned circuit 1540 that is tuned to be resonant at the frequency of operation (e.g., 13.56 MHz). The performance enhancement circuits include an amplifier 1510, outgoing data extraction circuit 1520, and load modulation driver circuit 1530. Amplifier 1510 amplifies the voltage received at antenna1542, and the amplified voltage is provided to the smartcard controller. This increases the maximum distance at which the RFID card can operate while receiving data, but also creates a unidirectional data path where a bidirectional data path previously existed. In other words, amplifier 1510 forms a simplex communication path where a half duplex path previously existed.

[00109] In order to restore the outgoing data path and re-create a half duplex communications system, the RFID card includes outgoing data extraction circuit 1520 and load modulation driver circuits 1530. Outgoing data extraction circuit 1520 receives a signal that is formed by the interrogating RF field having been load modulated by the smartcard controller. For example, the impedance of the antenna port is modulated by load modulation driver circuit 1410 (Figure 14), where the modulating signal is the data. Outgoing data extraction circuit 1520 recovers the data, and then load modulation driver circuit 1530 modulates the impedance of the tuned circuit 1540 to form the outgoing data path.

[00110] Outgoing data extraction circuit 1520 may include one or more filters to extract the data. For example, referring now to Figure 16, the load modulation driver circuit within the smartcard controller creates frequency sidebands 1610 about the carrier frequency 1620 of the interrogating RF field. Outgoing data extraction circuit 1520 may include conventional filters to isolate one or more sidebands and extract the data. As shown in Figure 16, in some 13.56 MHz embodiments, the bandwidth of the carrier frequency of the interrogating RF field may be on the order of 850 KHz and the bandwidth of the sidebands may be on the order of 100-200 KHz, although this is not a limitation of the present invention.

[00111] Load modulation driver circuit 1530 receives the extracted data from outgoing data extraction circuit 1520, and load modulates the tuned circuit 1540 in response thereto. Load modulation driver circuits are generally well known, and may be as simple as a switched transistor that adds and removes a reactive element from tuned circuit 1540. In some embodiments, load modulation driver circuit 1530 substantially duplicates the load modulation driver circuit 1410 within smartcard controller 330.

[00112] Amplifier 1510 is shown coupled to smartcard controller pad 1472, and data extraction circuit 1520 is shown coupled to smartcard controller pad 1474, but this is not a limitation of the present invention. For example, outgoing data extraction circuit 1520 may be coupled to smartcard controller pad 1472 while amplifier 1510 may be coupled to smartcard controller pad 1474. Also for example, both circuit 1520 and amplifier 1510 may be coupled to either pad 1472 or pad 1474 without departing from the scope of the present invention.

[00113] Figure 17 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. Figure 17 shows smartcard controller 330, amplifier 1510, outgoing data extraction circuit 1520, and load modulation driver circuit 1530, all of which are described above. Figure 17 also shows tuned circuits 1740 and 1750. Tuned circuit 1740 includes receive antenna 1742 and capacitor 1744. Tuned circuit 1750 includes transmit antenna 1752 and capacitor 1754. In some embodiments, receive antenna 1742 and transmit antenna 1752 are small inductive elements as described above.

[00114] Separate transmit and receive antennas allow for different tuning, both in frequency and bandwidth, or "Q." For example, tuned circuit 1740 may be tuned with relatively high Q for receive as shown at 1820 in Figure 18, while tuned circuit 1750 may be tuned for a lower Q to envelope both sidebands for transmit as shown at 1830 in Figure 18. The higher Q tuning for the receive antenna may further increase the maximum usable distance when the RFID card is receiving.

[00115] Figure 19 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. Figure 19 shows smartcard controller 330, amplifier 1510, outgoing data extraction circuit 1520, load modulation driver circuit 1530, and tuned receive circuit 1740, all of which are described above. Figure 19 also shows two tuned transmit circuits 1950 and 1960. Tuned circuit 1950 includes antenna 1952 and capacitor 1954, and tuned circuit 1960 includes antenna 1962 and capacitor 1964. Antennas 1952 and 1962 may be small inductive elements as described above.

[00116] Separate transmit antennas allow separate tuning for the two sidebands. For example, tuned circuit 1950 may be tuned for the lower sideband tuned circuit 1960 may be tuned for the upper sideband as shown in Figure 20. Higher Q tuning of the transmit antennas

for the separate sidebands may further increase the maximum usable distance when the RFID card is transmitting.

[00117] Figure 21 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and a single antenna in accordance with various embodiments of the present invention. The circuits shown in Figure 21 are similar to Figure 15 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 may include circuits to actively transmit a signal rather than simply load modulate tuned circuit 1540. For example, active transmit driver circuit 2130 may include one or more amplifiers, filters, oscillators, modulators, etc., to form a signal that mimics the sidebands 1610 (Figure 16) as if the interrogating RF field experienced load modulation. Active transmission can make use of power available on the RFID card and can further increase the usable distance when smartcard controller 330 is transmitting.

[00118] Figure 22 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 22 are similar to Figure 17 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00119] Figure 23 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 23 are similar to Figure 19 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00120] Figure 24 shows a smartcard controller with a pad to provide a digital data output. Smartcard controller 2430 includes the antenna pads 1472 and 1474 as described above. Smartcard controller 2430 also includes pad 2410 which provides the digital data output directly. By providing the digital data output directly, smartcard controller 2430 enables various embodiments of the invention to eliminate the outgoing data extraction circuit.

[00121] Figure 25 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and a single antenna in accordance with various embodiments of the present invention. Figure 25 shows smartcard

controller 2430, amplifier 1510, load modulation driver circuits 1530, and tuned circuit 1540, all of which are described above. Note that because smartcard controller 2430 provides digital data directly, the outgoing data extraction circuit 1520 (Figure 15) can be omitted, thereby reducing parts count and cost.

[00122] Figure 26 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. Figure 26 shows circuits similar to those shown in Figure 25, except that separate transmit and receive antennas are provided. Separate transmit and receive antennas (and associated tuned circuits) allow for a higher Q tuning of the receive antenna, thereby increasing the maximum usable distance when RFID card is receiving. See Figure 18.

[00123] Figure 27 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. Figure 27 shows circuits similar to those shown in Figure 26, except that multiple transmit antennas are provided. Multiple separate transmit antennas (and associated tuned circuits) allow for a higher Q tuning of each transmit antenna, thereby increasing the maximum usable distance when RFID card is transmitting. See Figure 20.

[00124] Figure 28 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and a single antenna in accordance with various embodiments of the present invention. The circuits shown in Figure 28 are similar to Figure 25 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21. In general, the term "driver" as used herein refers to an active transmit driver or a load modulation driver or any other method of driving the transmit output data.

[00125] Figure 29 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 29 are similar to Figure 26 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00126] Figure 30 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 30 are similar to Figure 27 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00127] Figures 31-34 show performance enhancing application specific integrated circuits (ASICs) coupled to various smartcard controllers in accordance with various embodiments of the present invention. Figures 31 and 32 show ASICs coupled to smartcard controller 330. Both ASICs include amplifier 1510 and outgoing data extraction circuits 1520. The ASIC of Figure 31 includes load modulation driver circuits 1530 and the ASIC of Figure 32 includes active transmit driver circuit 2130. Figures 33 and 34 show ASICs coupled to receive direct digital data from smartcard controller 2430. Accordingly, the outgoing data extraction circuits are omitted. The ASIC of Figure 33 includes amplifier 1510 and load modulation driver circuits 1530, and the ASIC of Figure 34 includes amplifier 1510 and active transmit driver circuit 2130.

[00128] By combining a smartcard controller and an ASIC as described herein, the performance of an RFID card may be enhanced with a reduced parts count. Further, any of ASICs shown may be used with separate receive and transmit antennas, multiple transmit antennas, or any combination. Further, one ASIC may be provided with all of the functionality shown in Figures 31-34 and the manner in which it is connected to a smartcard controller will dictate which functional blocks (e.g., data extraction, load modulation, active transmit) are utilized.

[00129] Figure 35 shows a memory card with integrated smartcard controller, performance enhancement circuits, and antennas in accordance with various embodiments of the present invention. Host interface 310, memory card controller 340, and memory 360 are described above. Smartcard controller 3520 may be any smartcard controller described herein, including smartcard controller 330 or smartcard controller 2430. Enhancement circuits 3550 may include any of the enhancement circuits described herein including any combination of amplifier 1510, outgoing data extraction circuits 1520, load modulation driver circuits 1530 and active transmit driver circuit 2130. Antenna(s) 3560 may include any number or type of

antennas. For example, antenna(s) 3560 may include one antenna, separate transmit and receive antennas, or a receive antenna and multiple transmit antennas.

[00130] Figure 36 shows a memory card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention. The memory card of Figure 36 shows circuits similar to Figure 35 with the exception of antenna(s) 3560. Instead, the memory card of Figure 36 is intended for use with a host device that includes antenna(s). In some embodiments, antenna(s) 3560 are included in the memory card of Figure 36, thereby allowing the host device to decide whether to use the antennas on the memory card, or the antennas on the host device. The form factor of the memory card in Figures 35 and 36 is shown as a microSD card, but this is not a limitation of the present invention. Any form factor may be employed.

[00131] Figure 37 shows a subscriber identity module (SIM) card with integrated smartcard controller, performance enhancement circuits and antennas in accordance with various embodiments of the present invention. Smartcard controller 3520, enhancement circuits 3550, and antenna(s) 3560 are described above with reference to Figure 35.

[00132] Figure 38 shows a subscriber identity module (SIM) card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention. The SIM card of Figure 38 shows circuits similar to Figure 37 with the exception of antenna(s) 3560. Instead, the SIM card of Figure 38 is intended for use with a host device that includes antenna(s). In some embodiments, antenna(s) 3560 are included in the SIM card of Figure 38, thereby allowing the host device to decide whether to use the antennas on the SIM card, or the antennas on the host device.

[00133] Figure 39 shows a mobile device with a smartcard controller, enhancement circuits, and antenna(s). The mobile device of Figure 39 includes a built-in smartcard controller for RFID functionality as opposed to accepting a separate RFID card as described above. The mobile device may be any electronic device including a mobile phone, a tablet computer, or the like.

[00134] Although the present invention has been described in conjunction with certain embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention as those skilled in the art readily understand.

Such modifications and variations are considered to be within the scope of the invention and the appended claims.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING
First Named Inventor/Applicant Name:	Siva G. Narendra
Filer:	Usman Mughal/Katherine Campbell
Attorney Docket Number:	18.115.026US13

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	80	80
UTILITY SEARCH FEE	2111	1	350	350
UTILITY EXAMINATION FEE	2311	1	400	400
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	2	50	100
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	930

Electronic Acknowledgement Receipt

EFS ID:	41959739
Application Number:	17179237
International Application Number:	
Confirmation Number:	3258
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING
First Named Inventor/Applicant Name:	Siva G. Narendra
Customer Number:	175023
Filer:	Usman Mughal/Katherine Campbell
Filer Authorized By:	Usman Mughal
Attorney Docket Number:	18.115.026US13
Receipt Date:	18-FEB-2021
Filing Date:	
Time Stamp:	19:13:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$930
RAM confirmation Number	E20212HJ14044861
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	115_026US13_ADS.pdf	1257132 a1f9b42e1876427d33fcf5dc7d9342313ead4121	no	10
Warnings:					
Information:					
2	Drawings-only black and white line drawings	115026US13_FIGS_asfiled.pdf	836385 441a3e8ae45c869931725d45eb5f73aa1895030e	no	30
Warnings:					
Information:					
3	Power of Attorney	iCashe_GPOA_signed.pdf	2113661 04612dcd9c6350cba9b296d7cf97dd28241b7a63	no	1
Warnings:					
Information:					
4	Oath or Declaration filed	115026US13_EXEC_DEC.pdf	40756 340d8e884ca03ad3eeeaeefbdbf29526ea118062	no	1
Warnings:					
Information:					
5		115026US13_SPEC_asfiled.pdf	175152 816049257d8c448fbbe4176cd2a80b01dfcfe811	yes	33

Multipart Description/PDF files in .zip description

Document Description	Start	End
Abstract	33	33
Claims	30	32
Specification	1	29

Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	37033 476ecd1003aa027fad7a05bbbe392226805d4ded	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	4460119	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Siva	G.	Narendra	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	Portland	State/Province	OR	Country of Residence	US

Mailing Address of Inventor:

Address 1	7180 SW 84th Ave.
Address 2	

City	Portland	State/Province	OR
Postal Code	97223	Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Saurav		Chakraborty	

Residence Information (Select One) ○ US Residency ● Non US Residency Active US Military Service

City	West Bengal	Country of Residence	IN

Mailing Address of Inventor:

Address 1	Sristi Apartment (Block-B), Flat No. D-119
Address 2	89 G.T. Road (W), Mallickpara, Srirampure, Hooghly

City	West Bengal	State/Province	We
Postal Code	712203	Country	IN

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Prabhakar		Tadepalli	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	

Residence Information (Select One) ○ US Residency ◉ Non US Residency Active US Military Service

City	Bangalore	Country of Residence [i]	IN

Mailing Address of Inventor:

Address 1	E24 Chaithanya Smaran		
Address 2	Whitefield Hoskote Road		
City	Bangalore	State/Province	Ka
Postal Code	5600067	Country [i]	IN

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	175023		
Email Address	docketing@ghmip.com	Add Email	Remove Email

Application Information:

Title of the Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING		
Attorney Docket Number	18.115.026US13	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	30	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country [i]

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	◯ Limited Recognition (37 CFR 11.9)
Customer Number	175023		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16791609	2020-02-14

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16791609	Continuation of	16393275	2019-04-24	10607129	2020-03-31

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16393275	Continuation of	15904328	2018-02-24	10318855	2019-06-11

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15904328	Continuation of	15338436	2016-10-30	9904887	2018-02-27

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	

Prior Application Status	Patented	Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15338436	Continuation of	14517585	2014-10-17	9489608	2016-11-08

Prior Application Status	Patented	Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14517585	Continuation of	14460647	2014-08-15	8937549	2015-01-20

Prior Application Status	Patented	Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14460647	Continuation of	13871849	2013-04-26	8866614	2014-10-21

Prior Application Status	Patented	Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13871849	Continuation of	13038341	2011-03-01	8451122	2016-05-28

Prior Application Status	Patented	Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13038341	Continuation of	12188346	2008-08-08	7961101	2011-06-14

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Cashe, Inc.		
Mailing Address Information For Applicant:			
Address 1	6331 SW Macadam Avenue		
Address 2	Suite 251		
City	Portland	**State/Province**	OR
Country	US	Postal Code	97239
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	iCashe, Inc.

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	5331 SW Macadam Avenue		
Address 2	Suite 251		
City	Portland	**State/Province**	OR
Country i	US	Postal Code	97239
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Usman Mughal/			Date (YYYY-MM-DD)	2021-02-18
First Name	Usman	Last Name	Mughal	Registration Number	62887

Additional Signature may be generated within this form by selecting the Add button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

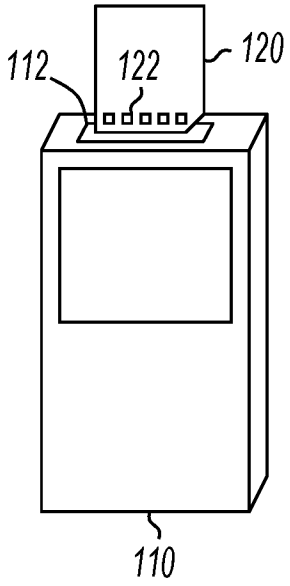

112
122
120
110

FIG. 1

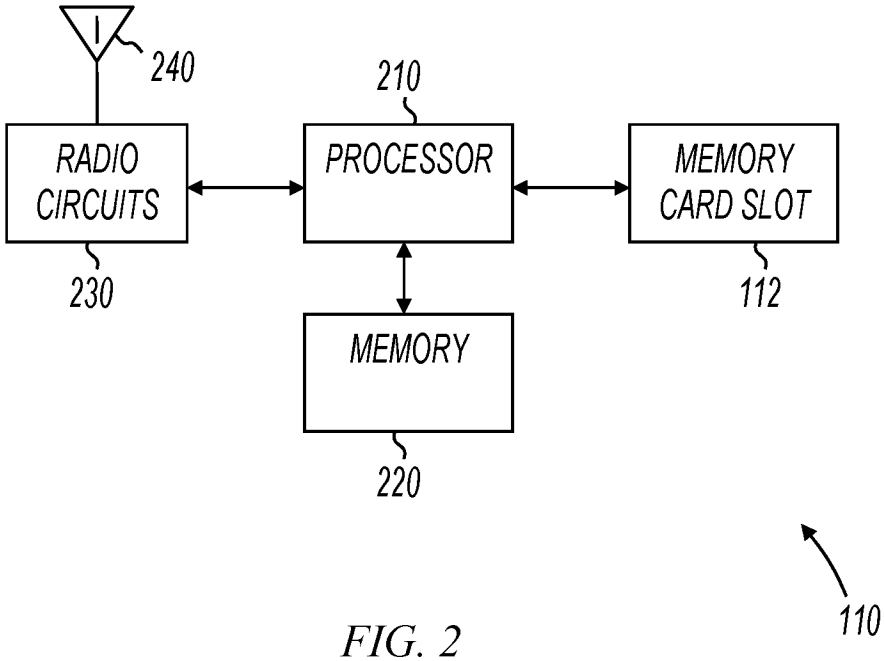

240
210
RADIO CIRCUITS
PROCESSOR
MEMORY CARD SLOT
230
112
MEMORY
220
110

FIG. 2

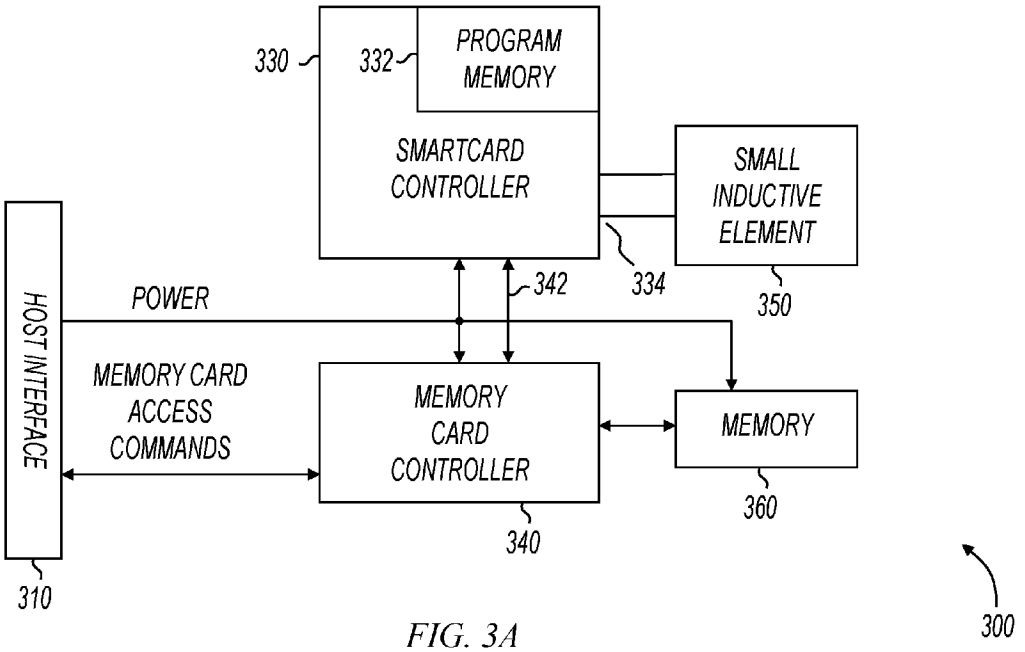

330
332
PROGRAM MEMORY
SMARTCARD CONTROLLER
SMALL INDUCTIVE ELEMENT
334
350
342
POWER
HOST INTERFACE
MEMORY CARD ACCESS COMMANDS
MEMORY CARD CONTROLLER
MEMORY
360
340
310
300

FIG. 3A

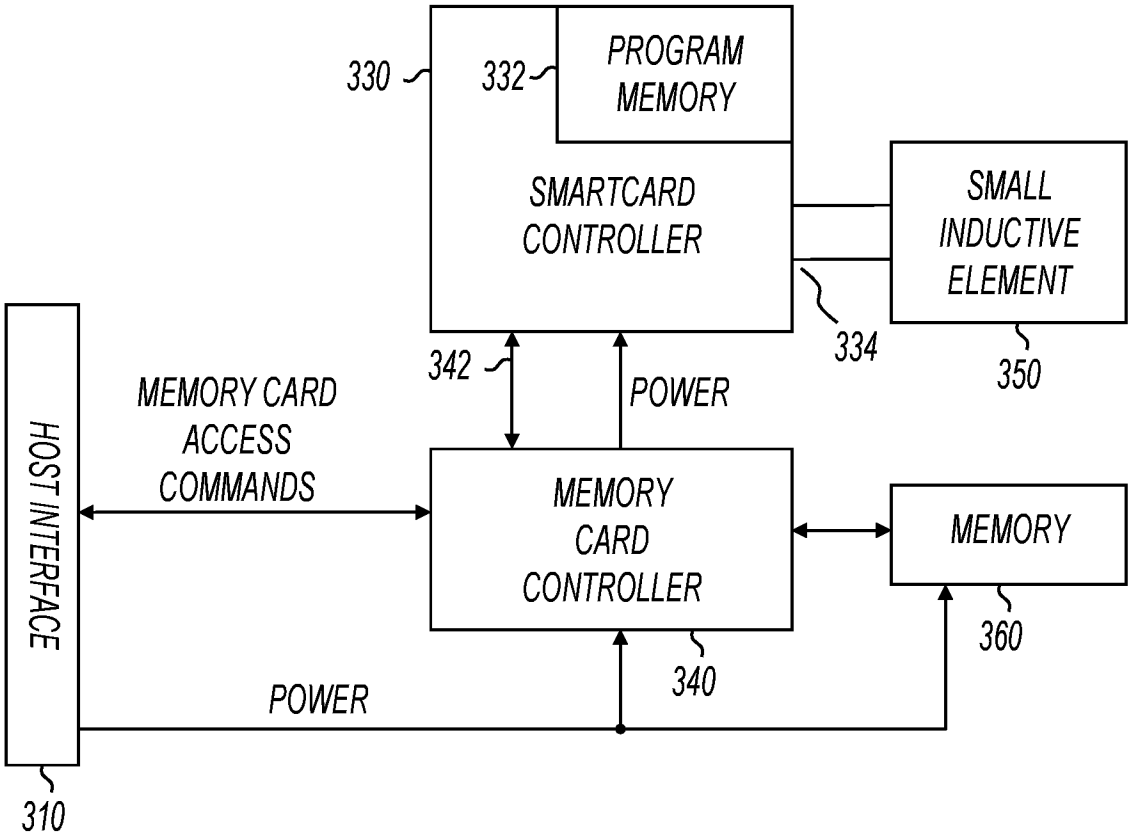

330
332
PROGRAM MEMORY
SMARTCARD CONTROLLER
SMALL INDUCTIVE ELEMENT
334
350
342
POWER
MEMORY CARD ACCESS COMMANDS
HOST INTERFACE
MEMORY CARD CONTROLLER
MEMORY
360
340
POWER
310
302

FIG. 3B

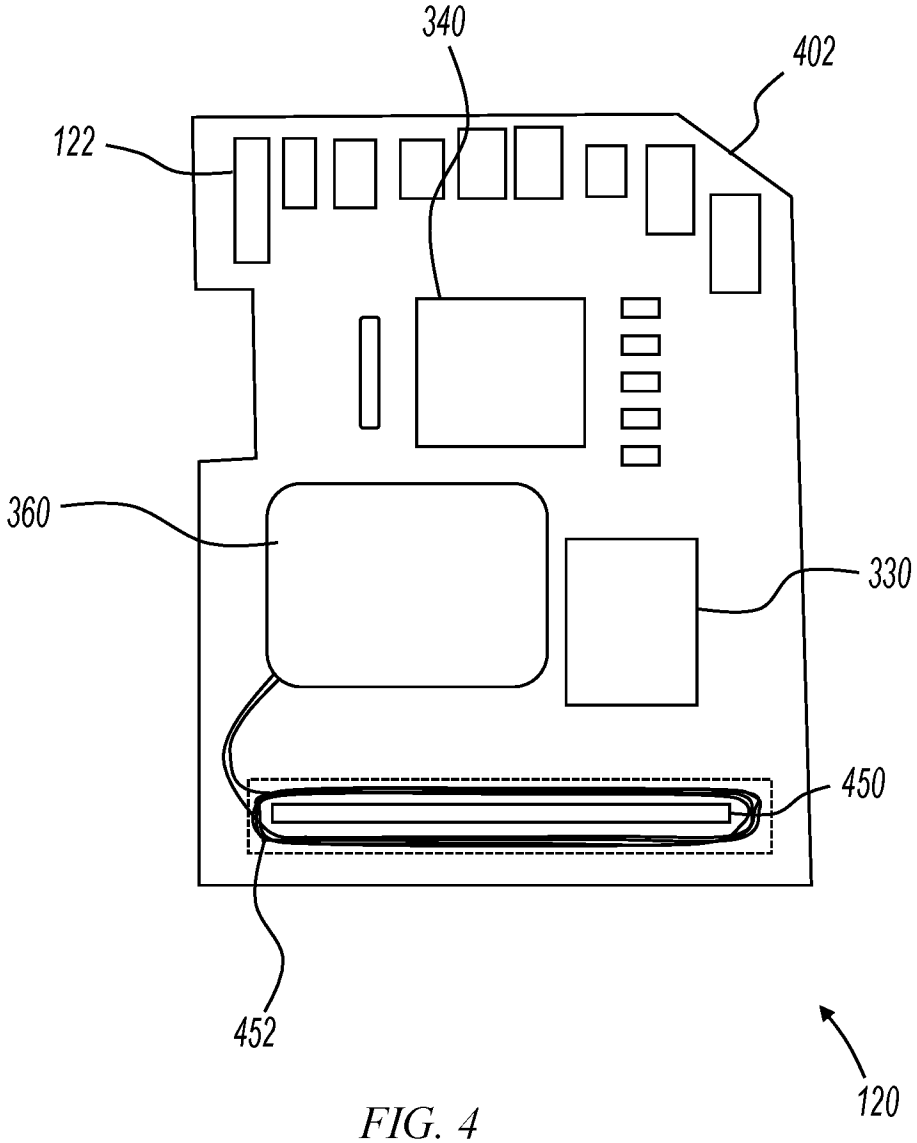


FIG. 4

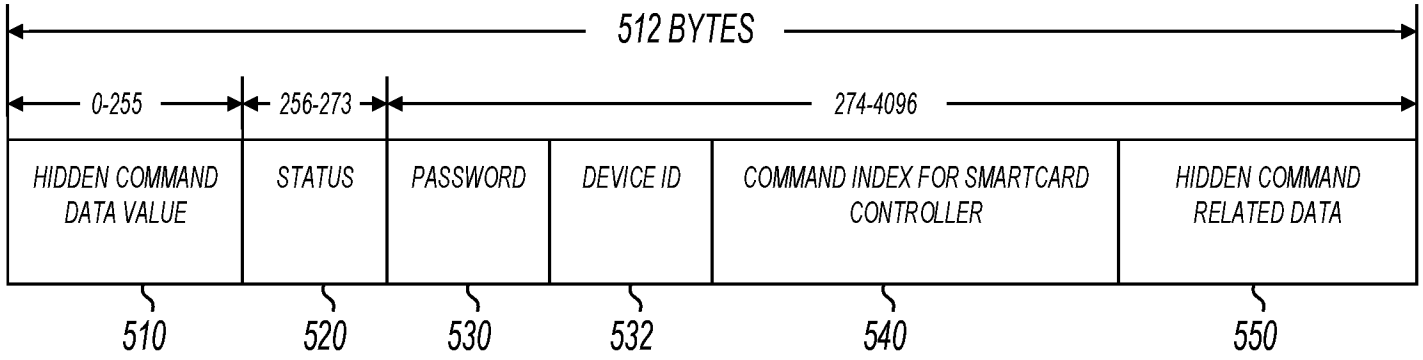

512 BYTES
0-255
256-273
274-4096
HIDDEN COMMAND DATA VALUE
STATUS
PASSWORD
DEVICE ID
COMMAND INDEX FOR SMARTCARD CONTROLLER
HIDDEN COMMAND RELATED DATA
510
520
530
532
540
550

FIG. 5

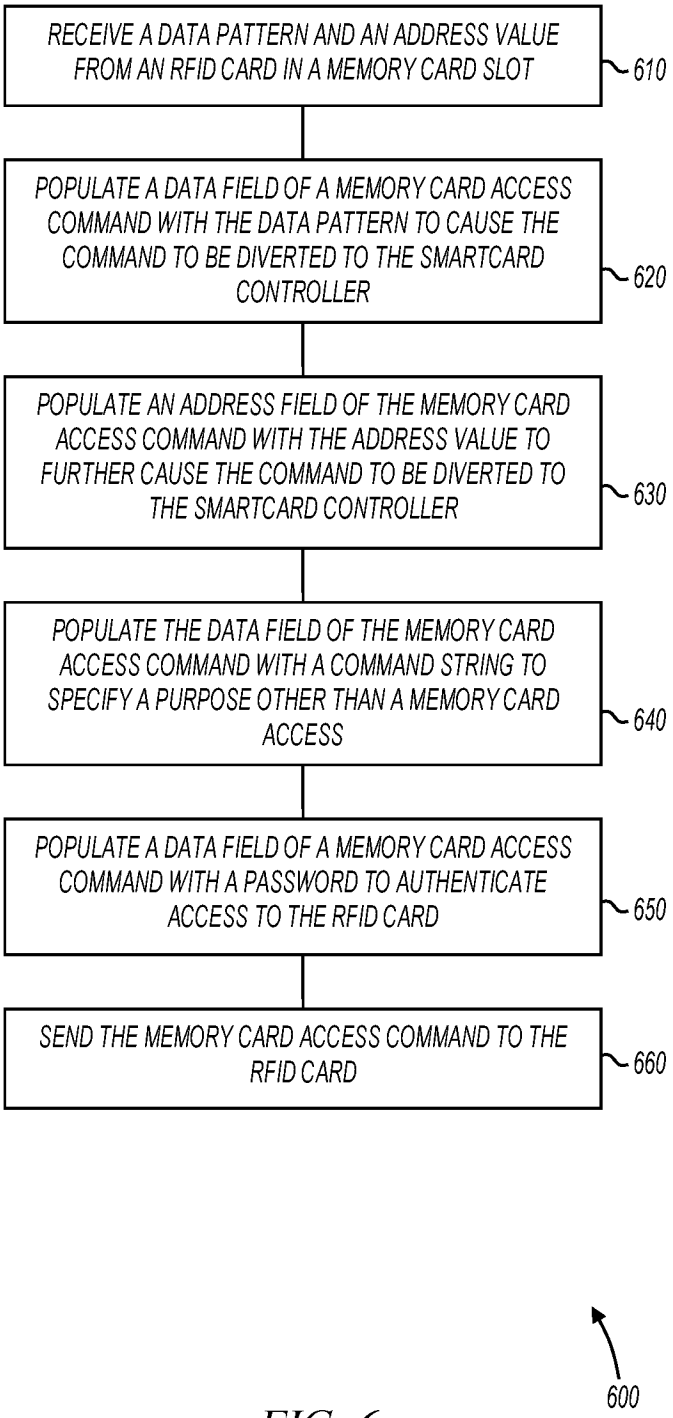

RECEIVE A DATA PATTERN AND AN ADDRESS VALUE FROM AN RFID CARD IN A MEMORY CARD SLOT
610
POPULATE A DATA FIELD OF A MEMORY CARD ACCESS COMMAND WITH THE DATA PATTERN TO CAUSE THE COMMAND TO BE DIVERTED TO THE SMARTCARD CONTROLLER
620
POPULATE AN ADDRESS FIELD OF THE MEMORY CARD ACCESS COMMAND WITH THE ADDRESS VALUE TO FURTHER CAUSE THE COMMAND TO BE DIVERTED TO THE SMARTCARD CONTROLLER
630
POPULATE THE DATA FIELD OF THE MEMORY CARD ACCESS COMMAND WITH A COMMAND STRING TO SPECIFY A PURPOSE OTHER THAN A MEMORY CARD ACCESS
640
POPULATE A DATA FIELD OF A MEMORY CARD ACCESS COMMAND WITH A PASSWORD TO AUTHENTICATE ACCESS TO THE RFID CARD
650
SEND THE MEMORY CARD ACCESS COMMAND TO THE RFID CARD
660
600

FIG. 6

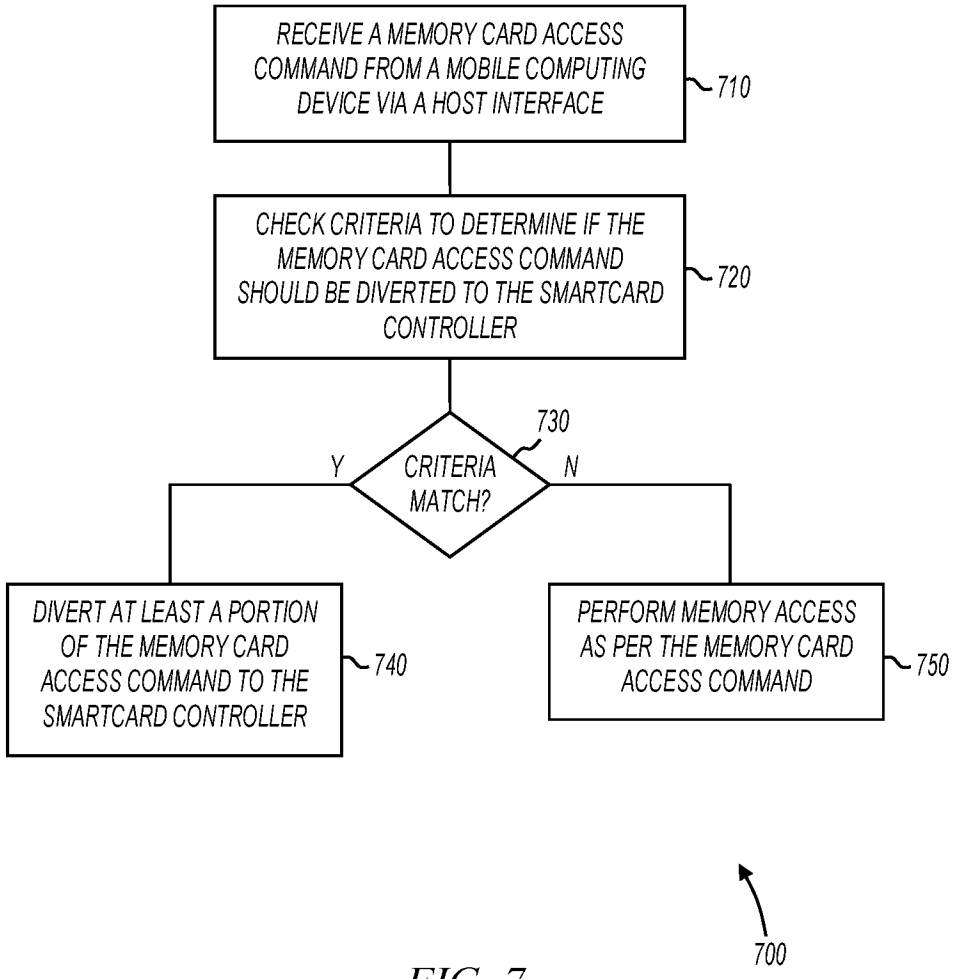

RECEIVE A MEMORY CARD ACCESS COMMAND FROM A MOBILE COMPUTING DEVICE VIA A HOST INTERFACE
710
CHECK CRITERIA TO DETERMINE IF THE MEMORY CARD ACCESS COMMAND SHOULD BE DIVERTED TO THE SMARTCARD CONTROLLER
720
730
CRITERIA MATCH?
Y
N
DIVERT AT LEAST A PORTION OF THE MEMORY CARD ACCESS COMMAND TO THE SMARTCARD CONTROLLER
740
PERFORM MEMORY ACCESS AS PER THE MEMORY CARD ACCESS COMMAND
750
700

FIG. 7

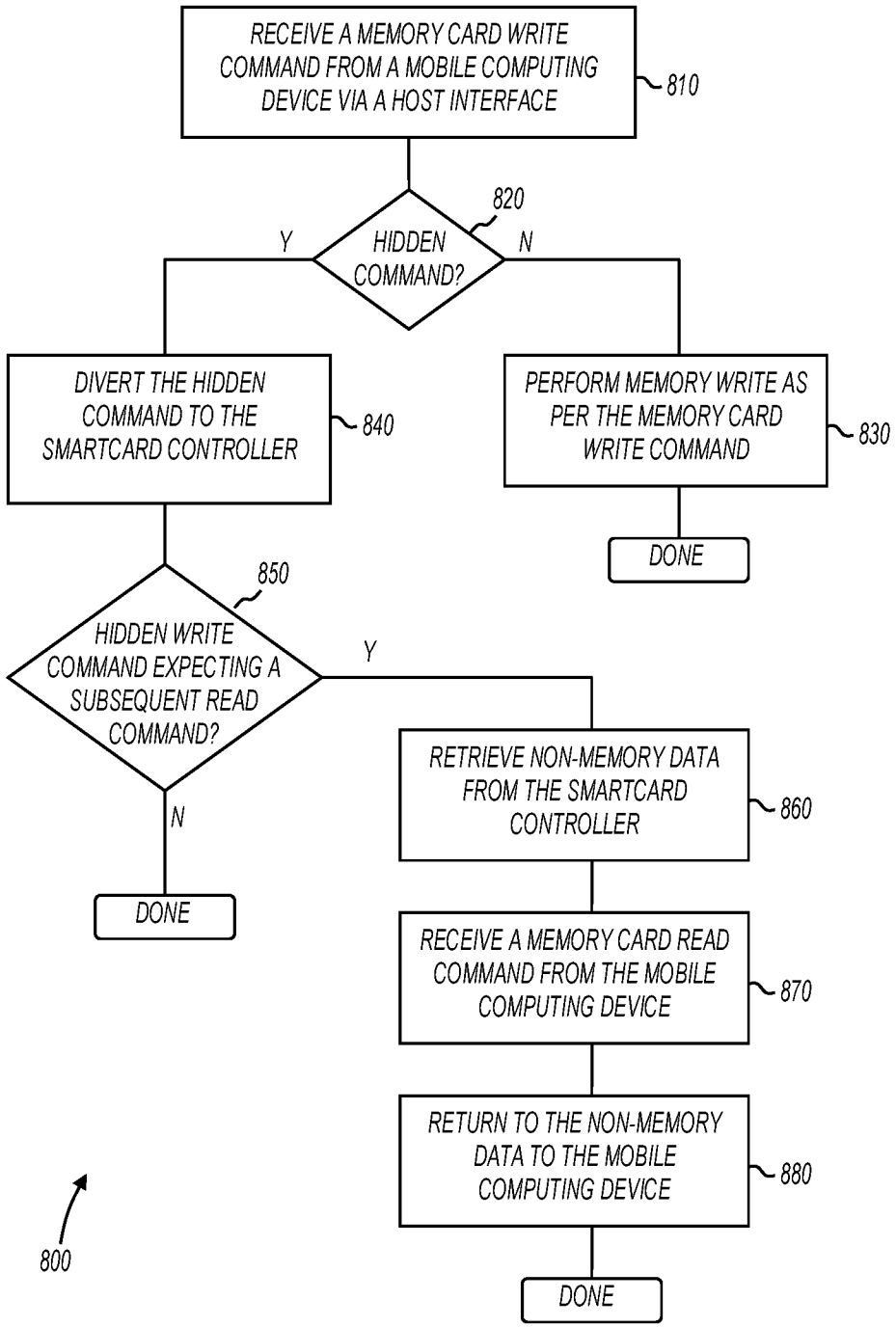

RECEIVE A MEMORY CARD WRITE COMMAND FROM A MOBILE COMPUTING DEVICE VIA A HOST INTERFACE
810
820
HIDDEN COMMAND?
Y
N
DIVERT THE HIDDEN COMMAND TO THE SMARTCARD CONTROLLER
840
PERFORM MEMORY WRITE AS PER THE MEMORY CARD WRITE COMMAND
830
DONE
850
HIDDEN WRITE COMMAND EXPECTING A SUBSEQUENT READ COMMAND?
Y
N
DONE
RETRIEVE NON-MEMORY DATA FROM THE SMARTCARD CONTROLLER
860
RECEIVE A MEMORY CARD READ COMMAND FROM THE MOBILE COMPUTING DEVICE
870
RETURN TO THE NON-MEMORY DATA TO THE MOBILE COMPUTING DEVICE
880
DONE
800

FIG. 8

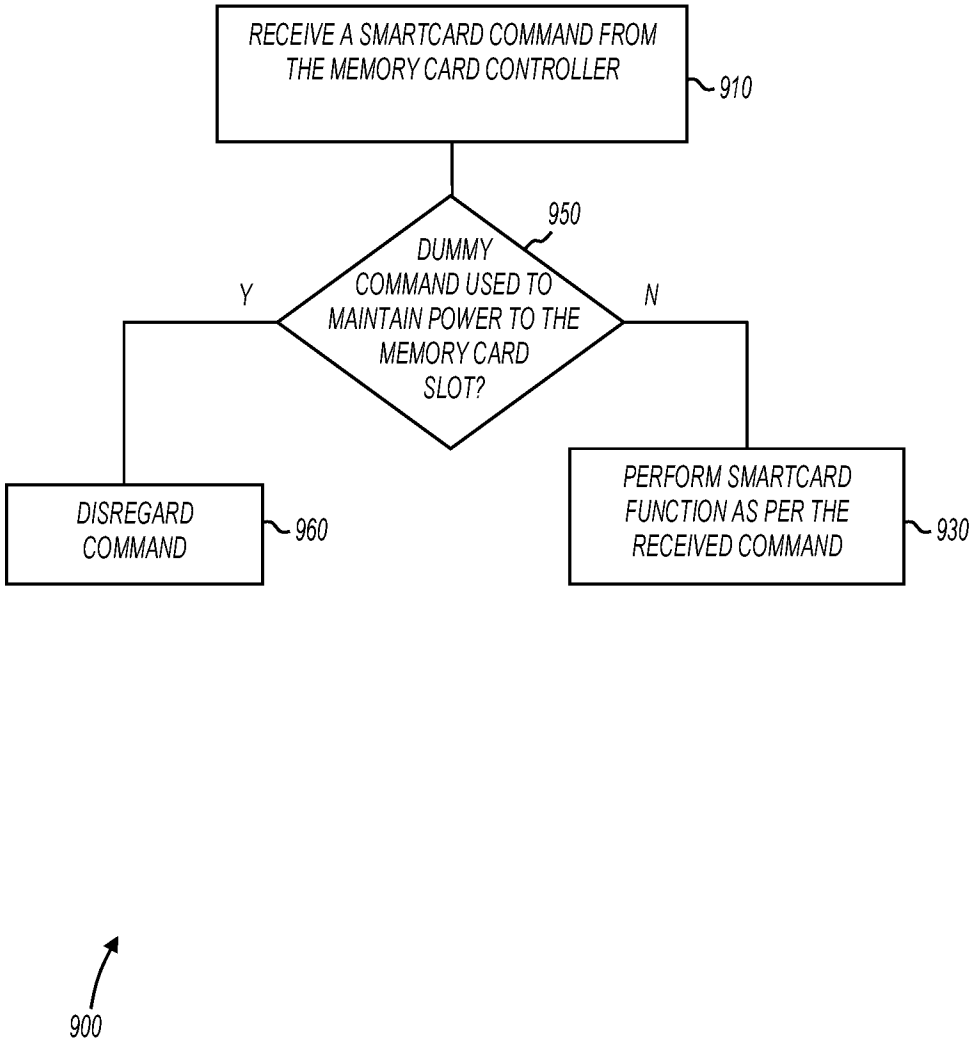

RECEIVE A SMARTCARD COMMAND FROM THE MEMORY CARD CONTROLLER
910
950
DUMMY COMMAND USED TO MAINTAIN POWER TO THE MEMORY CARD SLOT?
Y
N
DISREGARD COMMAND
960
PERFORM SMARTCARD FUNCTION AS PER THE RECEIVED COMMAND
930
900

FIG. 9

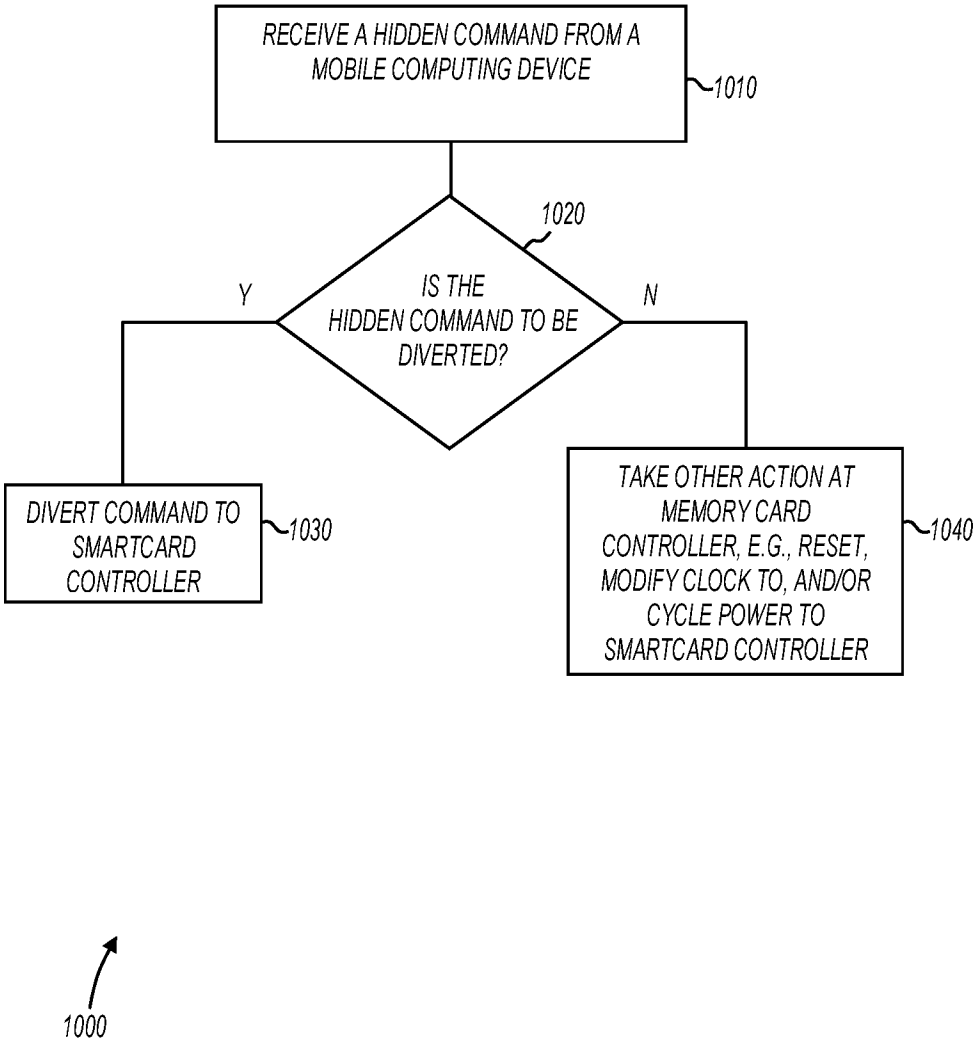

RECEIVE A HIDDEN COMMAND FROM A MOBILE COMPUTING DEVICE
1010
1020
IS THE HIDDEN COMMAND TO BE DIVERTED?
Y
N
DIVERT COMMAND TO SMARTCARD CONTROLLER
1030
TAKE OTHER ACTION AT MEMORY CARD CONTROLLER, E.G., RESET, MODIFY CLOCK TO, AND/OR CYCLE POWER TO SMARTCARD CONTROLLER
1040
1000

FIG. 10

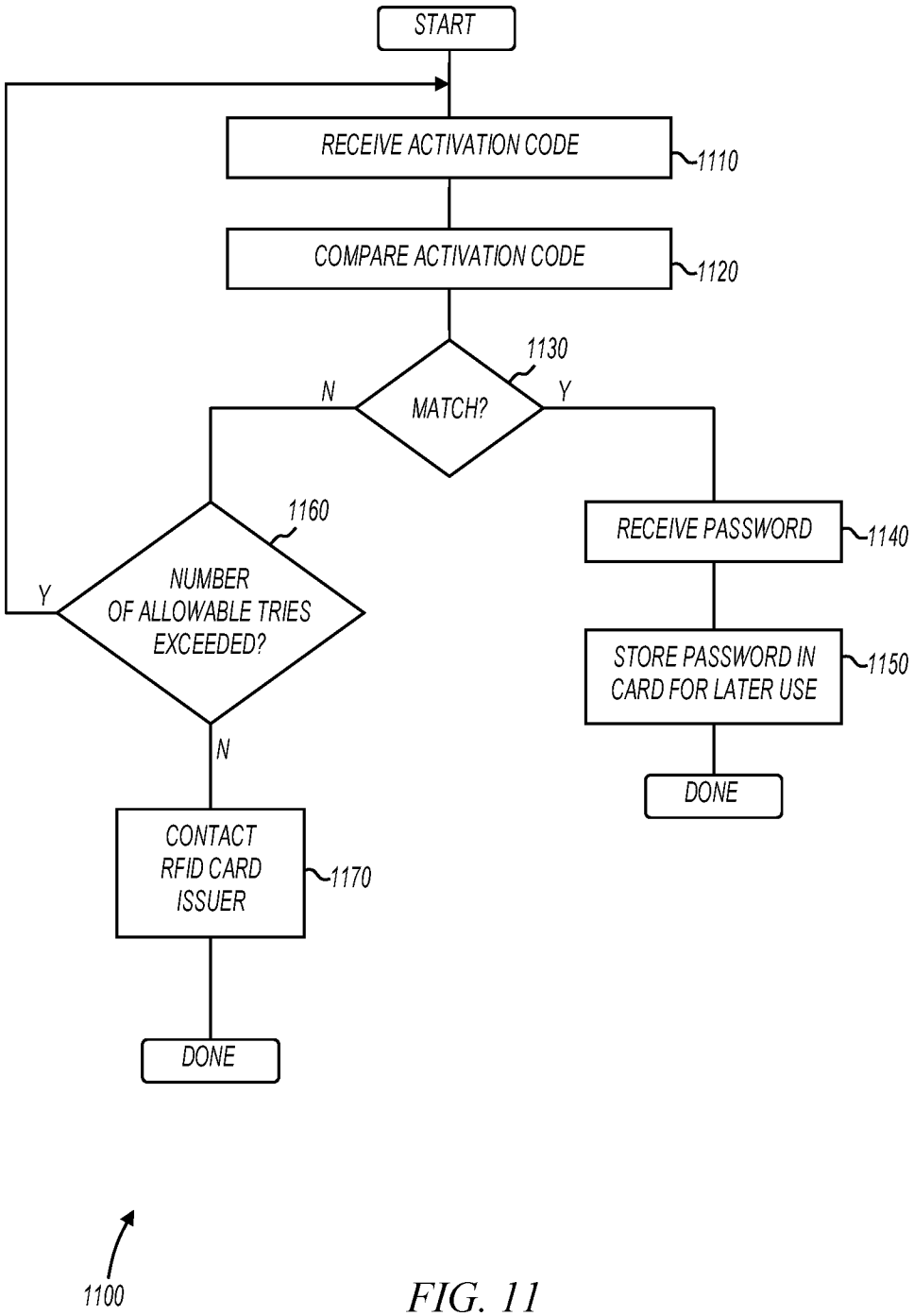

START
RECEIVE ACTIVATION CODE
1110
COMPARE ACTIVATION CODE
1120
1130
MATCH?
N
Y
RECEIVE PASSWORD
1140
STORE PASSWORD IN CARD FOR LATER USE
1150
DONE
1160
NUMBER OF ALLOWABLE TRIES EXCEEDED?
Y
N
CONTACT RFID CARD ISSUER
1170
DONE
1100

FIG. 11

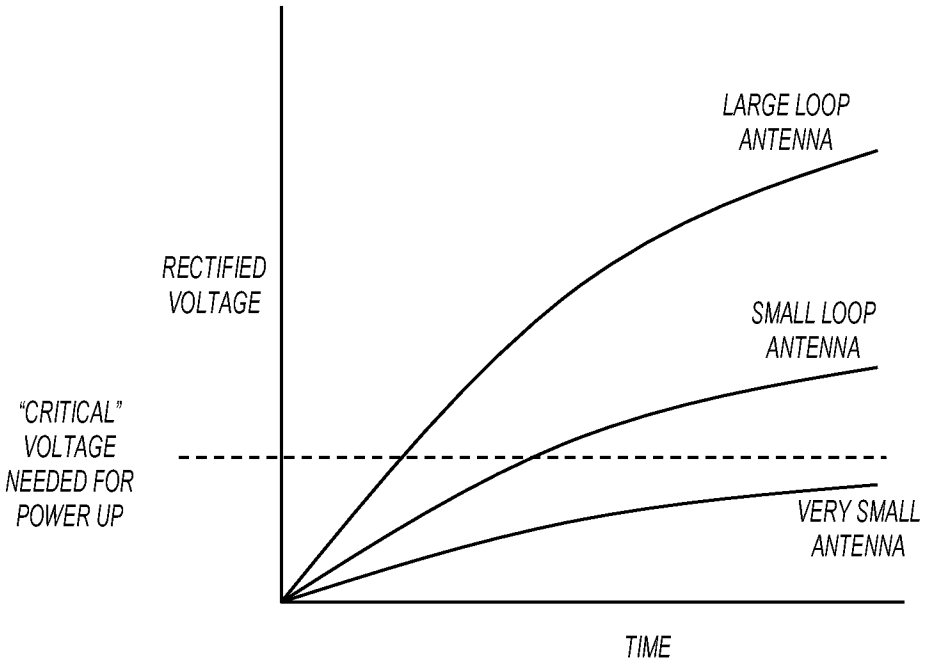


FIG. 12
(PRIOR ART)

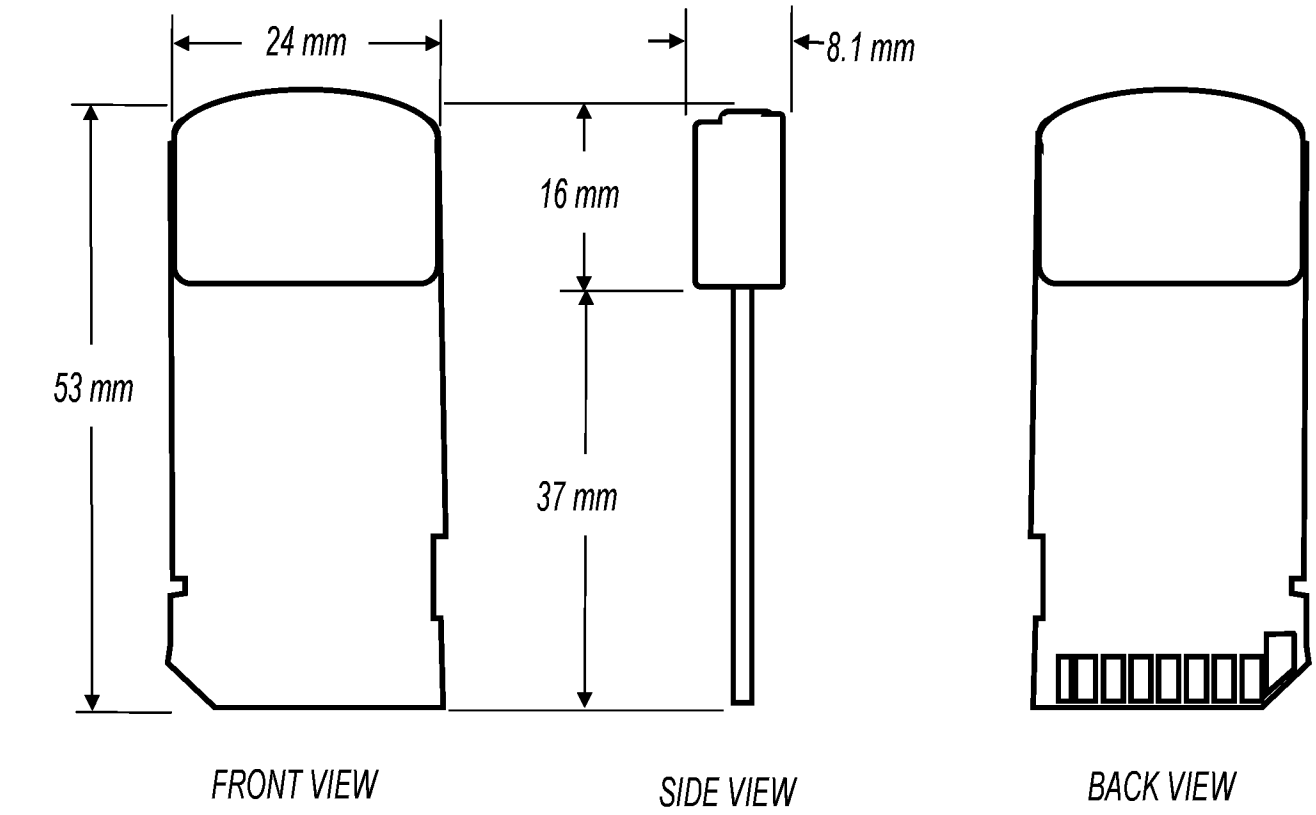


FIG. 13
(PRIOR ART)

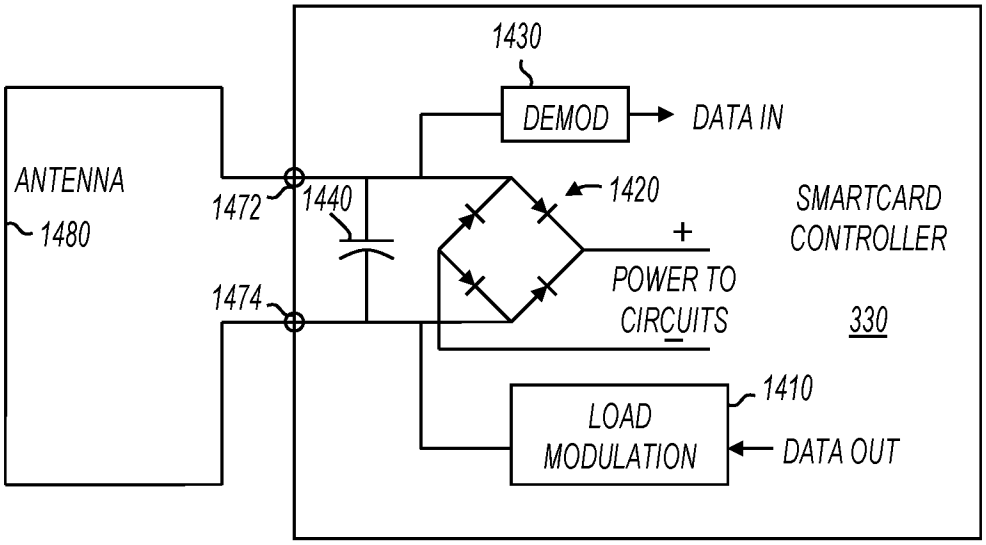


FIG. 14
(PRIOR ART)

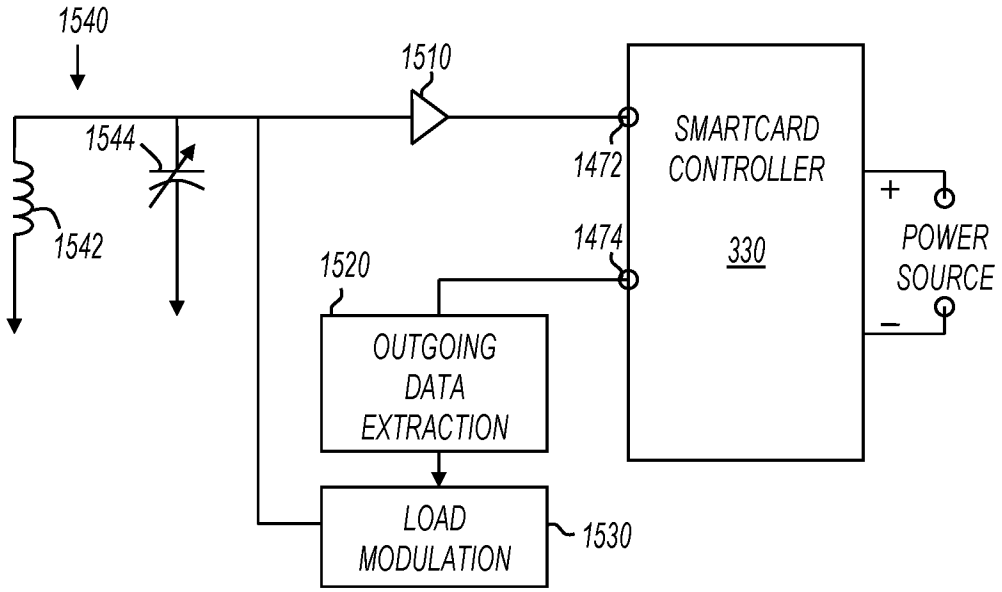


FIG. 15

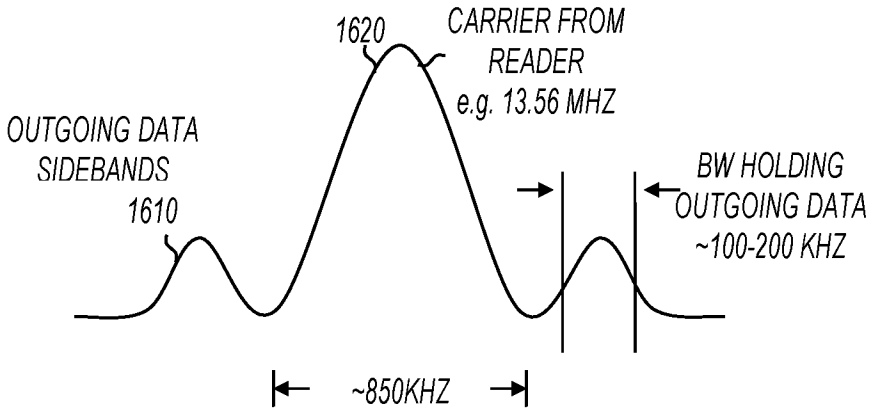

1620
CARRIER FROM READER
e.g. 13.56 MHZ
OUTGOING DATA SIDEBANDS
1610
BW HOLDING OUTGOING DATA
~100-200 KHZ
~850KHZ

FIG. 16

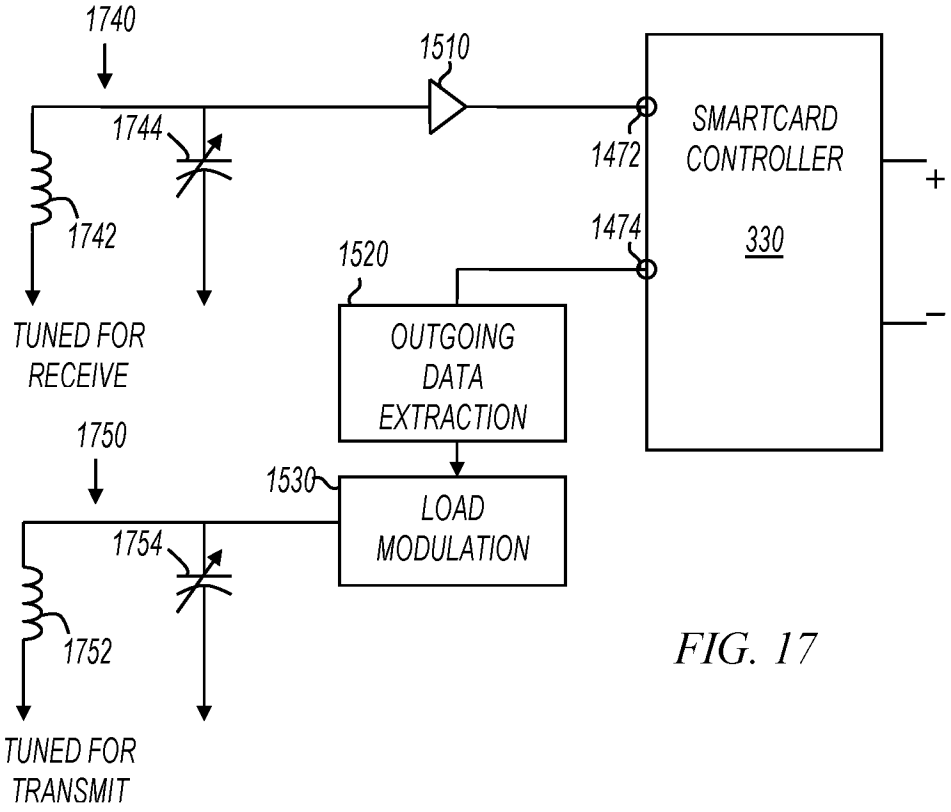

1740
1510
1744
1742
1472
SMARTCARD CONTROLLER
1474
330
+
–
1520
TUNED FOR RECEIVE
OUTGOING DATA EXTRACTION
1750
1530
LOAD MODULATION
1754
1752
TUNED FOR TRANSMIT

FIG. 17

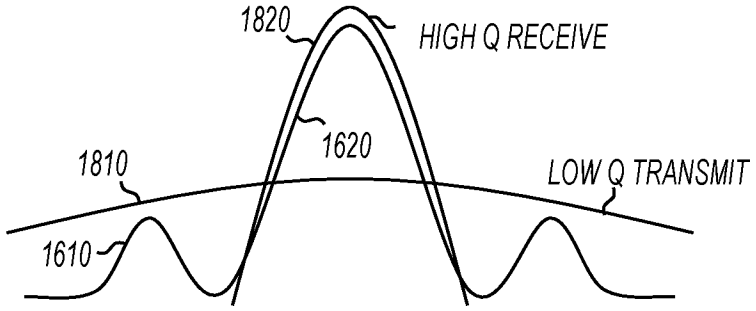

1820
HIGH Q RECEIVE
1620
1810
LOW Q TRANSMIT
1610

FIG. 18

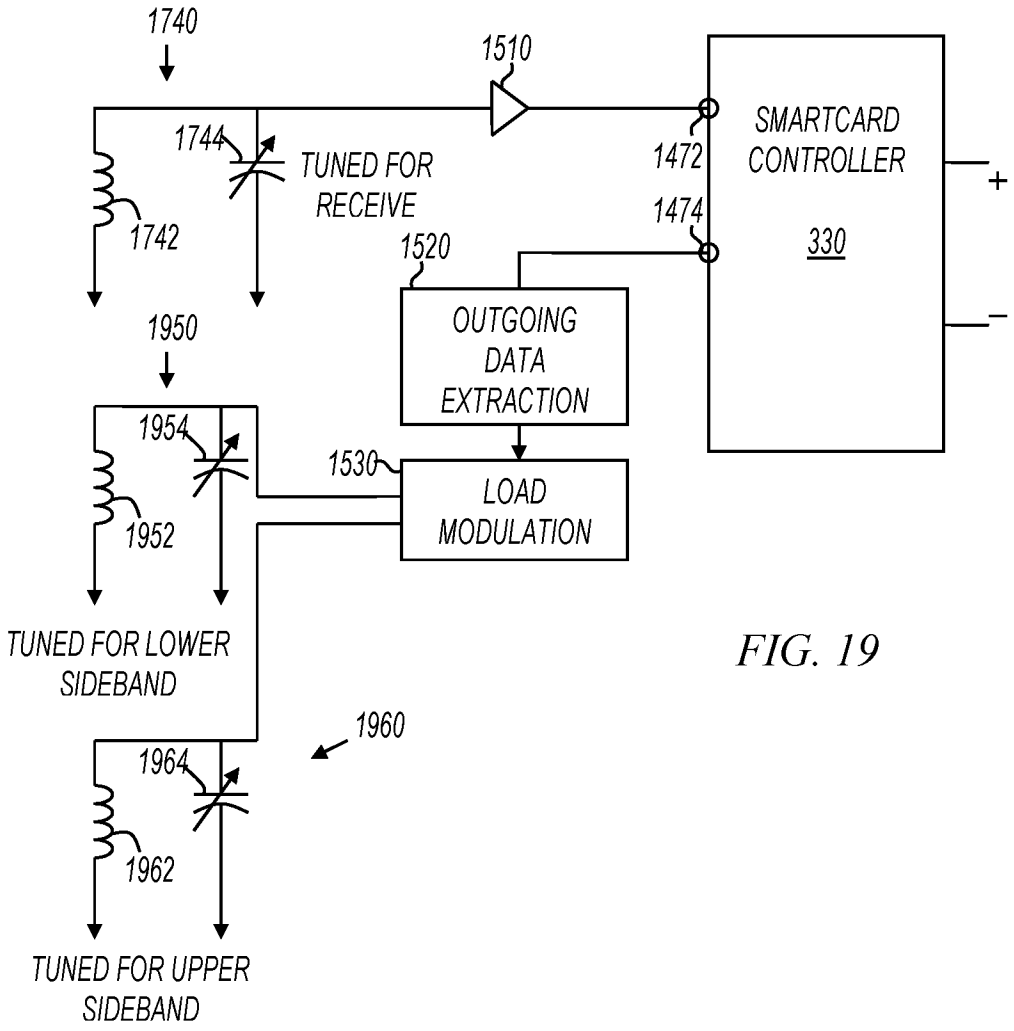

1740
1510
SMARTCARD CONTROLLER
1744
TUNED FOR RECEIVE
1472
1474
330
+
−
1742
1520
OUTGOING DATA EXTRACTION
1950
1954
1530
LOAD MODULATION
1952
TUNED FOR LOWER SIDEBAND
1960
1964
1962
TUNED FOR UPPER SIDEBAND

FIG. 19

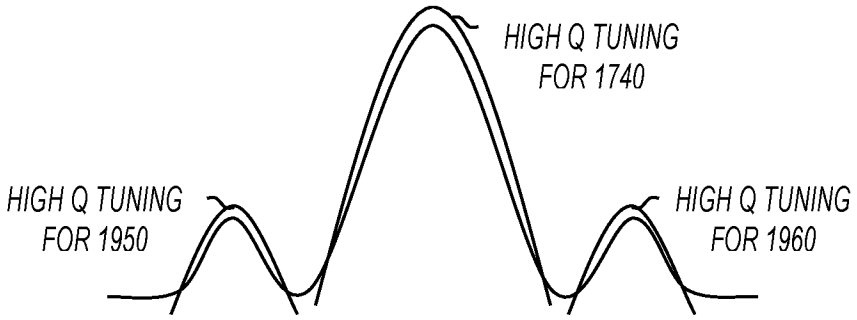

HIGH Q TUNING
FOR 1740
HIGH Q TUNING
FOR 1950
HIGH Q TUNING
FOR 1960

FIG. 20

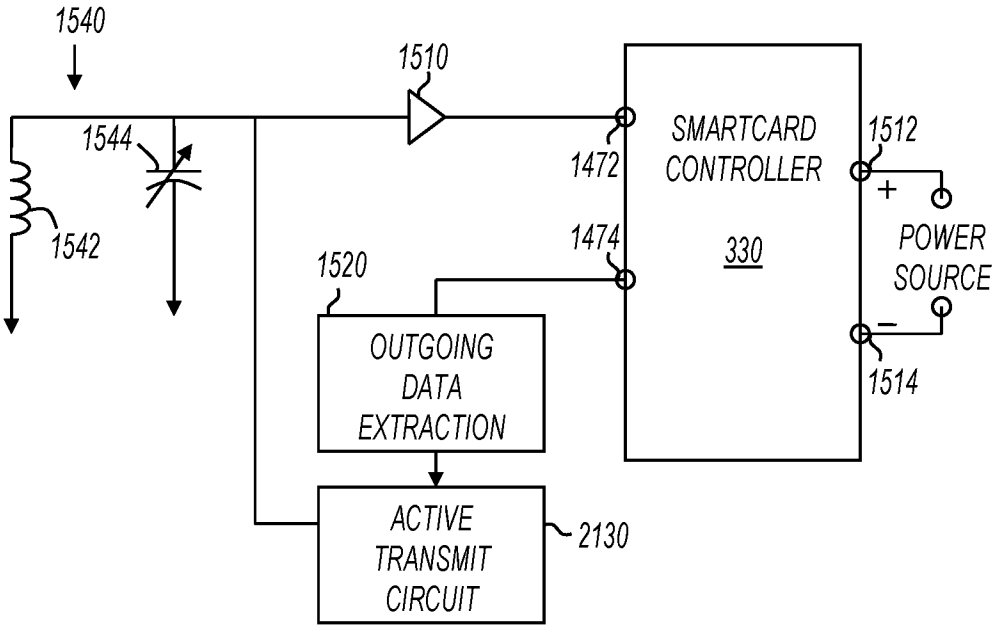

1540
1510
1544
1542
1472
SMARTCARD
CONTROLLER
1512
+
POWER
SOURCE
1474
330
1520
OUTGOING
DATA
EXTRACTION
−
1514
ACTIVE
TRANSMIT
CIRCUIT
2130

FIG. 21

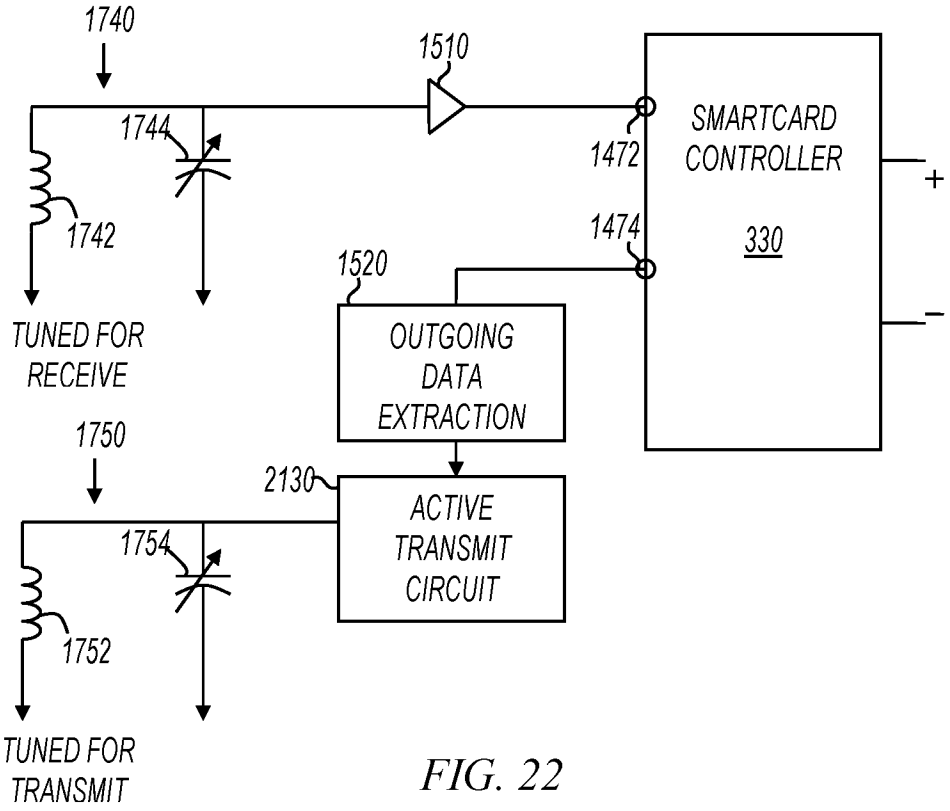

1740
1510
1744
1472
SMARTCARD
CONTROLLER
+
1742
1474
330
1520
TUNED FOR
RECEIVE
OUTGOING
DATA
EXTRACTION
1750
2130
ACTIVE
TRANSMIT
CIRCUIT
1754
1752
TUNED FOR
TRANSMIT

FIG. 22

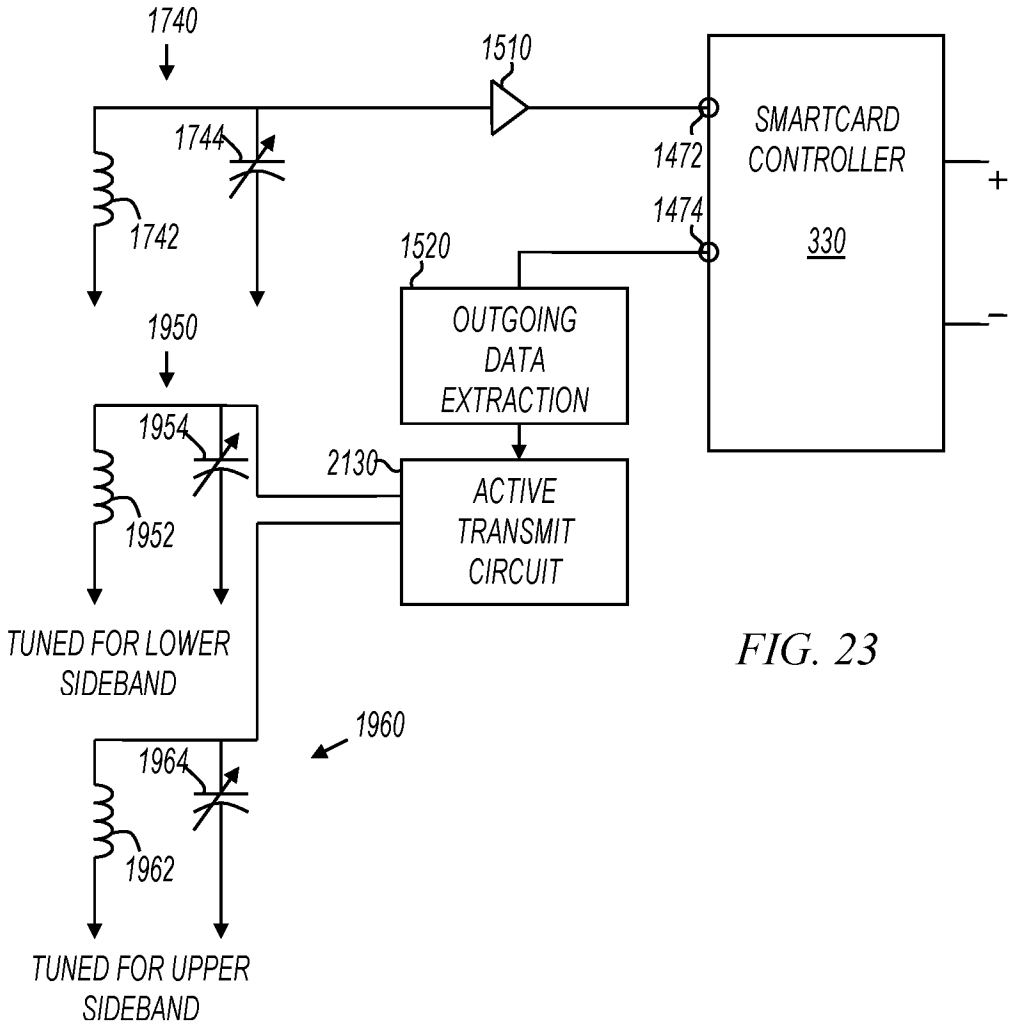

1740
1510
SMARTCARD CONTROLLER
1744
1472
1742
1474
330
+
1520
OUTGOING DATA EXTRACTION
1950
1954
2130
ACTIVE TRANSMIT CIRCUIT
1952
TUNED FOR LOWER SIDEBAND
1960
1964
1962
TUNED FOR UPPER SIDEBAND

FIG. 23

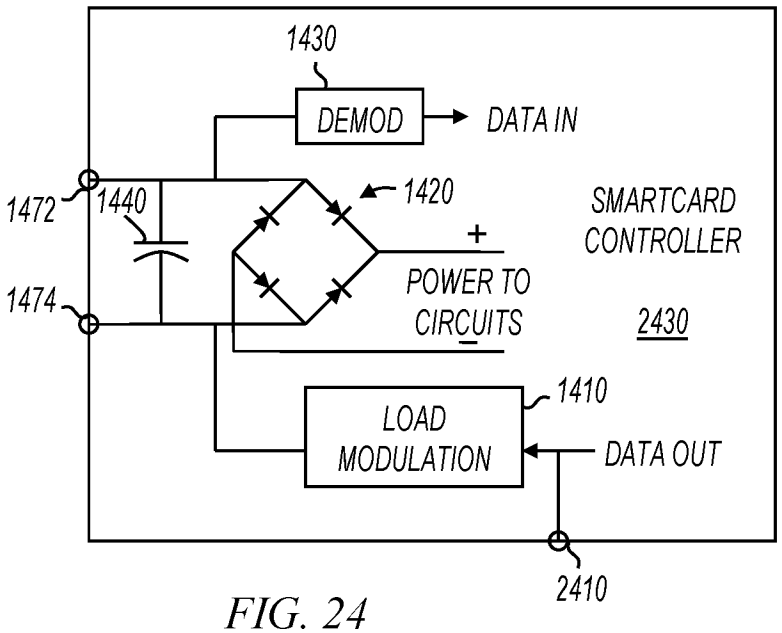

1430
DEMOD
DATA IN
1472
1440
1420
SMARTCARD
CONTROLLER
+
POWER TO
CIRCUITS
1474
2430
1410
LOAD
MODULATION
DATA OUT
2410

FIG. 24

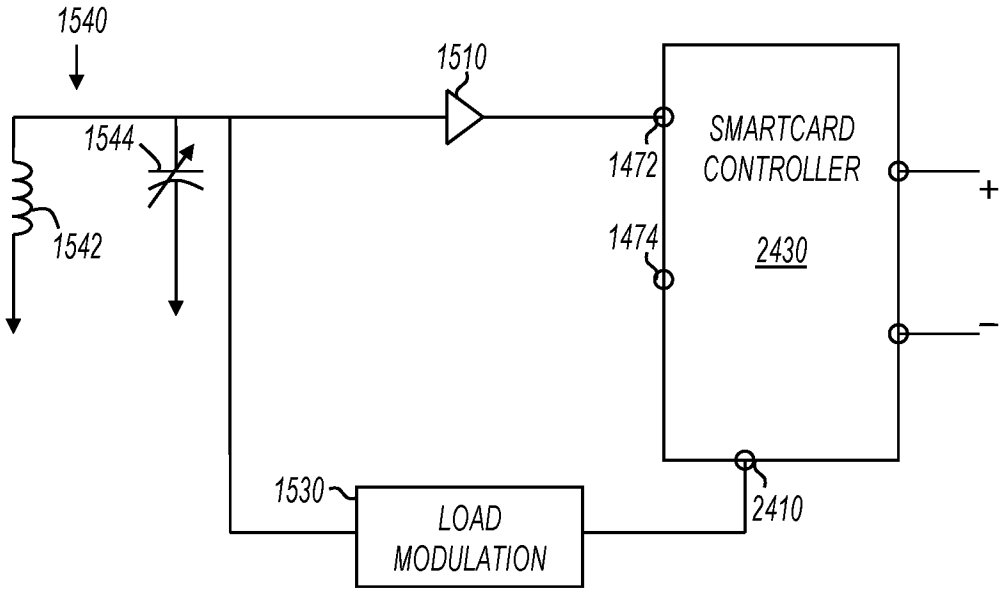

1540
1510
1544
1472
SMARTCARD
CONTROLLER
+
1542
1474
2430
–
1530
LOAD
MODULATION
2410

FIG. 25

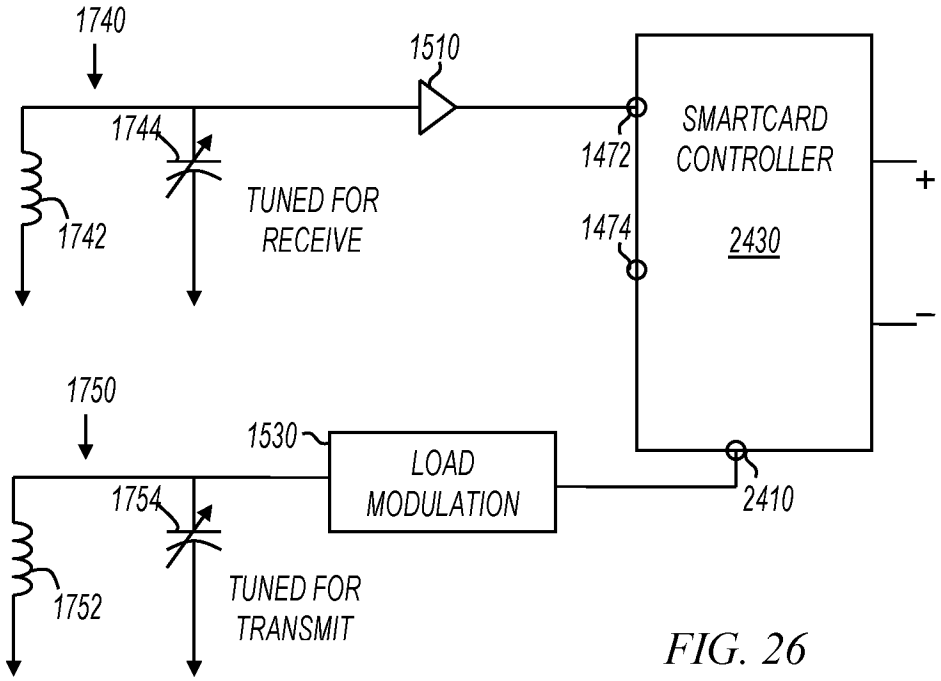

1740
1510
1744
1742
TUNED FOR
RECEIVE
1472
SMARTCARD
CONTROLLER
1474
2430
+
–
1750
1530
LOAD
MODULATION
1754
2410
1752
TUNED FOR
TRANSMIT

FIG. 26

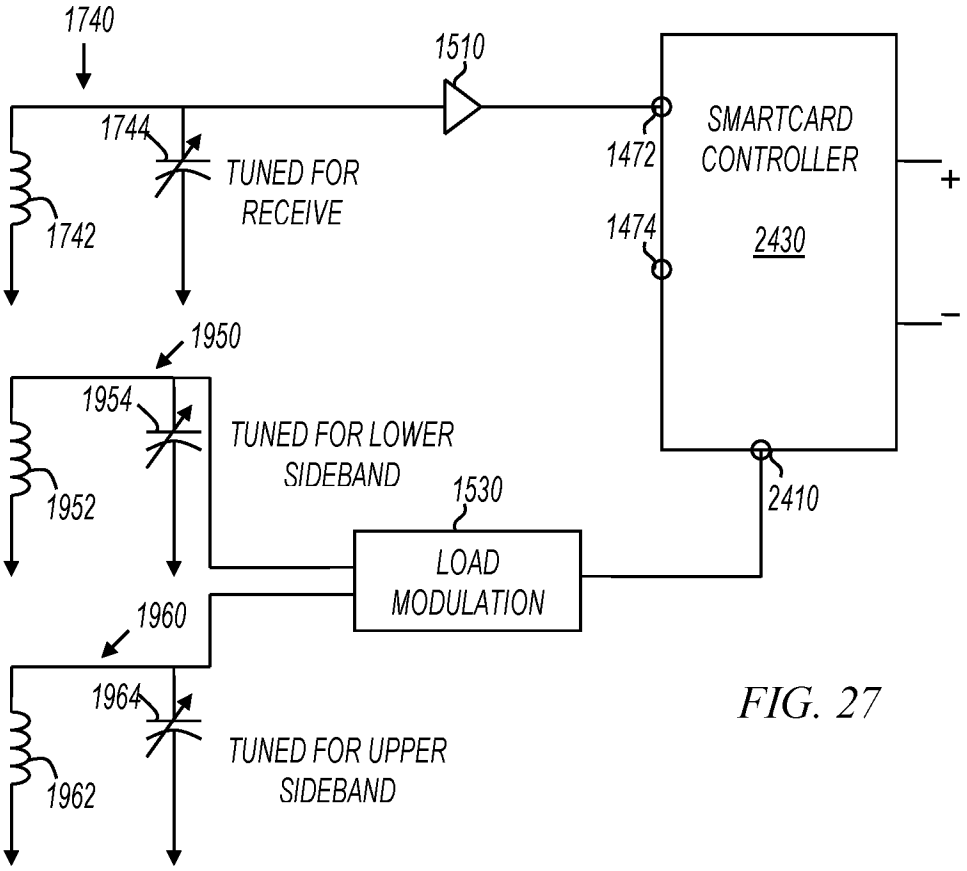

1740
1510
1744
1742
TUNED FOR
RECEIVE
1472
SMARTCARD
CONTROLLER
1474
2430
+
–
1950
1954
1952
TUNED FOR LOWER
SIDEBAND
1530
2410
LOAD
MODULATION
1960
1964
1962
TUNED FOR UPPER
SIDEBAND

FIG. 27

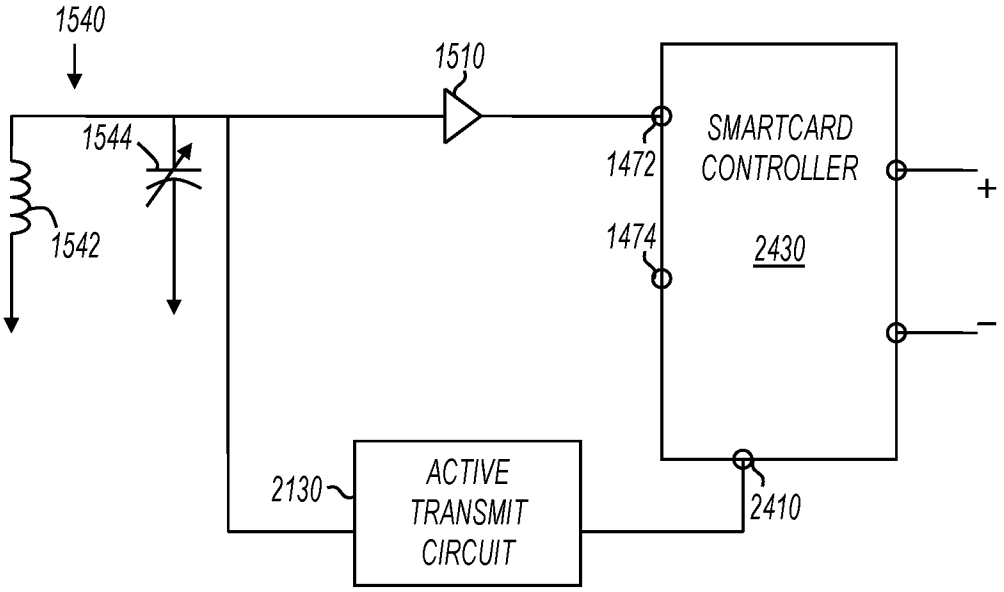

1540
1510
1544
1542
1472
SMARTCARD
CONTROLLER
1474
2430
+
–
2130
ACTIVE
TRANSMIT
CIRCUIT
2410

FIG. 28

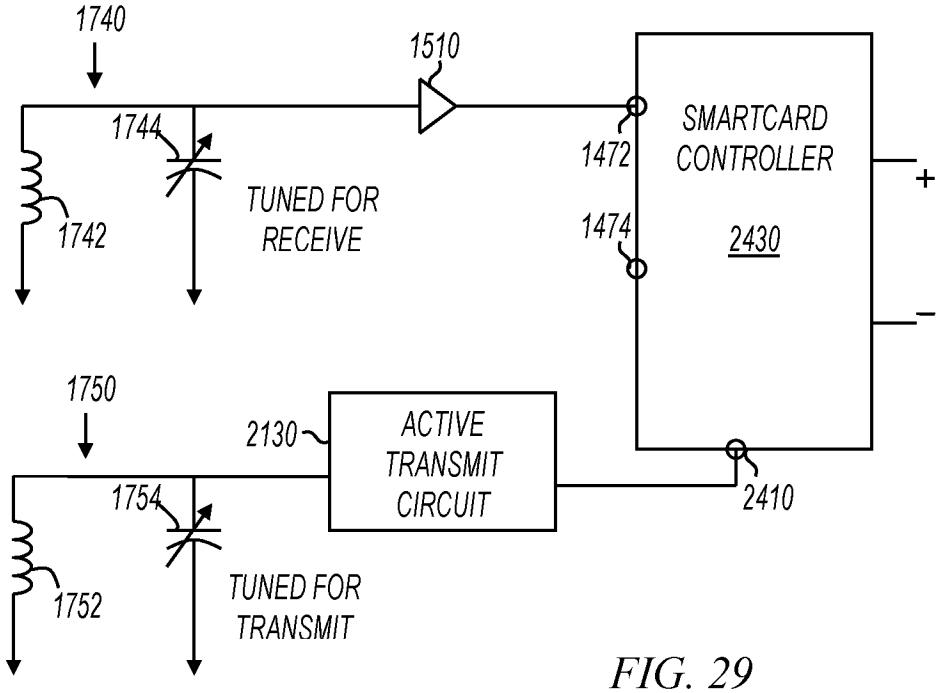

1740
1510
1744
1742
TUNED FOR
RECEIVE
1472
SMARTCARD
CONTROLLER
1474
2430
+
–
1750
2130
ACTIVE
TRANSMIT
CIRCUIT
2410
1754
1752
TUNED FOR
TRANSMIT

FIG. 29

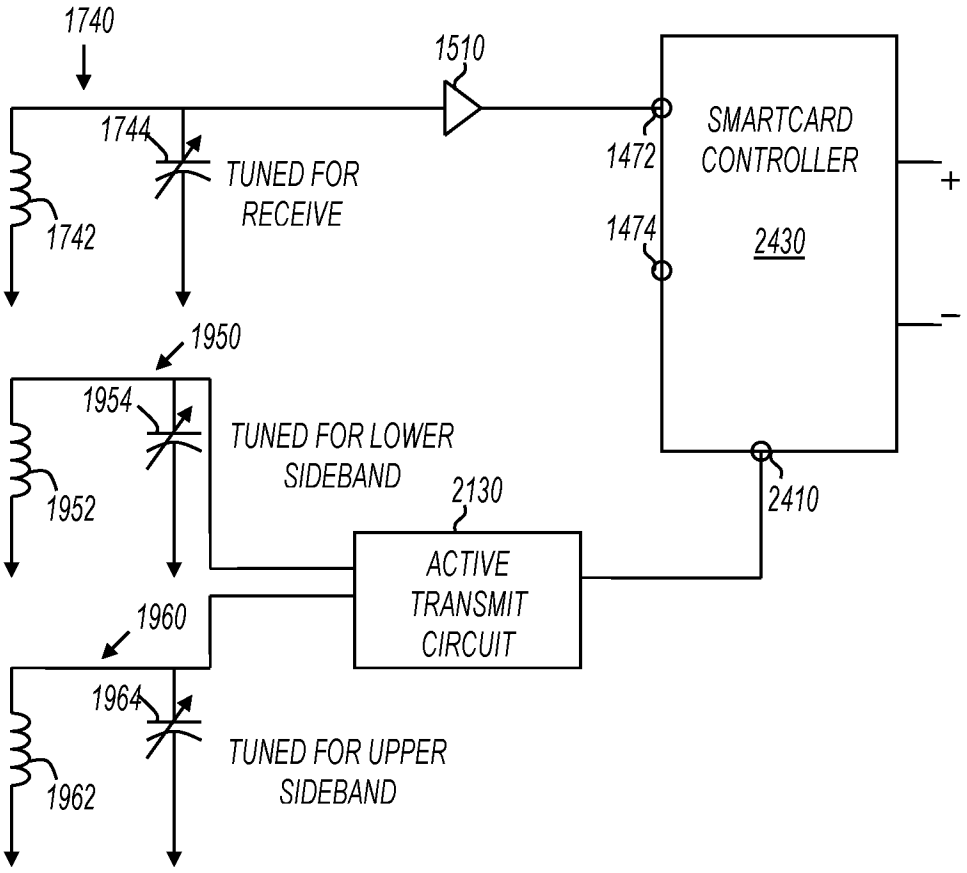

1740
1510
1744
TUNED FOR
RECEIVE
1742
1472
SMARTCARD
CONTROLLER
1474
2430
+
–
1950
1954
TUNED FOR LOWER
SIDEBAND
1952
2130
2410
ACTIVE
TRANSMIT
CIRCUIT
1960
1964
TUNED FOR UPPER
SIDEBAND
1962

FIG. 30

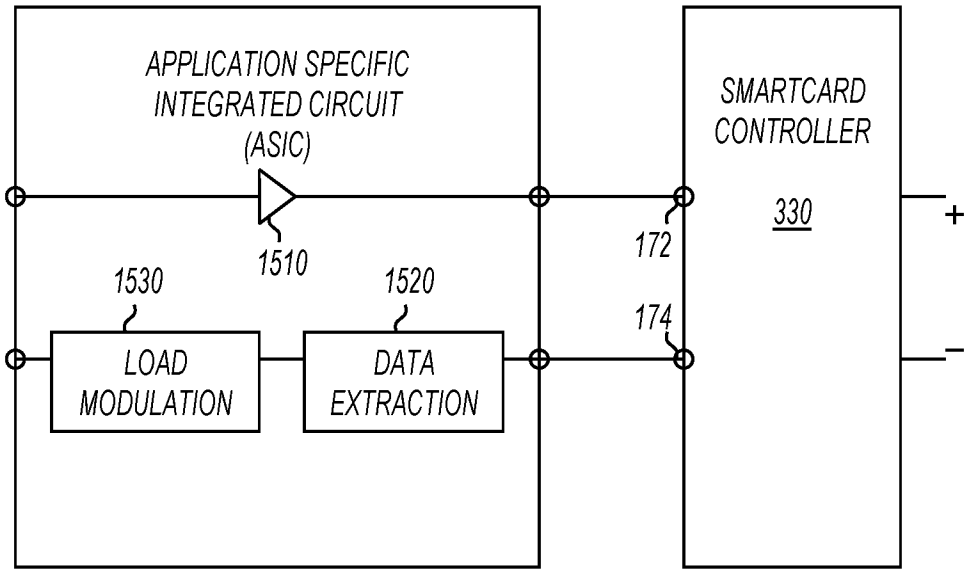

APPLICATION SPECIFIC
INTEGRATED CIRCUIT
(ASIC)
1510
1530
LOAD
MODULATION
1520
DATA
EXTRACTION
SMARTCARD
CONTROLLER
330
172
174
+
–

FIG. 31

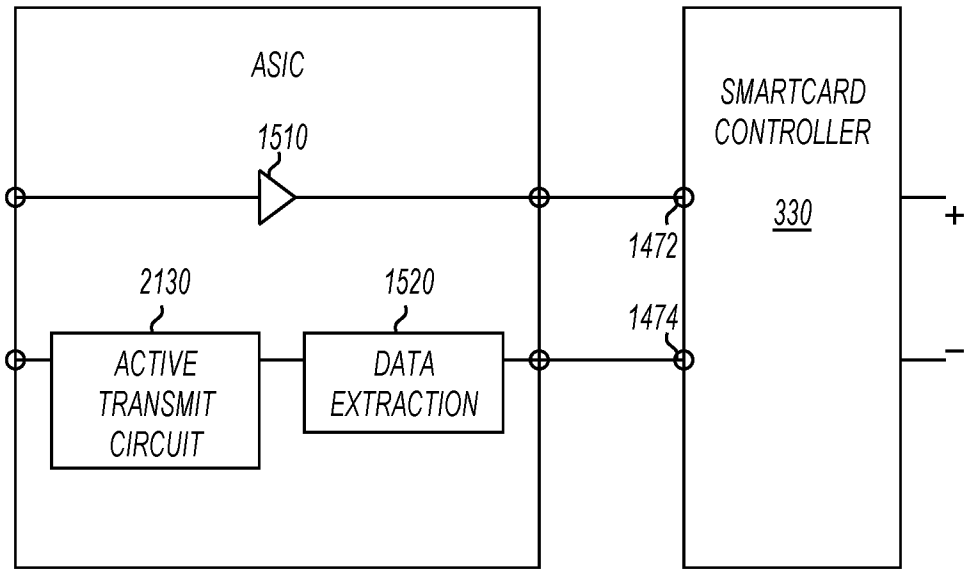

ASIC
1510
2130
ACTIVE
TRANSMIT
CIRCUIT
1520
DATA
EXTRACTION
SMARTCARD
CONTROLLER
330
1472
1474
+
–

FIG. 32

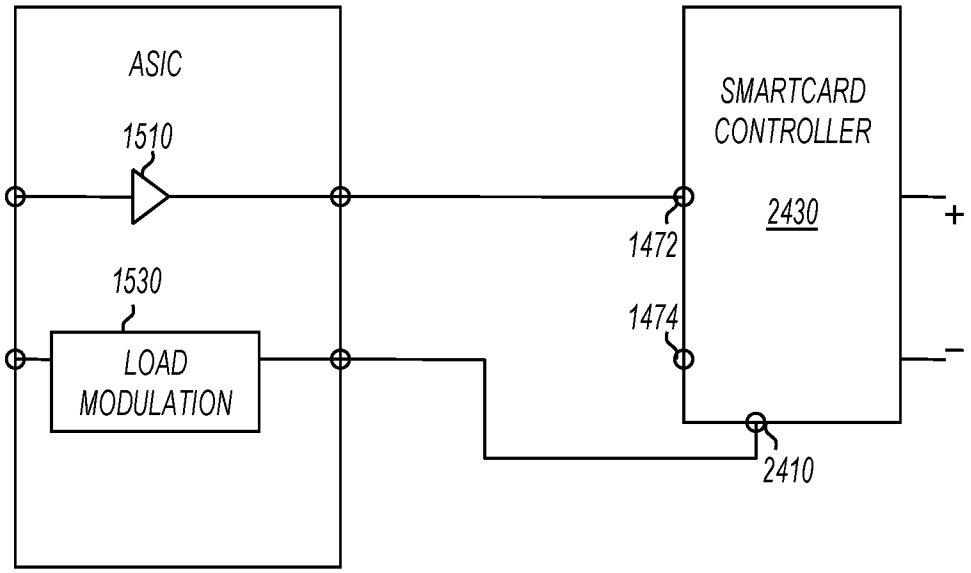

ASIC
1510
1530
LOAD
MODULATION
SMARTCARD
CONTROLLER
2430
1472
1474
2410
+
–

FIG. 33

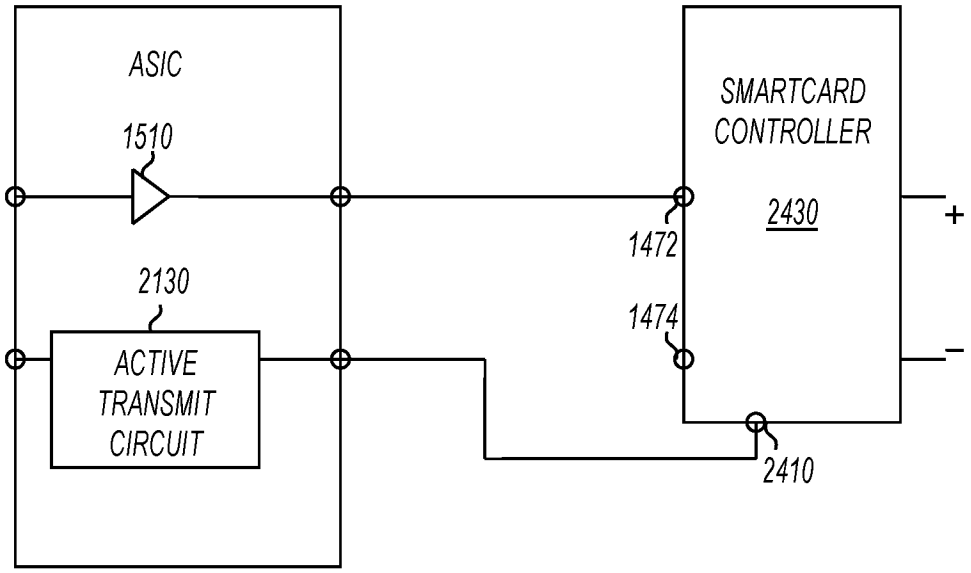

ASIC
1510
2130
ACTIVE
TRANSMIT
CIRCUIT
SMARTCARD
CONTROLLER
2430
1472
1474
2410
+
–

FIG. 34

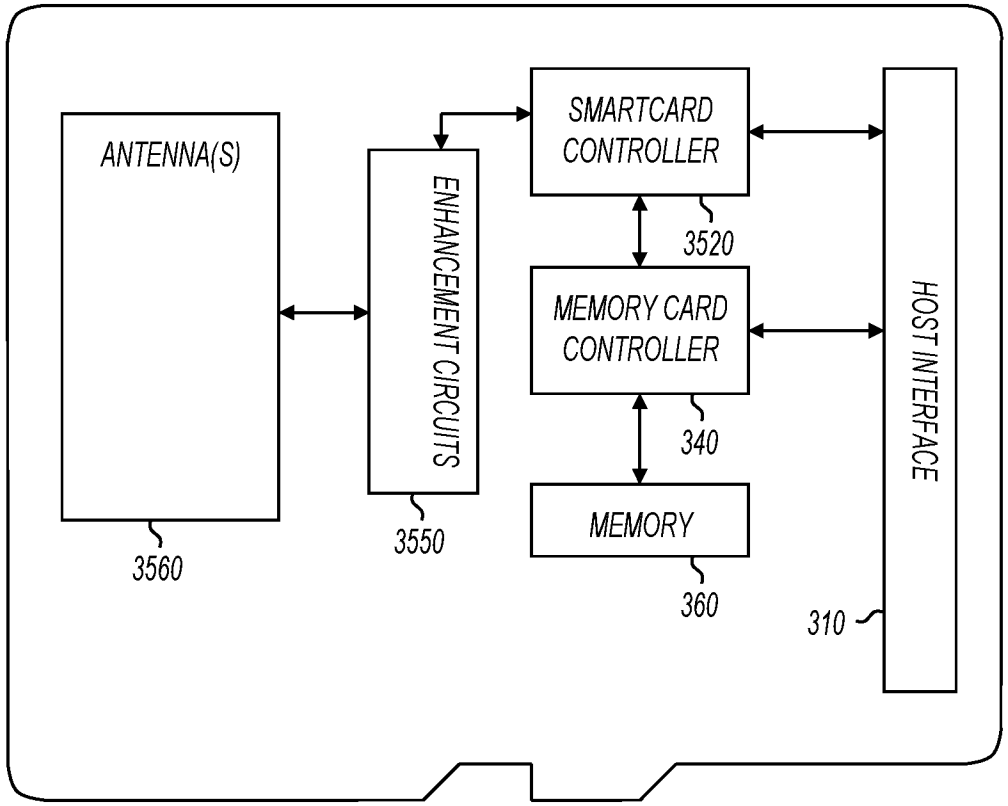

ANTENNA(S)
3560
ENHANCEMENT CIRCUITS
3550
SMARTCARD CONTROLLER
3520
MEMORY CARD CONTROLLER
340
MEMORY
360
HOST INTERFACE
310

FIG. 35

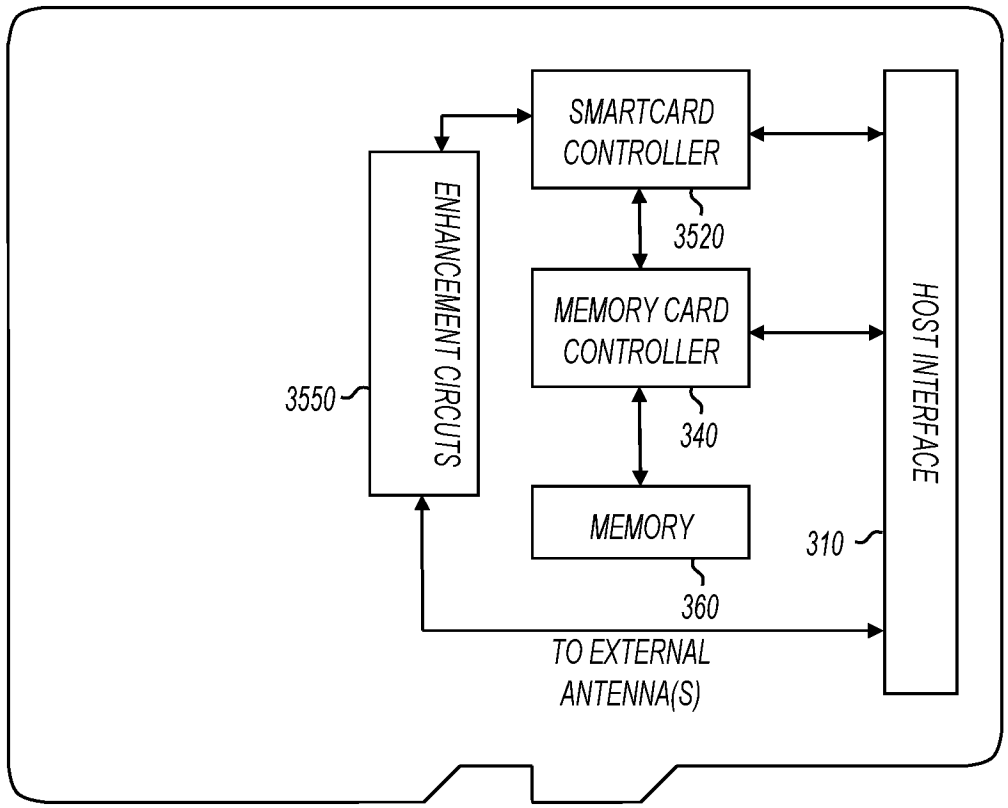

SMARTCARD CONTROLLER
3520
MEMORY CARD CONTROLLER
340
MEMORY
360
ENHANCEMENT CIRCUITS
3550
HOST INTERFACE
310
TO EXTERNAL ANTENNA(S)

FIG. 36

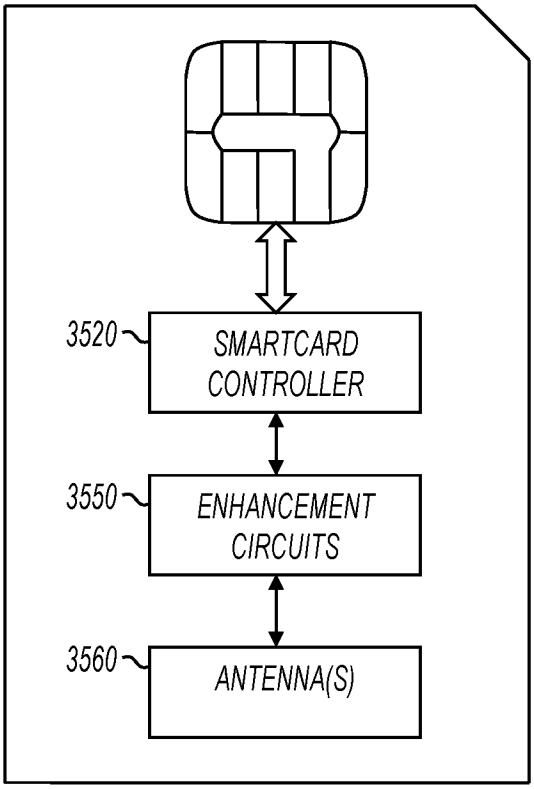

3520
SMARTCARD CONTROLLER
3550
ENHANCEMENT CIRCUITS
3560
ANTENNA(S)

FIG. 37

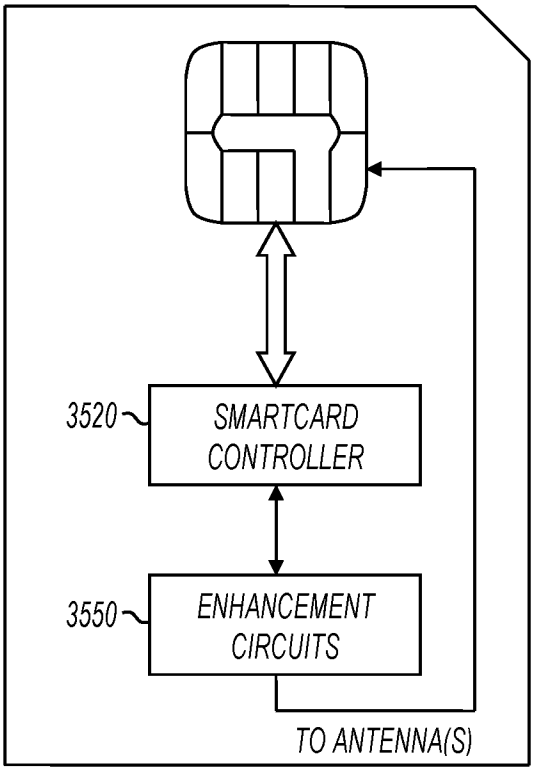

3520
SMARTCARD CONTROLLER
3550
ENHANCEMENT CIRCUITS
TO ANTENNA(S)

FIG. 38

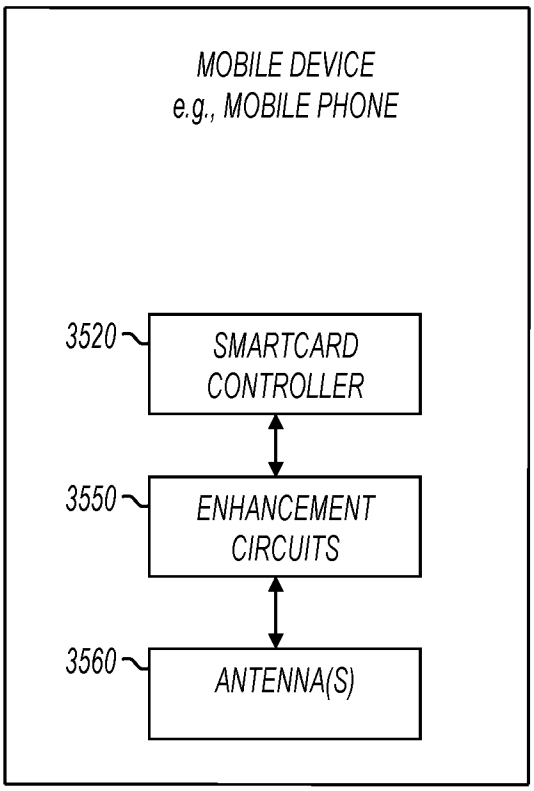

MOBILE DEVICE
e.g., MOBILE PHONE
3520
SMARTCARD CONTROLLER
3550
ENHANCEMENT CIRCUITS
3560
ANTENNA(S)

FIG. 39

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/179,237	02/18/2021	Siva G. Narendra	18.115.026US13

CONFIRMATION NO. 3258

175023
Green, Howard, & Mughal LLP
5 Centerpointe Dr. Suite 400
Lake Oswego, OR 97035

FORMALITIES LETTER

OC000000123699897

Date Mailed: 03/01/2021

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing.

Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- Additional claim fees of $ **430** as a small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are itemized below. Small entity discount is in effect. If applicant is qualified for micro entity status, an acceptable Certification of Micro Entity Status must be submitted to establish micro entity status. (See 37 CFR 1.29 and forms PTO/SB/15A and 15B.)

- $ **430** for multiple dependent claim surcharge.
- $(**0**) previous unapplied payment amount.
- $ **430** TOTAL FEE BALANCE DUE.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/lqchau/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/179,237	02/18/2021	2685	930	18.115.026US13	20	3

CONFIRMATION NO. 3258

FILING RECEIPT

175023
Green, Howard, & Mughal LLP
5 Centerpointe Dr. Suite 400
Lake Oswego, OR 97035

OC000000123899898

Date Mailed: 03/01/2021

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Siva G. Narendra, Portland, OR;
Saurav Chakraborty, West Bengal, INDIA;
Prabhakar Tadepalli, Bangalore, INDIA;

Applicant(s)

iCashe, Inc., Portland, OR;

Assignment For Published Patent Application

iCashe, Inc., Portland, OR

Power of Attorney: The patent practitioners associated with Customer Number 175023

Domestic Priority data as claimed by applicant

This application is a CON of 16/791,609 02/14/2020 PAT 10949726
which is a CON of 16/393,275 04/24/2019 PAT 10607129
which is a CON of 15/904,328 02/24/2018 PAT 10318855
which is a CON of 15/338,436 10/30/2016 PAT 9904887
which is a CON of 14/517,585 10/17/2014 PAT 9489608
which is a CON of 14/460,647 08/15/2014 PAT 8937549
which is a CON of 13/871,849 04/26/2013 PAT 8866614
which is a CON of 13/038,341 03/01/2011 PAT 8451122
which is a CON of 12/188,346 08/08/2008 PAT 7961101

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 02/26/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/179,237**

Projected Publication Date: 06/10/2021

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

Preliminary Class

340

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/179,237

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	80		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	350		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	22 minus 20 =	* 2	x 50 =	100	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 240 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				430			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	1360		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
17179237	

Applicant(s) Siva Narendra

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT	
	Indep	Depend	Indep	Depend	Indep	Depend
1	1					
2		1				
3		1				
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Total Indep	3		0		0	
Total Depend	19	↵	0	↵	0	↵
Total Claims	22		0		0	

	*		*		*	
	Indep	Depend	Indep	Depend	Indep	Depend
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: **Siva G. Narendra**	Examiner:
Application No.: 17/179,237	Art Group:
Filed: February 18, 2021	Confirmation No.: 3528
For: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	Docket No.: 18.115.026US13

Mail Stop **Missing Parts**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE MISSING PARTS

Dear Examiner:

This is in response to the Notice to File Missing Parts notified March 01, 2021. Applicants submits the claim fees of $430. No new matter has been added.

Applicants request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. § 1.16 and § 1.17, to Deposit Account No. 50-6613.

Respectfully submitted,
GREEN, HOWARD, & MUGHAL, LLP

03/03/21
Date

/Usman Mughal/
Usman A. Mughal
Reg. No. 62,887
Attorney for Applicants

5 Centerpointe Drive, Suite 400
Lake Oswego, OR 97035
(503) 968-8233
docketing@ghmip.com

Electronic Patent Application Fee Transmittal

Application Number:	17179237
Filing Date:	18-Feb-2021
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING
First Named Inventor/Applicant Name:	Siva G. Narendra
Filer:	Usman Mughal/Katherine Campbell
Attorney Docket Number:	18.115.026US13

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
MULTIPLE DEPENDENT CLAIMS	2203	1	430	430
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**430**

Electronic Acknowledgement Receipt

EFS ID:	42074307
Application Number:	17179237
International Application Number:	
Confirmation Number:	3258
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING
First Named Inventor/Applicant Name:	Siva G. Narendra
Customer Number:	175023
Filer:	Usman Mughal/Katherine Campbell
Filer Authorized By:	Usman Mughal
Attorney Docket Number:	18.115.026US13
Receipt Date:	03-MAR-2021
Filing Date:	18-FEB-2021
Time Stamp:	19:10:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$430
RAM confirmation Number	E202133J10370074
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	18_115026US13_RMP.pdf	19707 482b8d0c70389617 7f6fd755e25c67f3e8e658e2	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30750 994dc041f77f9094efbd1ef3c43f4745ad35e8fe	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	50457		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/179,237	02/18/2021	2684	1360	18.115.026US13	20	3

CONFIRMATION NO. 3258

UPDATED FILING RECEIPT

175023
Green, Howard, & Mughal LLP
5 Centerpointe Dr. Suite 400
Lake Oswego, OR 97035

OC000000123844502

Date Mailed: 03/05/2021

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Siva G. Narendra, Portland, OR;
Saurav Chakraborty, West Bengal, INDIA;
Prabhakar Tadepalli, Bangalore, INDIA;

Applicant(s)

iCashe, Inc., Portland, OR;

Assignment For Published Patent Application

iCashe, Inc., Portland, OR

Power of Attorney: The patent practitioners associated with Customer Number 175023

Domestic Priority data as claimed by applicant

This application is a CON of 16/791,609 02/14/2020 PAT 10949726
which is a CON of 16/393,275 04/24/2019 PAT 10607129
which is a CON of 15/904,328 02/24/2018 PAT 10318855
which is a CON of 15/338,436 10/30/2016 PAT 9904887
which is a CON of 14/517,585 10/17/2014 PAT 9489608
which is a CON of 14/460,647 08/15/2014 PAT 8937549
which is a CON of 13/871,849 04/26/2013 PAT 8866614
which is a CON of 13/038,341 03/01/2011 PAT 8451122
which is a CON of 12/188,346 08/08/2008 PAT 7961101

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 02/26/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/179,237**

Projected Publication Date: 06/10/2021

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

Preliminary Class

235

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Title 35, United States Code, Section 184

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 17/179,237

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	80		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	350		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	400		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	22 minus 20 =	* 2	x 50 =	100	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 240 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				430			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	1360		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/179,237	02/18/2021	Siva G. Narendra	18.115.026US13

CONFIRMATION NO. 3258

PUBLICATION NOTICE

175023
Green, Howard, & Mughal LLP
5 Centerpointe Dr. Suite 400
Lake Oswego, OR 97035

OC000000126220234

Title:METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

Publication No.US-2021-0174158-A1
Publication Date:06/10/2021

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

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Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

U.S. PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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	Attorney Docket Number	18.115.026US13

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	Attorney Docket Number	18.115.026US13

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U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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PTO/SB/08a (01-10)
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	Attorney Docket Number	18.115.026US13

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	Attorney Docket Number	18.115.026US13

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		International Search Report notified August 07, 2008 for PCT Patent Application No. PCT/US2008/057588 (Attorney Docket No. 115.019WO1)	
		International Search Report notified December 16, 2005 for PCT Patent Application No. PCT/US2005/019988 (Docket No. 115.004WO1).	
		International Search Report notified January 09, 2006 for PCT Patent Application No. PCT/US2006/013603, 3 pages (Docket No. 115.001US3).	
		International Search Report notified March 29, 2007 for PCT Patent Application No. PCT/US2006/027847 (Attorney Docket No. 115.012WO1).	
		International Search Report notified October 09, 2007 for PCT Patent Application No. PCT/US2006/013603 (Attorney Docket No. 115.002WO1).	
		International Search Report notified October 21, 2005 PCT Patent Application No. PCT/US2005/022993 (Attorney Docket No. 115.P003WO1).	
		International Search Report notified September 22, 2006 for PCT Patent Application No. PCT/US2006/006361 (Attorney Docket No. 115.001WO1).	

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		International Written Opinion notified August 7, 2008 for PCT Patent Application No. PCT/US2008/057588, 5 pages (Docket No. 115.001US4.2).	
		International Written Opinion notified October 9, 2007 for PCT Patent Application No. PCT/US2006/013603, 7 pages (Docket No. 115.001US2.2).	
		Non-Final Office Action notified April 19, 2018 for U.S. Patent Application No. 15/658,208 (Docket No. 115.001US9.8).	
		Non-Final Office Action notified April 3, 2013 for U.S. Patent Application No. 13/426,500 (Docket No. 115.001US6.3).	
		Non-Final Office Action notified August 03, 2011 for U.S. Patent Application No. 13/114,473 (Docket No. 115.001US6.1).	
		Non-Final Office Action notified December 20, 2012 for U.S. Patent Application No. 13/593,492 (Docket No. 115.001US9.1).	
		Non-Final Office Action notified February 1, 2013 for U.S. Patent Application No. 13/184,227 (Docket No. 115.001US7).	
		Non-Final Office Action notified February 3, 2011 for U.S. Patent Application No. 12/962,953 (Docket No. 115.001US6).	

PTO/SB/08a (01-10)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		Non-Final Office Action notified January 18, 2013 for U.S. Patent Application No. 13/651,365 (Docket No. 115.001US4.4).	
		Non-Final Office Action notified July 3, 2012 for U.S. Patent Application No. 13/184,227 (Docket No. 115.001US7).	
		Non-Final Office Action notified July 5, 2013 for U.S. Patent Application No. 13/592,323 (Docket No. 115.001US9).	
		Non-Final Office Action notified June 22, 2012 for U.S. Patent Application No. 13/184,204 (Docket No. 115.001US5).	
		Non-Final Office Action notified March 15, 2013 for U.S. Patent Application No. 13/304,662 (Docket No. 115.001US6.2).	
		Non-Final Office Action notified May 22, 2015 for U.S. Patent Application No. 14/680,684 (Docket No. 115.001US9.2).	
		Non-Final Office Action notified November 25, 2011 for U.S. Patent Application No. 13/184,240 (Docket No. 115.001US8).	
		Non-Final Office Action notified November 29, 2019 for U.S. Patent Application No. 16/218,733 (Docket No. 115.001US9.9).	

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		Non-Final Office Action notified November 5, 2015 for U.S. Patent Application No. 14/866,998 (Docket No. 115.001US9.5).	
		Non-Final Office Action notified November 9, 2012 for U.S. Patent Application No. 13/552,633 (Docket No. 115.001US6.4).	
		Non-Final Office Action notified September 16, 2016 for U.S. Patent Application No. 14/929,297 (Docket No. 115.001US9.6).	
		Non-Final Office Action notified September 20, 2016 for U.S. Patent Application No. 14/948,325 (Docket No. 115.001US9.7).	
		Non-Final Office Action notified September 21, 2012 for U.S. Patent Application No. 13/311,247 (Attorney Docket No. 115.22US3).	
		Non-Final Office Action notified September 24, 2015 for U.S. Patent Application No. 14/833,113 (Docket No. 115.001US9.4).	
		Non-Final Office Action notified September 25, 2015 for U.S. Patent Application No. 14/747,770 (Docket No. 115.001US9.3).	
		Non-Final Office Action notified September 29, 2020 for U.S. Patent Application No. 16/791,609 (Attorney Docket No. 17.115.026US12).	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		Non-Final Office Action notified September 30 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.P022US1).	
		Non-Final Office Action notified September 30, 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.022US1).	
		Notice of Allowance notified April 18, 2011 for U.S. Patent Application No. 12/962,953 (Docket No. 115.001US6).	
		Notice of Allowance notified April 25, 2011 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.P022US1).	
		Notice of Allowance notified April 25, 2011 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.P022US1).	
		Notice of Allowance notified December 21, 2015 for U.S. Patent Application No. 14/866,998 (Docket No. 115.001US9.5).	
		Notice of Allowance notified February 14, 2013 for U.S. Patent Application No. 13/311,247 (Attorney Docket No. 115.22US3).	
		Notice of Allowance notified February 18, 2015 for U.S. Patent Application No. 13/592,323 (Docket No. 115.001US9).	

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	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		Notice of Allowance notified January 10, 2012 for U.S. Patent Application No. 13/184,240 (Docket No. 115.001US8).	
		Notice of Allowance notified June 18, 2020 for U.S. Patent Application No. 16/218,733 (Docket No. 115.001US9.9).	
		Notice of Allowance notified June 19, 2015 for U.S. Patent Application No. 14/680,684 (Docket No. 115.001US9.2).	
		Notice of Allowance notified March 24, 2017 for U.S. Patent Application No. 14/948,325 (Docket No. 115.001US9.7).	
		Notice of Allowance notified March 3, 2017 for U.S. Patent Application No. 14/929,297 (Docket No. 115.001US9.6).	
		Notice of Allowance notified May 13, 2013 for U.S. Patent Application No. 13/426,500 (Docket No. 115.001US6.3).	
		Notice of Allowance notified November 16, 2011 for U.S. Patent Application No. 13/114,473 (Docket No. 115.001US6.1).	
		Notice of Allowance notified October 26, 2015 for U.S. Patent Application No. 14/747,770 (Docket No. 115.001US9.3).	

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	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		Notice of Allowance notified October 28, 2011 for U.S. Patent Application No. 13/081,775 (Attorney Docket No. 115.022US2).	
		Notice of Allowance notified October 28, 2015 for U.S. Patent Application No. 14/833,113 (Docket No. 115.001US9.4).	
		Notice of Allowance notified September 19, 2018 for U.S. Patent Application No. 15/658,208 (Docket No. 115.001US9.8).	
		Official Letter from Taiwan Patent Office notified January 26, 2010 for Patent Application No. 95105997 (Docket No. 115.001TW1).	
		Restriction Requirement notified August 16, 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.022US1).	
		Restriction Requirement notified August 16, 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.P022US1).	
		International Search Report & Written Opinion notified January 11, 2006 for PCT Patent Application No. PCT/US2005/019988, 8 pages (Docket No. 115.001US3).	
		LEE, Y., "Anntenna Circuit Design For RFID Applications", Microchip, AN710, 2003, Microchip Technology Inc., 50 pages.	

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	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		LEE, Y., "Antenna Circuit Design for RFID Applications", Microchip, AN710, 2003 Microchip Technology, Inc., 50 pages (2003).	

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document.
[4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

PTO/SB/08a (01-10)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Usman Mughal/	Date (YYYY-MM-DD)	2021-07-28
Name/Print	Usman A. Mughal	Registration Number	62887

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: **Siva G. Narendra**	Examiner:
Application No.: 17/179,237	Art Group: 2684
Filed: February 18, 2021	Confirmation No.: 3258
For: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING	Docket No.: 18.115.026US13

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Applicants respectfully request that this Information Disclosure Statement be entered and the documents listed on the attached form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicants request that a copy of the form, initialed as being considered by the Examiner, be returned to the Applicants with the next official communication.

Pursuant to 37 CFR § 1.97(b), it is believed that no fee or statement is required with the Information Disclosure Statement.

Pursuant to 37 CFR § 1.98(d), copies of the listed documents are not provided as these references were previously cited by or submitted to the U.S. Patent Office in connection with Applicants' prior U.S. Application Numbers: 16/791,609, filed February 14, 2020, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 16/393,275, filed April 24, 2019, now issued on March 31, 2020 as U.S. Patent No. 10,607,129, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/904,328,

filed on February 24, 2018, now issued on June 11, 2019 as U.S. Patent No. 10,318,855, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/338,436, filed October 30, 2016, now issued on February 27, 2019, as U.S. Patent No. 9,904,887, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 14/517,585, filed October 17, 2014, now issued on November 08, 2016, as U.S. Patent No. 9,489,608, which is a continuation of, and claims priority to U.S. Patent Application No. 14/460,647, filed August 15, 2014, now issued on January 20, 2015, as U.S. Patent No. 8,937,549, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 13/871,849, on April 26, 2013, now issued on October 21, 2014, as U.S. Patent No. 8,866,614, which is a continuation of, and claims the benefit of priority to, U.S. Patent Application No. 13/038,341, filed March 01, 2011, now issued on May 28, 2013, as U.S. Patent No. 8,451,122, which is a continuation-in-part of, and claims the benefit of priority to U.S. Patent Application No. 12/188,346, filed August 08, 2008, now issued on June 14, 2011, as U.S. Patent No. 7,961,101 and which are relied upon for an earlier filing date under 35 U.S.C. § 120.

The Examiner is invited to contact the Applicants' Representative at the below-listed telephone number if there are any questions regarding this communication.

Respectfully submitted,
MUGHAL IP P.C

07/28/21
Date

/Usman Mughal/
Usman Mughal
Reg. No. 62887
Attorney for Applicants

1500 NW Bethany Blvd. Suite 200
Beaverton, OR 97006
docketing@impactpatents.com

Electronic Acknowledgement Receipt

EFS ID:	43367763
Application Number:	17179237
International Application Number:	
Confirmation Number:	3258
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING
First Named Inventor/Applicant Name:	Siva G. Narendra
Customer Number:	175023
Filer:	Usman Mughal/Katherine Campbell
Filer Authorized By:	Usman Mughal
Attorney Docket Number:	18.115.026US13
Receipt Date:	28-JUL-2021
Filing Date:	18-FEB-2021
Time Stamp:	19:44:38
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	18-115-026US13_IDS.pdf	254099 a62752d2b45038dfc29408656b2b40c96c8bd555	no	36

Warnings:

Information:					
This is not an USPTO supplied IDS fillable form					
2	Transmittal Letter	18-115-026US13_IDS_Transmittal.pdf	22183 a6cfe220af3924d4c2158a888191bf95630c7724	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	276282	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: **Siva G. Narendra**	Examiner:
Application No.: 17/179,237	Art Group: OPAP
Filed: February 18, 2021	Confirmation No.: 3258
For: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING	Docket No.: 18.115.026US13

Mail Stop **Missing Parts**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Dear Examiner:

Applicant requests a correction to the title: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS ~~INLCUDING~~ INCLUDING MOBILE PAYMENTS AND TICKETING. A corrected ADS is submitted with this request. No new information is added.

Applicants request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. § 1.16 and § 1.17, to Deposit Account No. 60-4139.

Respectfully submitted,
MUGHAL IP PC

October 06, 2021	/Usman Mughal/
Date	Usman Mughal Reg. No. 62,887 Attorney for Applicants 1500 NW Bethany Blvd. Suite 200 Beaverton, OR 97006 971-634-0286 docketing@impactpatents.com

Electronic Acknowledgement Receipt

EFS ID:	43968165
Application Number:	17179237
International Application Number:	
Confirmation Number:	3258
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING
First Named Inventor/Applicant Name:	Siva G. Narendra
Customer Number:	175023
Filer:	Usman Mughal/Katherine Campbell
Filer Authorized By:	Usman Mughal
Attorney Docket Number:	18.115.026US13
Receipt Date:	06-OCT-2021
Filing Date:	18-FEB-2021
Time Stamp:	20:54:02
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	115_026US13_CADS.pdf	780820 412e21b2248d501e1ccfd780c55aaba39f9e222e	no	10

Warnings:

Information:					
This is not an USPTO supplied ADS fillable form					
2	Preliminary Amendment	18_115026US13_Prelim_Amend.pdf	64352 028b728d241e3d3674fbf6e5ded7f0ab2bec4ee6	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	845172	

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New Applications Under 35 U.S.C. 111

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PTO/AIA/14 (02-18)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	17/179,237
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS ~~INCLUDING~~ INCLUDING MOBILE PAYMENTS AND TICKETING	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Siva	G.	Narendra	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Portland	State/Province	OR	Country of Residence	US

Mailing Address of Inventor:

Address 1	7180 SW 84th Ave.		
Address 2			
City	Portland	State/Province	OR
Postal Code	97223	Country	US

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Saurav		Chakraborty	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	West Bengal	Country of Residence	IN

Mailing Address of Inventor:

Address 1	Sristi Apartment (Block-B), Flat No. D-119		
Address 2	89 G.T. Road (W), Mallickpara, Srirampure, Hooghly		
City	West Bengal	State/Province	We
Postal Code	712203	Country	IN

Inventor 3 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Prabhakar		Tadepalli	

PTO/AIA/14 (02-18)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	17/179,237
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS ~~INLCUDING~~ INCLUDING MOBILE PAYMENTS AND TICKETING	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Bangalore	Country of Residence [i]	IN

Mailing Address of Inventor:

Address 1	E24 Chaithanya Smaran		
Address 2	Whitefield Hoskote Road		
City	Bangalore	State/Province	Ka
Postal Code	5600067	Country [i]	IN

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	175023		
Email Address	docketing@ghmip.com	Add Email	Remove Email

Application Information:

Title of the Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS ~~INLCUDING~~ INCLUDING MOBILE PAYMENTS AND TICKETING		
Attorney Docket Number	18.115.026US13	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	30	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
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Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	175023		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16791609	2020-02-14

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16791609	Continuation of	16393275	2019-04-24	10607129	2020-03-31

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16393275	Continuation of	15904328	2018-02-24	10318855	2019-06-11

Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15904328	Continuation of	15338436	2016-10-30	9904887	2018-02-27

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	17/179,237
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Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15338436	Continuation of	14517585	2014-10-17	9489608	2016-11-08
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14517585	Continuation of	14460647	2014-08-15	8937549	2015-01-20
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14460647	Continuation of	13871849	2013-04-26	8866614	2014-10-21
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13871849	Continuation of	13038341	2011-03-01	8451122	2016-05-28
Prior Application Status	Patented				Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13038341	Continuation of	12188346	2008-08-08	7961101	2011-06-14

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
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Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
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Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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	Application Number	17/179,237
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS ~~INLCUDING~~ INCLUDING MOBILE PAYMENTS AND TICKETING	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:	

If the Applicant is an Organization check here. ☒

Organization Name	iCashe, Inc.

Mailing Address Information For Applicant:

Address 1	5331 SW Macadam Avenue		
Address 2	Suite 251		
City	Portland	**State/Province**	OR
Country	US	Postal Code	97239
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	17/179,237
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Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	iCashe, Inc.

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	5331 SW Macadam Avenue		
Address 2	Suite 251		
City	Portland	**State/Province**	OR
Country i	US	Postal Code	97239
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Usman Mughal/			Date (YYYY-MM-DD)	2021-10-06
First Name	Usman	Last Name	Mughal	Registration Number	62887

Additional Signature may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	18.115.026US13
	Application Number	17/179,237
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS ~~INCLUDING~~ INCLUDING MOBILE PAYMENTS AND TICKETING	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/179,237	02/18/2021	Siva G. Narendra	18.P115.026US13	3258

175023 7590 09/15/2022

Mughal IP P.C.
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

EXAMINER	
PHAM, TOAN NGOC	

ART UNIT	PAPER NUMBER
2684	

NOTIFICATION DATE	DELIVERY MODE
09/15/2022	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@impactpatents.com
eofficeaction@appcoll.com

Office Action Summary	Application No. 17/179,237	Applicant(s) Narendra et al.	
	Examiner TOAN N PHAM	Art Unit 2684	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 2/18/21.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-20 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☑ Claim(s) 10-16 is/are allowed.

7) ☑ Claim(s) 1-9 and 17-20 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 2/18/21 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file

provisions of the AIA as explained in MPEP § 2159. See MPEP § 2146 *et seq.* for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1-9 and 17-20 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-14 of U.S. Patent No. 9,489,608. Although the claims at issue are not identical, they are not patentably distinct from each other because they all contained the same subject matter including “a power source; a smartcard controller coupled to the power source to receive power; an antenna tuned to operate at substantially 13.56 MHz; and an active transmit driver circuit effects the transmission of data between the antenna and the NFC reader”.

Allowable Subject Matter

Claims 10-16 are allowed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

-Itay et al. (US 2016/0234359) discloses a contactless communication device with external reader.

-Finn (US 2009/0166421) discloses an RFID reader/card combination with contactless smartcard reader.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TOAN NGOC PHAM whose telephone number is (571)272-2967. The examiner can normally be reached M - F (7 AM - 3:30 PM).

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quan-Zhen Wang can be reached on (571) 272-3114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and

https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TOAN N PHAM/
Primary Examiner, Art Unit 2684
9/9/22

Notice of References Cited	Application/Control No. 17/179,237	Applicant(s)/Patent Under Reexamination Narendra et al.	
	Examiner TOAN N PHAM	Art Unit 2684	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20160234359-A1	08-2016	ITAY; Nehemya	H04M1/026	1/1
*	B	US-20090166421-A1	07-2009	Finn; David	G06K7/0008	235/439
	C					
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/179,237	Narendra et al.
	Examiner	Art Unit
	TOAN N PHAM	2684

CPC - Searched*		
Symbol	Date	Examiner
G06K19/0723; GO6K19/0727P; G06K19/07732; GO6K19/07749	08/03/2022	TNP

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
SEARCH	,8/3/22; 9/9/22	TNP

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
SAME AS ABOVE	SAME AS ABOVE	09/09/2022	TNP

/TOAN N PHAM/ Primary Examiner, Art Unit 2684	

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/179,237	Narendra et al.
	Examiner	**Art Unit**
	TOAN N PHAM	2684

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/09/2022								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
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	20	✓								

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
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L3	2400	mobile with payment with device	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2010/08/13 04:19 PM
L4	309	L3 and (memory adj2 card)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2010/08/13 04:19 PM
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L7	133	L6 and secure and digital	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2010/08/13 04:20 PM
L8	25	L7 and antenna and coil	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2010/08/13 04:21 PM
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L16	22	((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and impedance	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2010/09/24 01:30 PM
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L20	5	235/493.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2010/09/24 02:03 PM

		coil					
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L53	5	L52 and (first adj2 antenna)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/14 04:06 PM
L54	5	smartcard with contactless with interface and (first adj2 antenna)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/14 04:08 PM
L55	11	smartcard with interface and (first adj2 antenna)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/14 04:10 PM
L56	21	smartcard with contactless and (first adj2 antenna)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/14 04:54 PM
L57	166	("20030025939"|"20030079096"|"20030085288"|"20030128124"|"20040006654"|"20040027881"|"20040065733"|"20040162932"|"20040177045"|"20040227859"|"20040243785"|"20050052924"|"20050204077"|"20050204092"|"20050223143"|"20050246546"|"20050253687"|"20050268330"|"20060045555"|"20060077039"|"20060097851"|"20060172606"|"20060219776"|"20060268764"|"20060279413"|"20070033334"|"20070108280"|"20070110404"|"20070195458"|"20070205864"|"20080046649"|"20080065830"|"20080068173"|"20080073436"|"20080136619"|"20080147950"|"20080148077"|"20080153416"|"20080186174"|"20080311849"|"20080318535	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/14 08:15 PM

		"|"20090150610"|"20090270127"|"20090290582"|"20090315667"|"20100049878"|"20110110404"|"20110180610"|"20110220726"|"20110223972"|"4864109"|"5212478"|"5378887"|"5537584"|"5629981"|"6747547"|"6937526"|"6952788"|"6995651"|"7088246"|"7185146"|"7221473"|"7281101"|"7295790"|"7350717"|"7353993"|"7410102"|"7493484"|"7558107"|"7558110"|"7607580"|"7673080"|"7716082"|"7789303"|"7792516"|"7933571"|"7941197"|"7948356"|"7954715"|"7954716"|"7954717"|"7961101"|"7991158"|"RE41352"|"RE41471"|"RE42254").PN.				
L58	24	L57 and antenna and receive and transmit and data	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/14 08:15 PM
L59	153	("20010002035" | "20010006902" | "20010013551" | "20020007434" | "20020043566" | "20020044043" | "20020095588" | "20020096570" | "20020099665" | "20020130187" | "20020138422" | "20020138735" | "20020139849" | "20020148892" | "20020153424" | "20020158747" | "20020178124" | "20020180584" | "20020186845" | "20030028481" | "20030052168" | "20030057278" | "20030061168" | "20030080183" | "20030115126" | "20030159050" | "20030200180" | "20030220876" | "20030231550" | "20040030660" |	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2013/01/14 08:18 PM

		"20040035942" | "20040050930" | "20040058705" | "20040064612" | "20040077372" | "20040087339" | "20040094624" | "20040133787" | "20040188519" | "20040199469" | "20040243806" | "20040251303" | "20040255145" | "20050006462" | "20050017068" | "20050022002" | "20050029349" | "20050038736" | "20050039027" | "20050044044" | "20050050367" | "20050060586" | "20050071282" | "20050077349" | "20050092830" | "20050108096" | "20050109838" | "20050116026" | "20050121512" | "20050122209" | "20050127164" | "20050127166" | "20050133606" | "20050136964" | "20050168339" | "20050177724" | "20050197859" | "20050212657" | "20050224589" | "20050240778" | "20050258245" | "20050268058" | "20060011731" | "20060027655" | "20060124755" | "20060169778" | "20060186209" | "20060226217" | "20070076877" | "20070145135" | "20070145152" | "20070257797" | "20080244208" | "20080279381" | "20090065571" | "20090065572" | "20090069049" | "20090069050" |				

		"20090069051" | "20090069052" | "20090070272" | "20090070691" | "20090070861").PN. OR ("20090108063" | "20090152361" | "20090199283" | "20090298540" | "20100033307" | "20100033310" | "20100213265" | "4701601" | "4786791" | "4791283" | "5574273" | "5585787" | "5700037" | "5710421" | "5834756" | "5909491" | "5952641" | "5955961" | "6016476" | "6039260" | "6068184" | "6182891" | "6189786" | "6206293" | "6219439" | "6223954" | "6223984" | "6250557" | "6315195" | "6402029" | "6481623" | "6568600" | "6592044" | "6594759" | "6598031" | "6607127" | "6609654" | "6631849" | "6636833" | "6669487" | "6705520" | "6712277" | "6715679" | "6721196" | "6764005" | "6769607" | "6805288" | "6811082" | "6836843" | "6857566" | "6882900" | "6883718" | "6905072" | "6907123" | "6908030" | "6925568" | "7059520" | "7333062" | "7581678" | "7828214").PN.					
L60	41	L59 and contactless	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/14 08:27 PM
L61	33	L57 and contactless	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/14 08:46 PM
L62	83	smartcard with contactless with antenna	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 07:58 AM
L63	2	smartcard with amplifier with antenna	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 02:54 PM
L64	0	("6606025").URPN.	(USPAT)	OR	OFF	OFF	2013/01/15 02:56 PM
L65	8	("3816708" | "4333072" | "4654658" | "4673932" | "4685099" | "4893118"	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2013/01/15 03:43 PM

		| "5434396" | "5467082").PN.					
L66	0	340/572.1.ccls. and controller with contractless with interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:09 PM
L67	0	340/572.1.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:09 PM
L68	0	340/572.8.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:09 PM
L69	0	340/10.1.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:10 PM
L70	0	340/10.51.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:10 PM
L71	0	235/492.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:10 PM
L72	0	235/379.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:10 PM
L73	1	235/380.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:10 PM
L74	0	235/493.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:10 PM
L75	0	705/1.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:11 PM
L76	0	710/100.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:11 PM
L77	0	710/301.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:11 PM
L78	0	455/558.ccls. and controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:11 PM

L79	3	controller and contractless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:11 PM
L80	5546	controller and contactless and interface	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:12 PM
L81	351	L80 and smartcard and antenna	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:12 PM
L82	15	L81 and amplifier and modulation	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 04:13 PM
L83	0	smartcard with pad with transmitter	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 06:29 PM
L84	1	smartcard with pad with transmit$3	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 06:29 PM
L85	1	smartcard with (dual adj2 interface) with transmit$3	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/01/15 06:33 PM
L86	4	("7961101" "8072331").pn.	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2013/02/04 04:12 PM
L87	2	"7961101".pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/22 07:35 PM
L88	8	((smart memory) adj2 card) with controller with amplifier with antenna	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 02:43 PM
L89	1	L88 and inductively and coupled	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 02:43 PM
L90	98	((smart memory) adj2 card) with controller with amplifier	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 03:11 PM
L91	1	L90 and inductively and coupled	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 03:11 PM
L92	1	L90 and contactless and interface	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 03:14 PM
L93	1	L90 and antenna and simplex and communication	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 03:15 PM
L94	0	L90 and microsd and card	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 03:15 PM
L95	11	L90 and sd and card	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 03:15 PM

L96	78	("8451122" "20110171996" "20130233931" "6121544" "20080190526" "7587756" "20050033688" "8156272" "8386681" "20120226840" "7961101" "8072331" "7961101" "8072331" "8410936" "20100033307" "20100033310" "20110180610" "20120305653" "20130043317" "7663567" "7857202" "7936274" "8011577" "7936274" "8011577" "8283975" "8441342" "8459548" "8570155" "8668143" "8740650" "20060113381" "20070131759" "20080126260" "20080217413" "20080316135" "20090159689" "20090159690" "20090159698" "20090166421" "20090179743" "20090230197" "20110102078" "20110210825" "20110276436" "20110276437" "20120037706" "20130086389" "20130240632").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 03:19 PM
L97	5	L96 and amplifier and antenna	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/07/23 03:21 PM
L98	4	("8451122" "7961101").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/09/19 03:02 PM
L99	6	("8866614" "7961101" "8451122" "7961101").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/12 07:06 PM
L100	6	mobile with (smartcard adj2 controller) with antenna	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/13 10:40 AM
L101	5	L100 and amplifier	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/13 10:40 AM

L102	1	mobile with smartcard with antenna with amplifier	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/13 10:41 AM
L103	23	mobile with smartcard with antenna	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/13 10:41 AM
L104	7	L103 and amplifier	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/13 10:41 AM
L105	5	L104 and modulation	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/13 10:41 AM
L106	21	(smartcard same controller) and antenna and amplifier and modulation and (mobile phone)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/13 10:59 AM
L107	132	(smartcard same controller) and antenna and mhz	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/13 12:56 PM
L108	58	(smartcard same controller) and antenna and ("13.56" adj2 mhz)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/13 12:56 PM
L109	160	("20010002035"|"20010006902"|"20010013551"|"20020007434"|"20020043566"|"20020044043"|"20020095588"|"20020096570"|"20020099665"|"20020130187"|"20020138422"|"20020138735"|"20020139849"|"20020148892"|"20020153424"|"20020158747"|"20020178124"|"20020180584"|"20020186845"|"20030025939"|"20030028481"|"20030052168"|"20030057278"|"20030061168"|"20030079096"|"20030080183"|"20030085288"|"20030115126"|"20030128124"|"20030159050"|"20030200180"|"20030220876"|"20030231550"|"20040006654"|"20040027881"|"20040030660"|"20040035942"|"20040050930"|"20040058705"|"20040064612"|"20040065733"|"20040077372"|"20040087339"|"20040094624"|"20040133787"|"20040162932"|"20040177045"|"20040188519"|"20	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/14 05:40 PM

		040199469"|"20040227859"|"20040243785"|"20040243806"|"20040251303"|"20040255145"|"20050006462"|"20050017068"|"20050022002"|"20050029349"|"20050038736"|"20050039027"|"20050044044"|"20050050367"|"20050052924"|"20050060586"|"20050071282"|"20050077349"|"20050092830"|"20050108096"|"20050109838"|"20050116026"|"20050121512"|"20050122209"|"20050127164"|"20050127166"|"20050133606"|"20050136964"|"20050168339"|"20050177724"|"20050197859"|"20050204077"|"20050204092"|"20050212657").pn.					
L110	372	("20050223143"|"20050224589"|"20050240778"|"20050246546"|"20050253687"|"20050258245"|"20050268058"|"20050268330"|"20060011731"|"20060027655"|"20060045555"|"20060077039"|"20060097851"|"20060124755"|"20060169778"|"20060172606"|"20060186209"|"20060219776"|"20060226217"|"20060268764"|"20060279413"|"20070033334"|"20070076877"|"20070108280"|"20070110404"|"20070145135"|"20070145152"|"20070195458"|"20070205864"|"20070257797"|"20070293202"|"20080046649"|"20080065830"|"20080068173"|"20080073436"|"20080136619"|"20080147950"|"20080148077"|"20080153416"|"20080186174"|"20080214111"|"20080244208"|"20080279381"|"20080311849"|"20080318535"|"20090065571"|"20090065572"|"20090069049"|"20090069050"|"20090069	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/14 05:40 PM

		051"|"20090069052"|"2 0090070272"|"2009007 0691"|"20090070861"|" 20090108063"|"200901 50610"|"20090152361"| "20090199283"|"20090 250521"|"20090265552 "|"20090270127"|"2009 0290582"|"2009029854 0"|"20090315667"|"910 8063"|"20100033307"|" 20100033310"|"201000 49878"|"20100069118"| "20100115164"|"20100 213265"|"0044444"|"20 110053644"|"20110065 386"|"20110073663"|"2 0110073665"|"2011007 7052"|"20110110404"|" 20110171996"|"201101 80610"|"20110220726"| "20110223972"|"20110 269438"|"20110271044 "|"20110272468"|"2011 0272469"|"2013023393 1"|"4701601"|"4786791" |"4791283"|"4864109"|" 5212478"|"5378887"|"5 537584"|"5574273"|"55 85787"|"5629981"|"570 0037"|"5710421"|"5834 756"|"5909491"|"59405 10"|"5949880"|"595264 1"|"5955961"|"6016476" |"6021944"|"6039260"|" 6045043"|"6068184"|"6 105013"|"6182891"|"61 89786"|"6206293"|"621 9439"|"6223954"|"6223 984"|"6237095"|"62505 57"|"6315195"|"640202 9"|"6481623"|"6568600" |"6588660"|"6592044"|" 6594759"|"6598031"|"6 606025"|"6607127"|"66 09654"|"6631849"|"663 6833"|"6669487"|"6705 520"|"6712277"|"67156 79"|"6721196"|"674754 7"|"6764005"|"6769607" |"6805288"|"6811082"|" 6836843"|"6857566"|"6 882900"|"6883718"|"69 05072"|"6907123"|"690 8030"|"6925568"|"6937 526"|"6952788"|"69956 51"|"7059520"|"708824 6"|"7185146"|"7221473"					

		|"7281101"|"7295790"|"7333062"|"7350717"|"7353993"|"7410102"|"7493484"|"7558107"|"7558110"|"7581678"|"7607580"|"7673080"|"7716082"|"7789303"|"7792516"|"7828214"|"7933571"|"7941197"|"7948356"|"7954715"|"7954716"|"7954717"|"7961101"|"7991158"|"8072331"|"8083145"|"8091786"|"8451122"|"RE41352"|"RE41471"|"RE42254").PN.					
L111	0	L109 and smartcard and controller and (amplifier same modulation same circuit)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/14 05:41 PM
L112	4	L110 and smartcard and controller and (amplifier same modulation same circuit)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/14 05:41 PM
L113	4	("8866614" "8451122").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2014/11/14 05:50 PM
L114	9	("8937549" "8866614" "7961101" "8451122").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/04/01 07:42 AM
L115	1	"14517495"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/10 03:54 PM
L116	31	G06K19/0723.CPC. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/10 03:57 PM
L117	16	G06K19/0723.CPC. and ((memory sd) adj2 card) and contactless and communication and amplifier and antenna and load and modulation	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/10 03:58 PM
L118	13	G06K19/0727.CPC. and ((memory sd) adj2 card) and contactless and communication and amplifier and antenna and load and modulation	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/10 04:06 PM
L119	16	G06K19/07732.CPC.	(US-PGPUB; USPAT;	OR	OFF	OFF	2015/07/10

		and ((memory sd) adj2 card) and contactless and communication and amplifier and antenna and load and modulation	EPO; JPO; DERWENT)				04:06 PM
L120	14	G06K19/07749.CPC. and ((memory sd) adj2 card) and contactless and communication and amplifier and antenna and load and modulation	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/10 04:07 PM
L121	93	((memory sd) adj2 card) and contactless and communication and amplifier and antenna and load and modulation	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/10 04:07 PM
L122	6	("8866614" "7961101" "8451122" "7961101").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/10 06:41 PM
L123	5	("5943624"|"7110792"). PN.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/10 06:46 PM
L124	6	("8866614" "7961101" "8451122" "7961101").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/11 10:26 AM
L125	0	(mobile adj2 device) with smartcard with amplifier with signal with antenna	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/11 10:32 AM
L126	569	(mobile adj2 device) with smartcard	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/11 10:32 AM
L127	13	L126 and amplifier and signal and antenna	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/07/11 10:33 AM
L128	1638	((mobile cell smart) adj2 (phone device)) and (smartcard flashcard memorycard) and control$4 and antenna	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/19 03:37 PM
L129	169	L128 and coil and amplifier	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/19 03:38 PM
L130	3218	((mobile cell smart) adj2 (phone device)) and (smartcard flashcard memorycard) and reader	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/19 04:46 PM
L131	218	L130 and antenna and amplifier	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/19 04:47 PM

L132	144	L131 and tuned	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/19 04:47 PM
L133	3178	(mobile near3 device) with $card with reader	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/19 05:08 PM
L134	31	L133 and antenna and tuned and amplifier and circuit	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/19 05:08 PM
L135	15	"8260199"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/19 07:24 PM
L136	7	("20060074813" | "20060280149" | "20070115125" | "20080181252" | "6873259" | "7699231" | "7796949").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2015/11/19 07:54 PM
L137	3178	(mobile near3 device) with $card with reader	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/20 08:02 AM
L138	31	L137 and antenna and tuned and amplifier and circuit	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/20 08:03 AM
L139	4	L138 and inductive and (small little) and power	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/20 08:03 AM
L140	15	("8866614" "7961101" "8451122" "7961101" "8937549" "9117152" "9122965").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/25 10:01 AM
L141	2	("8260199").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/25 01:34 PM
L142	1	L141 and modulation	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2015/11/25 01:34 PM
L143	7	("20060074813" | "20060280149" | "20070115125" | "20080181252" | "6873259" | "7699231" | "7796949").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2015/11/25 03:39 PM
L144	7	("20060074813" | "20060280149" | "20070115125" | "20080181252" | "6873259" | "7699231" | "7796949").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2015/11/25 03:39 PM
L145	7	("20060074813" | "20060280149" | "20070115125" | "20080181252" | "6873259" | "7699231" |	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2015/11/25 03:41 PM

		"7796949").PN.					
L146	7	("20060074813" | "20060280149" | "20070115125" | "20080181252" | "6873259" | "7699231" | "7796949").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2015/11/25 03:41 PM
L147	6	("9117152" "9122965").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/01/09 01:32 PM
L148	117	("4701601" "4786791" "4791283" "4864109" "5212478" "5378887" "5537584" "5574273" "5585787" "5629981" "5700037" "5710421" "5834756" "5909491" "5940510" "5949880" "5952641" "5955961" "6016476" "6021944" "6039260" "6045043" "6068184" "6105013" "6182891" "6189786" "6206293" "6219439" "6223954" "6223984" "6237095" "6250557" "6315195" "6402029" "6481623" "6568600" "6588660" "6592044" "6594759" "6598031" "6606025" "6607127" "6609654" "6631849" "6636833" "6669487" "6705520" "6712277" "6715679" "6721196" "6747547" "6764005").PN.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/01/09 02:00 PM
L149	1	L148 AND (mobile near3 device) with $card with reader	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/01/09 02:01 PM
L150	113	("6769607" "6805288" "6811082" "6836843" "6857566" "6882900" "6883718" "6905072" "6907123" "6908030" "6925568" "6937526" "6952788" "6995651" "7059520" "7088246" "7185146" "7221473" "7281101" "7295790" "7333062" "7350717" "7353993" "7410102" "7493484" "7558107" "7558110" "7581678" "7607580" "7673080" "7716082" "7789303"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/01/09 02:03 PM

		"7792516" "7828214" "7933571" "7941197" "7948356" "7954715" "7954716" "7954717" "7961101" "7991158" "8072331" "8083145" "8091786" "8451122" RE41352 RE41471 RE42254 "20010002035" "20010006902" "20010013551" "20020007434").PN.					
L151	1	L150 AND (mobile near3 device) with $card with reader	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/01/09 02:03 PM
L152	321	("20020043566" "20020044043" "20020095588" "20020096570" "20020099665" "20020130187" "20020138422" "20020138735" "20020139849" "20020148892" "20020153424" "20020158747" "20020178124" "20020180584" "20020186845" "20030025939" "20030028481" "20030052168" "20030057278" "20030061168" "20030079096" "20030080183" "20030085288" "20030115126" "20030128124" "20030159050" "20030200180" "20030220876" "20030231550" "20040006654" "20040027881" "20040030660" "20040035942" "20040050930" "20040058705" "20040064612" "20040065733" "20040077372" "20040087339" "20040094624" "20040133787"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/01/09 02:08 PM

		"20040162932" "20040177045" "20040188519" "20040199469" "20040227859" "20040243785" "20040243806" "20040251303" "20040255145" "20050006462" "20050017068" "20050022002" "20050029349" "20050038736" "20050039027" "20050044044" "20050050367" "20050052924" "20050060586" "20050071282" "20050077349" "20050092830" "20050108096" "20050109838" "20050116026" "20050121512" "20050122209" "20050127164" "20050127166" "20050133606" "20050136964" "20050168339" "20050177724" "20050197859" "20050204077" "20050204092" "20050212657" "20050223143" "20050224589" "20050240778" "20050246546" "20050253687" "20050258245" "20050268058" "20050268330" "20060011731" "20060027655" "20060045555" "20060077039" "20060097851" "20060124755" "20060169778" "20060172606" "20060186209" "20060219776" "20060226217" "20060268764" "20060279413"					

		"20070033334" "20070076877" "20070108280" "20070110404" "20070145135" "20070145152" "20070195458" "20070205864" "20070257797" "20070293202" "20080046649" "20080065830" "20080068173" "20080073436" "20080136619" "20080147950" "20080148077" "20080153416" "20080186174" "20080214111" "20080244208" "20080279381" "20080311849" "20080318535" "20090065571" "20090065572" "20090069049" "20090069050" "20090069051" "20090069052" "20090070272" "20090070691" "20090070861" "20090108063" "20090150610" "20090152361" "20090199283" "20090250521" "20090265552" "20090270127" "20090290582" "20090298540" "20090315667" "20090108063" "20100033307" "20100033310" "20100049878" "20100069118" "20100115164" "20100213265" "2010044444" "20110053644" "20110065386" "20110073663" "20110073665" "20110077052" "20110110404" "20110171996"					

		"20110180610" "20110220726" "20110223972" "20110269438" "20110271044" "20110272468" "20110272469" "20130233931").PN.					
L153	15	L152 AND (mobile near3 device) with $card with reader	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/01/09 02:09 PM
L154	23	L152 AND CONTACTLESS with $card with reader	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/01/09 02:10 PM
L155	8	("9117152" "9122965" "8260199").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/04/25 02:34 PM
L156	0	L155 and applifier	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/04/25 02:37 PM
L157	2	("8260199").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/04/25 02:43 PM
L158	1	("8260199").pn. and (amplifier amplify)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/04/25 07:02 PM
L159	321	("20020043566" "20020044043" "20020095588" "20020096570" "20020099665" "20020130187" "20020138422" "20020138735" "20020139849" "20020148892" "20020153424" "20020158747" "20020178124" "20020180584" "20020186845" "20030025939" "20030028481" "20030052168" "20030057278" "20030061168" "20030079096" "20030080183" "20030085288" "20030115126" "20030128124" "20030159050" "20030200180" "20030220876" "20030231550" "20040006654"	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/04/25 07:05 PM

		"20040027881" "20040030660" "20040035942" "20040050930" "20040058705" "20040064612" "20040065733" "20040077372" "20040087339" "20040094624" "20040133787" "20040162932" "20040177045" "20040188519" "20040199469" "20040227859" "20040243785" "20040243806" "20040251303" "20040255145" "20050006462" "20050017068" "20050022002" "20050029349" "20050038736" "20050039027" "20050044044" "20050050367" "20050052924" "20050060586" "20050071282" "20050077349" "20050092830" "20050108096" "20050109838" "20050116026" "20050121512" "20050122209" "20050127164" "20050127166" "20050133606" "20050136964" "20050168339" "20050177724" "20050197859" "20050204077" "20050204092" "20050212657" "20050223143" "20050224589" "20050240778" "20050246546" "20050253687" "20050258245" "20050268058" "20050268330" "20060011731" "20060027655"					

		"20060045555" "20060077039" "20060097851" "20060124755" "20060169778" "20060172606" "20060186209" "20060219776" "20060226217" "20060268764" "20060279413" "20070033334" "20070076877" "20070108280" "20070110404" "20070145135" "20070145152" "20070195458" "20070205864" "20070257797" "20070293202" "20080046649" "20080065830" "20080068173" "20080073436" "20080136619" "20080147950" "20080148077" "20080153416" "20080186174" "20080214111" "20080244208" "20080279381" "20080311849" "20080318535" "20090065571" "20090065572" "20090069049" "20090069050" "20090069051" "20090069052" "20090070272" "20090070691" "20090070861" "20090108063" "20090150610" "20090152361" "20090199283" "20090250521" "20090265552" "20090270127" "20090290582" "20090298540" "20090315667" "20090108063" "20100033307" "20100033310" "20100049878"					

		"20100069118" "20100115164" "20100213265" "2010044444" "20110053644" "20110065386" "20110073663" "20110073665" "20110077052" "20110110404" "20110171996" "20110180610" "20110220726" "20110223972" "20110269438" "20110271044" "20110272468" "20110272469" "20130233931").PN.					
L160	3	L159 and ((amplify amplified) same receive$2 same signal)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/04/25 07:06 PM
L161	7	("20060074813" | "20060280149" | "20070115125" | "20080181252" | "6873259" | "7699231" | "7796949").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2016/05/16 06:42 PM
L162	7	("20060074813" | "20060280149" | "20070115125" | "20080181252" | "6873259" | "7699231" | "7796949").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2016/05/16 06:42 PM
L163	14	("8260199").URPN.	(USPAT)	OR	OFF	OFF	2016/05/16 06:46 PM
L164	2	("8260199").PN.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 08:18 AM
L165	2	("20090108063").PN.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 08:19 AM
L166	34	wireless with smartcard and radio and frequency and digital and data and output and antenna and pad	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 11:09 AM
L167	530	wireless with smartcard and radio and frequency	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 11:22 AM
L168	71	L167 and (digital same output)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 11:22 AM
L169	71	L168 and data	(US-PGPUB; USPAT; EPO; JPO;	OR	OFF	OFF	2016/05/17 11:23 AM

			DERWENT)				
L170	29	L168 and (digital adj2 data)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 11:31 AM
L171	62	wireless with smartcard with radio with frequency	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 12:16 PM
L172	9	L171 and (digital adj2 data)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 12:16 PM
L173	201	(wireless contactless) with smartcard with frequency	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 12:31 PM
L174	16	L173 and (digital adj2 data)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 12:32 PM
L175	36	L173 and digital same output	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 12:50 PM
L176	349	(wireless contactless) with smartcard with mobile	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 03:59 PM
L177	26	L176 and (tansmit output) same digital same data	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 04:00 PM
L178	5	("20040075616" | "20070252771" | "20100219252" | "20110036912" | "7545336").PN.	(US-PGPUB; USPAT; USOCR)	OR	OFF	OFF	2016/05/17 04:02 PM
L179	2665174	"5" and digital	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 04:05 PM
L180	0	L178 and digital	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/17 04:05 PM
L181	6	("89375549" "8866614" "8451122" "7961101").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/05/28 03:51 PM
L182	14	(smartcard (memory near1 card)) and (load adj2 modulation) and (half adj2 duplex) and communication and frequency and sideband and interrogating	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:31 PM
L183	14	L182 and transmit and circuitry	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:32 PM
L184	14	(smartcard (memory near1 card)) with (load adj2 modulation) and (half adj2 duplex)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:39 PM

L185	29196	(smartcard (memory near1 card)) with controller	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:39 PM
L186	14	L185 and communication and frequency and sideband and interrogating	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:39 PM
L187	14	L186 and (load adj2 modulation) and (half adj2 duplex)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:40 PM
L188	8121	($phone (mobile near1 device)) with (smartcard (removable adj2 memory))	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:42 PM
L189	15	L188 and (load adj2 modulation) and (half adj2 duplex)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:43 PM
L190	34425	(microsd ((memory smart) near1 card) (removable adj2 memory)) with controller	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:45 PM
L191	19	L190 and (load adj2 modulation) and (half adj2 duplex)	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:46 PM
L192	14	L191 and communication and frequency and sideband and interrogating	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 01:46 PM
L193	9	("8937549" "8866614" "7961101" "8451122" "7961101").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2016/09/13 02:06 PM
L194	12	("7961101" "8451122" "8866614" "8937549" "9489608").pn.	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2017/05/24 09:33 AM
L195	1220	smartcard same controller	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2017/05/24 10:42 AM
L196	89	L195 and inductive and reader and transmit and data	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2017/05/24 10:43 AM
L197	5160	card with reader with nfc	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2017/07/21 01:33 PM
L198	18	L197 and (inductive adj2 element) and power and controller and transmit and driver and digital and (data signal)	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2017/07/21 01:33 PM
L199	2	"8866614".pn.	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2017/07/21 02:31 PM
L200	57	nfc and card and reader	(US-PGPUB; USPAT;	OR	OFF	OFF	2017/07/21

		and inductive and interrogating and radio and frequency and transmit and circuit and resonant	FPRS; EPO; JPO; DERWENT)				02:46 PM
L201	26	L200 and smartcard	(US-PGPUB; USPAT; FPRS; EPO; JPO; DERWENT)	OR	OFF	OFF	2017/07/21 02:52 PM
L202	11	("7961101" "8451122" "8866614" "8937549" "9489608" "9904887").pn.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2018/07/20 01:50 PM
L203	13	("7961101" "8451122" "8866614" "8937549" "9489608" "9904887" "10318855").pn.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2019/09/26 04:45 PM
L204	13	("7961101" "8451122" "8866614" "8937549" "9489608" "9904887" "10318855").pn.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2019/09/30 10:49 AM
L205	7	("9117152" "9122965").pn.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2019/09/30 10:55 AM
L206	21	G06K19/0723.CPC. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:35 PM
L207	21	G06K19/0727.CPC. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:35 PM
L208	21	G06K19/07732.CPC. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:36 PM
L209	21	G06K19/07749.CPC. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:36 PM
L210	0	340/572.8.ccls. and ((memory sd) adj2 card) and contactless and communication and	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:37 PM

		magnetic and core and coil and frequency and sidebands and inductive					
L211	3	340/572.1.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:37 PM
L212	3	340/10.1.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:37 PM
L213	0	340/10.51.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:37 PM
L214	8	235/492.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:37 PM
L215	0	235/379.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2019/09/30 01:37 PM
L229	212	("10318855"|"20010002035"|"20010006902"|"20010013551"|"20020007434"|"20020043566"|"20020044043"|"20020095588"|"20020096570"|"20020099665"|"20020130187"|"20020138422"|"20020138735"|"20020139849"|"20020148892"|"20020153424"|"20020158747"|"20020178124"|"20020180584"|"20020186845"|"20030025939"|"20030028481"|"20030052168"|"20030057278"|"20030061168"|"20030079096"|"200300	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/08/29 12:05 PM

		80183"|"20030085288"| "20030115126"|"20030 128124"|"20030159050 "|"20030200180"|"2003 0220876"|"2003023155 0"|"20040006654"|"200 40027881"|"200400306 60"|"20040035942"|"20 040050930"|"20040058 705"|"20040064612"|"2 0040065733"|"2004007 7372"|"20040087339"|" 20040094624"|"200401 33787"|"20040162932"| "20040177045"|"20040 188519"|"20040199469 "|"20040227859"|"2004 0243785"|"2004024380 6"|"20040251303"|"200 40255145"|"200500064 62"|"20050017068"|"20 050022002"|"20050029 349"|"20050038736"|"2 0050039027"|"2005004 4044"|"20050050367"|" 20050052924"|"200500 60586"|"20050071282"| "20050077349"|"20050 092830"|"20050108096 "|"20050109838"|"2005 0116026"|"2005012151 2"|"20050122209"|"200 50127164"|"200501271 66"|"20050133606"|"20 050136964"|"20050168 339"|"20050177724"|"2 0050197859"|"2005020 4077"|"20050204092"|" 20050212657"|"200502 23143"|"20050224589"| "20050240778"|"20050 246546"|"20050253687 "|"20050258245"|"2005 0268058"|"2005026833 0"|"20060011731"|"200 60027655"|"200600455 55"|"20060077039"|"20 060097851"|"20060124 755"|"20060169778"|"2 0060172606"|"2006018 6209"|"20060219776"|" 20060226217"|"200602 68764"|"20060279413"| "20070022012"|"20070 033334"|"20070076877 "|"20070108280"|"2007 0110404"|"2007014513 5"|"20070145152"|"200					

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		|"6592044"|"6594759"|"6598031"|"6606025").PN.					
L230	67	("6607127"|"6609654"|"6631849"|"6636833"|"6669487"|"6705520"|"6712277"|"6715679"|"6721196"|"6747547"|"6764005"|"6769607"|"6805288"|"6811082"|"6836843"|"6857566"|"6882900"|"6883718"|"6905072"|"6907123"|"6908030"|"6925568"|"6937526"|"6952788"|"6995651"|"7059520"|"7088246"|"7110792"|"7185146"|"7221473"|"7281101"|"7295790"|"7333062"|"7350717"|"7353993"|"7410102"|"7493484"|"7558107"|"7558110"|"7581678"|"7607580"|"7673080"|"7716082"|"7789303"|"7792516"|"7796949"|"7828214"|"7933571"|"7941197"|"7948356"|"7954715"|"7954716"|"7954717"|"7961101"|"7991158"|"8072331"|"8083145"|"8091786"|"8260199"|"8451122"|"8866614"|"8937549"|"9489608"|"9904887"|"RE41352"|"RE41471"|"RE42254").PN.	(US-PGPUB; USPAT)	OR	OFF	OFF	2020/08/29 12:05 PM
L231	3003	((mobile smart) near1 phone) and (field adj2 communication) and inductive and (smartcard $card) and controller and receive and power	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/08/29 12:17 PM
L232	194	L231 and nfc and reader and interrogating and radio and frequency and field	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/08/29 12:18 PM
L233	40	L232 and point near2 sale	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/08/29 12:18 PM
L234	20	("10607129" "10318855" "9904887" "9489608" "89375549" "8866614" "8451122" "7961101").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2020/08/29 01:35 PM
L235	2152	((mobile adj2 phone) smartphone) with reader with nfc	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/08/29 01:49 PM

L236	329	L235 and inductive and power	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/08/29 01:49 PM
L237	81	L236 and modulation and (point adj2 sale)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/08/29 01:49 PM
L238	12	((mobile adj2 phone) smartphone) with (smartcard same controller)	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/08/29 01:53 PM
L239	6768	(mobile (cell near1 phone) (smart near1 phone)) and smartcard and reader	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/09/17 02:02 PM
L240	273	(mobile (cell near1 phone) (smart near1 phone)) with smartcard with reader	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/09/17 02:04 PM
L241	135	L240 and field same communication	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/09/17 02:04 PM
L242	2	L241 and interrogating same (rf (radio adj2 frequency))	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/09/17 02:04 PM
L243	13	L241 and inductive and power	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/09/17 02:11 PM
L244	69	"7333062"	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/09/17 02:39 PM
L245	1	"7333062".pn.	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/09/17 02:40 PM
L246	273	(mobile (cell near1 phone) (smart near1 phone)) with smartcard with reader	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/09/17 02:44 PM
L247	19	L246 and inductive and power	(US-PGPUB; USPAT; FPRS; EPO; JPO)	OR	OFF	OFF	2020/09/17 02:45 PM
L248	249	("1178450" OR "20010001035" OR "20010002035" OR "20010006902" OR "20010013551" OR "20010034246" OR "20020007434" OR "20020025796" OR "20020043566" OR "20020044043" OR "20020095588" OR "20020096570" OR "20020099665" OR "20020130187" OR "20020138422" OR "20020138735" OR "20020139849" OR "20020148892" OR "20020153424" OR "20020158747" OR "20020178124" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/03 10:14 AM

		"20020180584" OR "20020186845" OR "20030025939" OR "20030028481" OR "20030038177" OR "20030052168" OR "20030057278" OR "20030061168" OR "20030079096" OR "20030080183" OR "20030084220" OR "20030085288" OR "20030115126" OR "20030128124" OR "20030159050" OR "20030200180" OR "20030209604" OR "20030220876" OR "20030231550" OR "20040006654" OR "20040027881" OR "20040030660" OR "20040035942" OR "20040050930" OR "20040058705" OR "20040064612" OR "20040065733" OR "20040077372" OR "20040087339" OR "20040094624" OR "20040122685" OR "20040133787" OR "20040162932" OR "20040177045" OR "20040188519" OR "20040199469" OR "20040227859" OR "20040243785" OR "20040243806" OR "20040251303" OR "20040255145" OR "20050006462" OR "20050017068" OR "20050022002" OR "20050029349" OR "20050038736" OR "20050039027" OR "20050044044" OR "20050050367" OR "20050052924" OR "20050060586" OR "20050071282" OR "20050077349" OR "20050092830" OR "20050108096" OR "20050109838" OR "20050116026" OR "20050121512" OR					

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		"6105013" OR "6182891" OR "6189786" OR "6206293" OR "6219439" OR "6223954" OR "6223984" OR "6237095" OR "6250557" OR "6315195" OR "63811082" OR "6402029" OR "6450407" OR "6481623" OR "6568600" OR "6588660" OR "6592044" OR "6594759" OR "6598031" OR "6607127" OR "6609654" OR "6631849" OR "6636833" OR "6669487" OR "6705520" OR "6712277" OR "6715679" OR "6721196" OR "6747547" OR "6764005" OR "6769607" OR "6805288" OR "6811082" OR "6836843" OR "6857566" OR "6882900" OR "6883718" OR "6905072" OR "6907123" OR "6908030" OR "6925568" OR "6937526" OR "6952788" OR "6995651" OR "7059520" OR "7088246" OR "7185146" OR "7213766" OR "7221473" OR "7281101" OR "7295790" OR "7333062" OR "7350717" OR "7353993" OR "7410102").pn.					
L249	27	("7493484" OR "7558107" OR "7558110" OR	(US-PGPUB; USPAT)	OR	ON	ON	2022/08/03 10:14 AM

		"7581678" OR "7607580" OR "7673080" OR "7716082" OR "7789303" OR "7792516" OR "7828214" OR "7898994" OR "7933571" OR "7941197" OR "7948356" OR "7954715" OR "7954716" OR "7954717" OR "7961101" OR "7991158" OR "8072331" OR "8082575" OR "8083145" OR "8091786" OR "8103881" OR "RE41352" OR "RE41471" OR "RE42254").pn.					
L250	23	("10949726" "10607129" "10318855" "9904887" "9489608" "89375549" "8866614" "8451122" "7961101").pn.	(US-PGPUB; USPAT; EPO; JPO; DERWENT)	OR	OFF	OFF	2022/08/03 10:15 AM
L251	10603	((smartphone) mobile adj2 phone) WITH nfc WITH reader	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/03 01:36 PM
L252	670	((smartphone) mobile adj2 phone) WITH nfc WITH reader WITH external	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO,	OR	ON	ON	2022/08/03 01:36 PM

			RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				
L253	425	252 AND receive AND power	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/03 01:36 PM
L254	352	253 AND antenna	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/03 01:37 PM
L255	47	254 AND mobile adj2 payment	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY, CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2022/08/03 02:19 PM
L256	36	(Artificial Intelligence) More like doc: US-20140136350-A1	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, BE, BG, BR, BY,	OR	ON	ON	2022/08/03 02:26 PM

		Text: (WO-2014076584-A2 OR WO-2014076584-A3 OR US-20150339659-A1 OR TW-I633505-B OR TW-201610877-A OR WO-2015179115-A1 OR US-11263619-B2 OR JP-2018533785-A OR JP-6505948-B2 OR US-9378496-B1 OR US-9355399-B1 OR US-20160148193-A1 OR US-20150012440-A1 OR US-9286605-B2 OR CN-108140182-A OR WO-2020014014-A1 OR WO-2010070539-A1 OR EP-2380149-A1 OR US-20190354973-A1 OR US-9489672-B1).did.	CA, CH, CN, CS, CU, CZ, DD, DE, DK, EA, EE, EP, ES, FI, FR, GB, HR, HU, ID, IE, IL, IS, IT, JP, KR, LT, LU, LV, MA, OA, RU, SU, WO, MC, MD, MY, NL, NO, NZ, PH, PL, PT, RO, RS, SE, SG, SI, SK, TH, TN, TR, TW, UA, VN); FPRS; EPO; JPO; DERWENT; IBM_TDB)				

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N216	10	G06K19/0723.CPC. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(USPAT)	OR	OFF	OFF	2020/01/13 01:12 PM
N217	10	G06K19/0727.CPC. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(USPAT)	OR	OFF	OFF	2020/01/13 02:38 PM
N218	10	G06K19/07732.CPC. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(USPAT)	OR	OFF	OFF	2020/01/13 02:39 PM
N219	10	G06K19/07749.CPC. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(USPAT)	OR	OFF	OFF	2020/01/13 02:39 PM

N220	0	340/572.1.ccls. and controller with contractless with interface	(USPAT)	OR	OFF	OFF	2020/01/13 02:40 PM
N221	0	340/572.1.ccls. and controller and contractless and interface	(USPAT)	OR	OFF	OFF	2020/01/13 02:40 PM
N222	5	340/10.1.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil	(USPAT)	OR	OFF	OFF	2020/01/13 02:40 PM
N223	2	340/10.51.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil	(USPAT)	OR	OFF	OFF	2020/01/13 02:56 PM
N224	17	235/492.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil	(USPAT)	OR	OFF	OFF	2020/01/13 02:57 PM
N225	0	235/379.ccls. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(USPAT)	OR	OFF	OFF	2020/01/13 03:00 PM
N226	10	(SIVA NEAR1 NARENDRA).IN. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(USPAT)	OR	OFF	OFF	2020/01/13 03:01 PM
N227	10	(SAURAV NEAR1 CHAKRABORTY).IN. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and coil and frequency and sidebands and inductive	(USPAT)	OR	OFF	OFF	2020/01/13 03:02 PM
N228	10	(pRABHAKAR NEAR1 TADEPALLI).IN. and ((memory sd) adj2 card) and contactless and communication and magnetic and core and	(USPAT)	OR	OFF	OFF	2020/01/13 03:02 PM

		coil and frequency and sidebands and inductive					

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	17/179,237
Filing Date	Feb 18, 2021
First Named Inventor	Siva Narendra
Art Unit	2684
Examiner Name	Toan Pham
Attorney Docket Number	18.115.026US13

U.S. PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		4701601		1987-10-20	Francini et al.	
		4786791		1988-11-22	Hodama	
		4791283		1988-12-13	Burkhardt	
		4864109		1989-09-05	Minematsu et al.	
		5212478		1993- 05-18	Moseley	
		5378887		1995-01-03	Kobayashi	
		5537584		1996-07-16	Miyai et al.	
		5574273		1996-11-12	Nakagawa et al.	
		5585787		1996-12-17	Wallerstein	
		5629981		1997- 05-13	Nerlikar	
		5700037		1997-12-23	Keller et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

PTO/SB/08a (01-10)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		5710421		1998-01-20	Kokubu et al.	
		5834756		1998-11-10	Gutman et al.	
		5909491		1999-06-01	Luo	
		5940510		1999-08-17	Curry et al.	
		5949880		1999-09-07	Curry et al.	
		5952641		1999-09-14	Korshun	
		5955961		1999-09-21	Wallerstein	
		6016476		2000-01-18	Maes et al.	
		6021944		2000-02-08	Arakaki	
		6039260		2000-03-21	Eisele	
		6045043		2000-04-04	Bashan et al.	
		6068184		2000- 05-30	Barnett	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

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	Art Unit	2684
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	Attorney Docket Number	18.115.026US13

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		Notice of Allowance notified May 13, 2013 for U.S. Patent Application No. 13/426,500 (Docket No. 115.001US6.3).	
		Notice of Allowance notified November 16, 2011 for U.S. Patent Application No. 13/114,473 (Docket No. 115.001US6.1).	
		Notice of Allowance notified October 26, 2015 for U.S. Patent Application No. 14/747,770 (Docket No. 115.001US9.3).	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		Notice of Allowance notified October 28, 2011 for U.S. Patent Application No. 13/081,775 (Attorney Docket No. 115.022US2).	
		Notice of Allowance notified October 28, 2015 for U.S. Patent Application No. 14/833,113 (Docket No. 115.001US9.4).	
		Notice of Allowance notified September 19, 2018 for U.S. Patent Application No. 15/658,208 (Docket No. 115.001US9.8).	
		Official Letter from Taiwan Patent Office notified January 26, 2010 for Patent Application No. 95105997 (Docket No. 115.001TW1).	
		Restriction Requirement notified August 16, 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.022US1).	
		Restriction Requirement notified August 16, 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.P022US1).	
		International Search Report & Written Opinion notified January 11, 2006 for PCT Patent Application No. PCT/US2005/019988, 8 pages (Docket No. 115.001US3).	
		LEE, Y., "Anntenna Circuit Design For RFID Applications", Microchip, AN710, 2003, Microchip Technology Inc., 50 pages.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

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	First Named Inventor	Siva Narendra
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	Examiner Name	
	Attorney Docket Number	18.115.026US13

		LEE, Y., "Antenna Circuit Design for RFID Applications", Microchip, AN710, 2003 Microchip Technology, Inc., 50 pages (2003).	

EXAMINER SIGNATURE

Examiner Signature	/TOAN N PHAM/	Date Considered	08/03/2022

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document.
[4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Usman Mughal/	Date (YYYY-MM-DD)	2021-07-28
Name/Print	Usman A. Mughal	Registration Number	62887

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

Bibliographic Data

Application No: 17/179,237

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /TOAN N PHAM/ (Examiner's Signature) | (Initials)

Title: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
02/18/2021	340	2684	18.P115.026US13
RULE			

APPLICANTS

iCashe, Inc., Portland, OR, UNITED STATES

INVENTORS

Siva G. Narendra, Portland, OR, UNITED STATES

Saurav Chakraborty, West Bengal, INDIA

Prabhakar Tadepalli, Bangalore, INDIA

CONTINUING DATA

This application is a CON of 16791609 02/14/2020 PAT 10949726

16791609 is a CON of 16393275 04/24/2019 PAT 10607129

16393275 is a CON of 15904328 02/24/2018 PAT 10318855

15904328 is a CON of 15338436 10/30/2016 PAT 9904887

15338436 is a CON of 14517585 10/17/2014 PAT 9489608

14517585 is a CON of 14460647 08/15/2014 PAT 8937549

14460647 is a CON of 13871849 04/26/2013 PAT 8866614

13871849 is a CON of 13038341 03/01/2011 PAT 8451122

13038341 is a CON of 12188346 08/08/2008 PAT 7961101

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

02/26/2021

** SMALL ENTITY **

STATE OR COUNTRY

UNITED STATES

ADDRESS

Mughal IP P.C.
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006
UNITED STATES

FILING FEE RECEIVED

$930

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: **Siva G. Narendra**	Examiner: **PHAM, TOAN NGOC**
Application No.: 17/179,237	Art Group: 2684
Filed: February 18, 2021	Confirmation No.: 3258
For: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING	Docket No.: 18.115.026US13

Mail Stop **Missing Parts**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR CORRECTED FILING RECEIPT

Dear Examiner:

Applicant submitted a Corrected ADS on October 06, 2021 to correct a typographical error in the title. Applicant requests a Corrected Filing Receipt indicating the corrected title.

Applicants request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. § 1.16 and § 1.17, to Deposit Account No. 60-4139.

Respectfully submitted,
MUGHAL IP P.C.

September 16, 2022
Date

/Usman Mughal/
Usman Mughal
Reg. No. 62,887
Attorney for Applicants

1500 NW Bethany Blvd. Suite 200
Beaverton, OR 97006
971-634-0286
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UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/179,237	**09/16/2022 04:01:19 PM ET**	**18.P115.026US13**

Title of Invention

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3258	FILED BY	Katherine Campbell
PATENT CENTER #	60970488	FILING DATE	02/18/2021
CUSTOMER #	175023	FIRST NAMED INVENTOR	Siva G. Narendra
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Usman Mughal

Documents

TOTAL DOCUMENTS: 1

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
18_115026US13_RCFR.pdf	1	Request for Corrected Filing Receipt	19 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
18_115026US13_RCFR.pdf	3CFE6642750890EC4600AAF8491BDC1678AC5C3F4FC1ABCA969D6D549D938EBC00CA5E9D92629BE1854DF8A3A92C7CFC76B989CE931757D24A5C6CAF9902D0A7

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
17/179,237	02/18/2021	2684	1360	18.P115.026US13	20	3

CONFIRMATION NO. 3258

CORRECTED FILING RECEIPT

175023
Mughal IP P.C.
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

OC000000136339927

Date Mailed: 09/20/2022

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Siva G. Narendra, Portland, OR;
Saurav Chakraborty, West Bengal, INDIA;
Prabhakar Tadepalli, Bangalore, INDIA;

Applicant(s)

iCashe, Inc., Portland, OR;

Assignment For Published Patent Application

iCashe, Inc., Portland, OR

Power of Attorney: The patent practitioners associated with Customer Number 175023

Domestic Priority data as claimed by applicant

This application is a CON of 16/791,609 02/14/2020 PAT 10949726
which is a CON of 16/393,275 04/24/2019 PAT 10607129
which is a CON of 15/904,328 02/24/2018 PAT 10318855
which is a CON of 15/338,436 10/30/2016 PAT 9904887
which is a CON of 14/517,585 10/17/2014 PAT 9489608
which is a CON of 14/460,647 08/15/2014 PAT 8937549
which is a CON of 13/871,849 04/26/2013 PAT 8866614
which is a CON of 13/038,341 03/01/2011 PAT 8451122
which is a CON of 12/188,346 08/08/2008 PAT 7961101

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 02/26/2021

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/179,237**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****
Title

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

Preliminary Class

340

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 17/179,237	Filing Date 02/18/2021	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $240 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	12/14/2022	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 22	Minus	** 22	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $240 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/JULIET MCMILLAN/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

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If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/07 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET Substitute for Form PTO-1360 (For use with Form PTO/SB/06)	Application Number 17/179,237	Filing Date 02/18/2021	☐ To be Mailed	
	Applicant(s) Narendra et al.	Examiner PHAM, TOAN NGOC	AIA (FITF) Status No	Page 1 of 1

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT 14 December 2022		AFTER SEC. AMENDMENT		*			*		*	
	Indep	Depend	Indep	Depend	Indep	Depend		Indep	Depend	Indep	Depend	Indep	Depend
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49							99						
50							100						
Total Indep	0		3		0		Total Indep						
Total Depend		0		19		0	Total Depend						
Total Claims	0		22		0		Total Claims						

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2

Doc Code: DIST.E.FILE Document Description: Electronic Terminal Disclaimer - Filed	PTO/SB/26 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT**
Application Number	17179237
Filing Date	18-Feb-2021
First Named Inventor	Siva Narendra
Attorney Docket Number	18.P115.026US13
Title of Invention	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

☒ Filing of terminal disclaimer does not obviate requirement for response under 37 CFR 1.111 to outstanding Office Action

☒ This electronic Terminal Disclaimer is not being used for a Joint Research Agreement.

Owner	Percent Interest
iCashe, Inc.	100%

The owner(s) with percent interest listed above in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of prior patent number(s)

9489608

as the term of said prior patent is presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the prior patent, "as the term of said prior patent is presently shortened by any terminal disclaimer," in the event that said prior patent later:
- expires for failure to pay a maintenance fee;
- is held unenforceable;
- is found invalid by a court of competent jurisdiction;
- is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
- has all claims canceled by a reexamination certificate;
- is reissued; or
- is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

◉ Terminal disclaimer fee under 37 CFR 1.20(d) is included with Electronic Terminal Disclaimer request.

○	I certify, in accordance with 37 CFR 1.4(d)(4), that the terminal disclaimer fee under 37 CFR 1.20(d) required for this terminal disclaimer has already been paid in the above-identified application.

Applicant claims the following fee status:

◉ Small Entity

○ Micro Entity

○ Regular Undiscounted

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

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

◉ An attorney or agent registered to practice before the Patent and Trademark Office who is of record in this application

Registration Number 62887

○ A sole inventor

○ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application

○ A joint inventor; all of whom are signing this request

Signature	/Usman Mughal/
Name	Usman Mughal

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this certification. See MPEP § 324.

Electronic Patent Application Fee Transmittal

Application Number:	17179237
Filing Date:	18-Feb-2021
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING
First Named Inventor/Applicant Name:	Siva G. Narendra
Filer:	Usman Mughal/Katherine Campbell
Attorney Docket Number:	18.P115.026US13

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
STATUTORY OR TERMINAL DISCLAIMER	2814	1	170	170
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**170**

Doc Code: DISQ.E.FILE
Document Description: Electronic Terminal Disclaimer – Approved

Application No.: 17179237

Filing Date: 18-Feb-2021

Applicant/Patent under Reexamination: Narendra

Electronic Terminal Disclaimer filed on December 14, 2022

☒ APPROVED

This patent is subject to a terminal disclaimer

☐ DISAPPROVED

Approved/Disapproved by: Electronic Terminal Disclaimer automatically approved by EFS-Web

U.S. Patent and Trademark Office

Electronic Acknowledgement Receipt

EFS ID:	47210420
Application Number:	17179237
International Application Number:	
Confirmation Number:	3258
Title of Invention:	METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING
First Named Inventor/Applicant Name:	Siva G. Narendra
Customer Number:	175023
Filer:	Usman Mughal/Katherine Campbell
Filer Authorized By:	Usman Mughal
Attorney Docket Number:	18.P115.026US13
Receipt Date:	14-DEC-2022
Filing Date:	18-FEB-2021
Time Stamp:	19:30:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$170
RAM confirmation Number	E2022BDJ30502347
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Terminal Disclaimer-Filed (Electronic)	eTerminal-Disclaimer.pdf	41276 1d3402c3e9a7385f1c8666768e5f911aafa537de	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38266 c0d4de477d556c2d9d2593c9302f0024c62c0ccb	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	79542		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: **Siva G. Narendra**	Examiner: **PHAM, TOAN NGOC**
Application No.: 17/179,237	Art Group: 2684
Filed: February 18, 2021	Confirmation No.: 3258
For: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING	Docket No.: iC18P115.026US13

Mail Stop **Amendment**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT UNDER 37 C.F.R. § 1.111

Dear Examiner:

This Amendment is in response to the Non-Final Office Action notified September 15, 2022. Applicants respectfully request the Examiner to enter this Amendment and consider the following remarks.

LISTING OF CLAIMS

1. (**Currently Amended**) A mobile device comprising:

a power source;

a smartcard controller coupled to the power source to receive power;

an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile ~~phone~~ device; and

an active transmit driver circuit coupled to the power source to receive power, wherein the active transmit driver circuit affects ~~effects~~ [[the]] transmission of data between the antenna and the NFC reader.

2. (Original) The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.

3. (Original) The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.

4. (Original) The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.

5. (Original) The mobile device of claim 1, wherein the antenna includes an inductive element.

6. (Original) The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.

7. (Original) The mobile device of claim 1 comprising an amplifier coupled to the power source to receive power, wherein the amplifier is further coupled to the antenna.

8. (**Currently Amended**) The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.

9. (Original) The mobile device of claim 1, wherein the smartcard controller includes a bridge rectifier.

10. (**Currently Amended**) A method of activation, the method comprising:

receiving a first communication via a network including a request for activation; and

sending a second communication to a mobile device via a network, wherein the second communication comprises an activation code provided in response to the request for activation;

wherein verification of the activation code results in activation of a built-in RFID functionality in the mobile device;

wherein the mobile device comprises:

a smartcard controller ~~providing~~ to provide the RFID functionality and coupled to receive power from the mobile device;

an antenna tuned to operate at substantially 13.56 MHz; and

an active transmit driver circuit coupled to receive power from the mobile device;

wherein the activated RFID functionality comprises transmission of data between the antenna and an external RFID reader, the transmission effected by the active transmit driver circuit.

11. (Original) The method of claim 10, wherein the RFID functionality is a Near Field Communication (NFC) functionality and the RFID reader is a NFC reader.

12. (Original) The method of claim 10, wherein the transmitted data includes ticketing information for a mass transit system.

13. (Original) The method of claim 10, wherein the transmitted data includes transaction information for a mobile payment.

14. (Original) The method of claim 10, wherein the antenna includes an inductive element.

15. (Original) The method of claim 10, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.

16. (**Currently Amended**) The method of claim 10, wherein the mobile device further comprises an amplifier coupled to the antenna and further coupled to receive power from the mobile device, and wherein the amplifier operates to amplify a signal received by the antenna.

17. (**Currently Amended**) A method of near field communication between a mobile device and an NFC reader, the method comprising:

coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;

providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;

coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and

driving [[the]] transmission of data by the active transmit driver circuit from the antenna to the NFC reader.

18. (**Currently Amended**) The method of claim 17 further comprising:
amplifying a signal received from the antenna, to generate an amplified signal; and providing the amplified signal to the smartcard controller.

19. (Original) The method of claims 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.

20. (Original) The method of claims 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.

REMARKS

This listing of claims will replace all prior versions and listings of claims in the application. Claims 1, 8, 10, 16, 17, and 18 are amended. No claims are added or cancelled in this response. Hence, claims 1-20 are pending. Applicants respectfully request reconsideration of claims in view of the amendments and arguments.

DOUBLE PATENTING REJECTION

Claims 1-9, and 17-20 stand provisionally rejected on the grounds of nonstatutory double patenting as allegedly unpatentable over claims 1-14 of co-pending Application No. 9,489,608.

"A rejection based on a nonstatutory type of double patenting can be avoided by filing a terminal disclaimer in the application or proceeding in which the rejection is made." M.P.E.P. § 804.02. Hence, Applicants submit the Terminal Disclaimer and authorize Customer Number 175023 (that includes Applicants' Attorney) to sign the Terminal Disclaimer.

Applicants wish to note that the filing of the enclosed Terminal Disclaimer in compliance with 37 C.F.R. § 1.321(c) is not an admission to the propriety of the rejection. *See M.P.E.P.* § 804.02 ("The filing of a terminal disclaimer to obviate a rejection based on nonstatutory double patenting is not an admission of the propriety of the rejection. *Quad Environmental Technologies Corp. v. Union Sanitary District*, 946 F.2d 870, 20 USPQ 2d 1392 (Fed. Cir. 1991). The court indicated that the 'filing of a terminal disclaimer simply serves the statutory function of removing the rejection of double patenting, and raises neither a presumption nor estoppels on the merits of the rejection.'").

Accordingly, Applicants respectfully request Examiner to consider the Terminal Disclaimer and withdraw the double patenting rejection.

ALLOWED SUBJECT MATTER

Claims 10-16 stand as allowed. Office Action, p. 3, "Allowable Subject Matter." Applicants thank Examiner for acknowledging the allowable subject matter.

Accordingly, Applicants respectfully request reconsideration of pending claims in view of the amendments.

Note that merely because Applicants do not specifically argue that certain limitations of a claim are not in the references is not a concession that a reference or combination of references includes the limitations. That Applicants do not contradict a particular statement made in the Office action is not a concession that Applicants agree with it. Further, merely because Applicants do not separately argue the patentability of every dependent claim is not a concession that there are not additional reasons for patentability of these dependent claims.

Applicants believe every assertion by the Office Action has been addressed. However, in the interest of clarity and brevity, Applicants may not have asserted every available argument for each assertion made in the Office Action. Applicants' silence regarding any such assertion does not constitute any admission or acquiescence. Applicants reserve all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference.

Applicants do not admit that any of the cited references or any other references of record is relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objection evidence of record as manifested by a cited prior art reference, Applicants timely object to such reliance on Official Notice, and reserve all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by M.P.E.P. § 2144.03. Applicants reserve all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by M.P.E.P. § 821.04.

Based on the amendments and arguments, Applicants respectfully request the Examiner to allow all pending claims.

CONCLUSION

Applicants submit that they have overcome Examiner's objections to and rejections of the claims and that they have the right to claim the invention as listed in the listing of claims. Examiner is respectfully requested to contact the undersigned by telephone if it is believed that such contact would further the examination of the present application.

Pursuant to 37 C.F.R. § 1.136(a)(3), Applicants request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. § 1.16 and § 1.17, to Deposit Account No. 60-4139.

Respectfully submitted,
MUGHAL IP P.C.

December 14, 2022
Date

/Usman Mughal/
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SUBSTITUTE SPECIFICATION -- MARKED
UNITED STATES PATENT APPLICATION

for

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

Inventors:

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Docket No.: ~~18-115-026US13~~C18P115026US13

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

CLAIM FOR PRIORITY

[0001] This application is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 16/791,609, filed February 14, 2020, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 16/393,275, filed April 24, 2019, now issued on March 31, 2020 as U.S. Patent No. 10,607,129, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/904,328, filed on February 24, 2018, now issued on June 11, 2019 as U.S. Patent No. 10,318,855, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/338,436, filed October 30, 2016, now issued on February 27, 2019, as U.S. Patent No. 9,904,887, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 14/517,585, filed October 17, 2014, now issued on November 08, 2016, as U.S. Patent No. 9,489,608, which is a continuation of, and claims priority to U.S. Patent Application No. 14/460,647, filed August 15, 2014, now issued on January 20, 2015, as U.S. Patent No. 8,937,549, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 13/871,849, on April 26, 2013, now issued on October 21, 2014, as U.S. Patent No. 8,866,614, which is a continuation of, and claims the benefit of priority to, U.S. Patent Application No. 13/038,341, filed March 01, 2011, now issued on May 28, 2013, as U.S. Patent No. 8,451,122, which is a continuation-in-part of, and claims the benefit of priority to U.S. Patent Application No. 12/188,346, filed August 08, 2008, now issued on June 14, 2011, as U.S. Patent No. 7,961,101 and which are incorporated by reference in their entirety.

FIELD

[0002] The present invention relates generally to contactless communications devices, and more specifically to contactless smartcard devices.

BACKGROUND

[0003] RFID "tags" can be separated into two broad categories: active tags and passive tags. Active tags are characterized by a local power source such as a battery. Active tags

generally transmit information by broadcasting on an RF carrier frequency of choice using a locally generated RF carrier. Active tags are typically used to transmit over long distances, often referred to as "far field communications" (FFC). Antennas used with active RFID tags tend to be large to allow for the communications over long distances.

[0004] Passive tags are not powered. Passive tags derive the energy needed to power the tag from an interrogating RF field, and use that energy to transmit response codes by modulating the impedance that the antenna presents to the interrogating field, thereby modulating the signal reflected back to the reader antenna. Passive tags are typically used to transmit over short distances, often referred to as "near field communications" (NFC). For example, passive tags operating at 13.56 MHz are typically designed to communicate with RFID readers a few centimeters away.

[0005] Passive tags are typically connected to "loop antennas." One example of a loop antenna is shown in U.S. Patent No. 6,568,600, issued to Carpier et al. on May 27, 2003 (the '600 patent). The device described in the '600 patent is recognizable as a "credit card sized" passive RFID card (more specifically, a card that conforms to ISO 7816 size requirements). The loop antenna is necessarily large because passive tags are powered using energy received by the antenna from signals transmitted by the RFID reader.

[0006] Figure 12 shows a power supply voltage developed over time by rectifying a voltage induced in a loop antenna in the presence of an interrogating RF field. Once the power supply voltage reaches a critical value, the tag is powered up and can operate. As the antenna size is reduced, it takes longer for the power supply voltage to reach the critical value, and the tag operation may not meet response time specifications. Below a certain antenna size, the power supply voltage may never reach the critical value, and the tag may never power up.

[0007] Antenna design for RFID applications is described in a Microchip Technology, Inc. application note entitled "Antenna Circuit Design for RFID Applications" by Youbok Lee, Ph.D., published in 2003 (no month given). Dr. Lee's application note describes in great detail how to determine size requirements for a passive RFID tag antenna to operate at 13.56 MHz. On page 5 of the application note, Dr. Lee shows that the optimum radius of the loop antenna coil is equal to 1.414 times the required read range. This analysis confirms that for a read range on the order of a few centimeters, a credit card sized loop antenna can be made near optimal.

[0008] Passive tags are seeing widespread use in many applications. For example, mobile device manufacturers are embedding passive RFID tags in mobile devices for NFC applications. Example mobile applications include, but are not limited to, ticketing and mobile payments. U.S. Patent No. 7,333,062 issued to Leizerovich et al. on February 19, 2008 (the '062 patent) shows a mobile phone with an integrated loop antenna for an NFC device. As shown in the '062 patent, the mobile phone provides the real estate necessary to implement a loop antenna at 13.56 MHz.

[0009] There have been attempts to implement passive tags in smaller mobile devices. These attempts have been met with limited success due in part to the size of the loop antenna. For example, Figure 13 shows an RFID tag implementation in a secure digital (SD) memory card manufactured by Wireless Dynamics, Inc. of Calgary, Alberta, Canada. Card 1300 includes an antenna, but the SD card is significantly oversized as a result. Also for example, U.S. Patent Application Publication No.: US 2006/0124755 A1 shows a memory card having a passive tag, but the card must be inserted into a slot to access a loop antenna on a different device. In this implementation, mobile device real estate is still relied upon for loop antenna implementation. It can be seen, therefore, that the size of antennas are proving to be a barrier to further miniaturization of passive RFID tags.

[0010] Figure 14 shows a prior art smartcard controller and antenna in combination. Smartcard controller 330 includes a contactless interface that includes two pads 1472 and 1474 intended for connection to a coil (antenna 1480). Smartcard controller 330 also includes bridge rectifier 1420 to rectify an alternating voltage present on pads 1472 and 1474 when antenna 1480 is inductively coupled to another device and in the presence of an interrogating RF field. Capacitor 1440 is typically tuned to create a resonant circuit at the frequency of interest (e.g., 13.56 MHz). When antenna 1480 is a large loop antenna, then bridge rectifier 1420 provides power to internal circuits as shown in Figure 12. Demodulator 1430 demodulates data present in the interrogating RF field, and load modulation driver circuit 1410 modulates an impedance seen by the device presenting the interrogating RF field when the coil (antenna 1480) is inductively coupled to a separate device that is presenting the interrogating RF field. This creates a half-duplex communications path between the device presenting the interrogating RF field and smartcard controller 330. Examples of smartcard controllers are the "SmartMX" controllers sold by NXP Semiconductors N.V. of Eindhoven, The Netherlands.

[0011] A need exists for a small footprint RFID tag that does not rely on an external device to house an antenna. A need also exists for a memory card compatible RFID tag that is compatible with standard memory card slots on mobile devices.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Figure 1 shows a mobile computing device and a small RFID card compatible with a memory card slot;

[0013] Figure 2 shows a block diagram of a mobile computing device;

[0014] Figures 3A-3B show block diagrams of memory card compatible RFID cards with integrated inductive elements;

[0015] Figure 4 shows a memory card compatible RFID card with an integrated inductive element;

[0016] Figure 5 shows a data portion of a memory card write command;

[0017] Figures 6-11 show flowcharts of methods in accordance with various embodiments of the present invention;

[0018] Figure 12 shows a power supply voltage developed over time by rectifying a voltage induced in a loop antenna in the presence of an interrogating RF field;

[0019] Figure 13 shows a prior art RFID tag implementation in a secure digital (SD) memory card;

[0020] Figure 14 shows a prior art smartcard controller and antenna in combination;

[0021] Figure 15 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and a single antenna in accordance with various embodiments of the present invention;

[0022] Figure 16 shows frequency spectrum used in RFID communications;

[0023] Figure 17 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0024] Figure 18 shows frequency spectrum used in RFID communications;

[0025] Figure 19 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0026] Figure 20 shows frequency spectrum used in RFID communications;

[0027] Figure 21 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and a single-an antenna in accordance with various embodiments of the present invention;

[0028] Figure 22 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0029] Figure 23 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0030] Figure 24 shows a smartcard controller with a pad to provide digital data output;

[0031] Figure 25 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and a single-an antenna in accordance with various embodiments of the present invention;

[0032] Figure 26 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0033] Figure 27 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0034] Figure 28 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and a single-an antenna in accordance with various embodiments of the present invention;

[0035] Figure 29 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0036] Figure 30 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0037] Figures 31-34 show performance enhancing application specific integrated circuits (ASICs) coupled to various smartcard controllers in accordance with various embodiments of the present invention;

[0038] Figure 35 shows a memory card with integrated smartcard controller, performance enhancement circuits and antennas in accordance with various embodiments of the present invention;

[0039] Figure 36 shows a memory card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention;

[0040] Figure 37 shows a subscriber identity module (SIM) card with integrated smartcard controller, performance enhancement circuits and antennas in accordance with various embodiments of the present invention;

[0041] Figure 38 shows a subscriber identity module (SIM) card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention; and

[0042] Figure 39 shows a mobile device with a smartcard controller, enhancement circuits, and antenna(s).

DESCRIPTION OF EMBODIMENTS

[0043] In the following detailed description, reference is made to the accompanying drawings that show, by way of illustration, various embodiments of an invention. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. It is to be understood that the various embodiments of the invention, although different, are not necessarily mutually exclusive. For example, a particular feature, structure, or characteristic described in connection with one embodiment may be implemented within other embodiments without departing from the spirit and scope of the invention. In addition, it is to be understood that the location or arrangement of individual elements within each disclosed embodiment may be modified without departing from the spirit and scope of the invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims, appropriately interpreted, along with the full range of equivalents to which the claims are entitled. In the drawings, like numerals refer to the same or similar functionality throughout the several views.

[0044] Figure 1 shows a mobile computing device and a small RFID card compatible with a memory card slot. Mobile computing device 110 is shown as a mobile phone in Figure 1, but this is not a limitation of the present invention. For example, mobile computing device 110 may

be a personal digital assistant (PDA), a smartphone, a mobile phone, a handheld computer, a desktop computer, or any other device capable of operating as described herein.

[0045] Mobile computing device 110 includes memory card slot 112. Memory card slot 112 is a slot capable of accepting RFID card 120. For example, memory card slot 112 may have physical dimensions compatible with RFID card 120, and may have a communications interface that operates using a protocol compatible with RFID card 120. In some embodiments of the present invention, memory card slot 112 is a memory card slot designed to accept and communicate with memory cards. As used herein, the term "memory card slot" refers to any add-on slot capable of accepting a card having memory accessible by a mobile computing device such as that shown in Figure 1. For example, a memory card slot may be compatible with an industry standard communications protocol, or may be compatible with a widely accepted communications protocol that is not necessarily formally documented as an industry standard. Examples include slots that are compatible with the Multimedia Memory Card (MMC) protocol, Memory Stick DUO protocol, secure digital (SD) protocol, and Smart Media protocol. The foregoing list is meant to be exemplary, and not exhaustive. Memory card slot 112 may be compatible with many memory card slot protocols other than those explicitly listed above without departing from the scope of the invention. Further, in some embodiments, memory card slot 112 accepts a subscriber identity module (SIM) card. Memory card slot 112 may be exposed on an edge of mobile computing device 110 as shown, or may be behind a cover. For example, memory card slot 112 may be behind a battery cover, behind a battery, or anywhere else on mobile computing device 110.

[0046] RFID card 120 includes electrical contacts 122 as part of a host interface that communicates with memory card slot 112. For example, electrical contacts 122 may provide connectivity compliant with a communications protocol for memory cards. RFID card 120 includes RFID functionality, and may also include memory accessible by mobile computing device 110. For example, in some embodiments, RFID card 120 includes a smartcard controller and an inductive element capable of interacting with an NFC reader (e.g., an ISO 14443 compliant interface). In other embodiments, RFID card 120 does not include memory accessible by mobile computing device 110. RFID card 120 may include functionality beyond memory and RFID. Electrical contacts 122 may also be compliant with a smartcard "contact" interface (e.g., ISO 7816).

[0047] In various embodiments of the present invention, the RFID functionality in RFID card 120 is accessed by mobile computing device 110 using memory card access commands already defined for use in memory card slot 112. Accordingly, the various embodiments of the present invention enable the implementation of RFID functions beyond memory accesses without defining new commands. In some embodiments, new commands for the RFID card are embedded inside the data bits subsequent to memory card read/write commands. RFID card 120 then decides if the incoming data bits are meant for regular read/write memory functions or for RFID functions. In other words, functions in addition to standard memory card functions may be accessed through commands "hidden" in the data stream that can be exchanged using existing memory card access commands and functions. According to the various embodiments of the invention, both existing memory card functions and RFID functions may be implemented without requiring changes in how the host protocol is built.

[0048] The combination of mobile computing device 110 and RFID card 120 may be used for any purpose. For example, in some embodiments, RFID card 120 may interact with a point-of-sale payment device to effect mobile payments. Also for example, in some embodiments, RFID card 120 may be used in wave-and-pay ticketing in mass transit environments, such as MIFARE.

[0049] Figure 2 shows a block diagram of a mobile computing device. Mobile computing device 110 includes antenna 240, radio circuits 230, processor 210, memory 220, and memory card slot 112. In some embodiments, mobile computing device 110 is a mobile phone, or includes mobile phone functionality. For example, antenna 240 and radio circuits 230 may be utilized to communicate with a cellular telephone network. Further, in some embodiments, mobile computing device 110 is a wireless local area network (WLAN) or wireless wide area network (WWAN) device. For example, antenna 240 and radio circuits 230 may be utilized to communicate with a wireless access point. In some embodiments, antenna 240 and radio circuits 230 are omitted, and mobile computing device 110 does not utilize wireless connectivity.

[0050] Processor 210 represents a processor capable of communicating with the other blocks shown in mobile computing device 110. For example, processor 210 may be a microprocessor, a digital signal processor (DSP), a microcontroller, or the like. Further, processor 210 may be formed from state machines or other sequential logic. In operation, processor 210 may read instructions from memory 220 and perform actions in response thereto. For example,

processor 210 may execute program instructions that influence communications between mobile computing device 110 and a device coupled to memory card slot 112.

[0051] Memory card slot 112 is described above with reference to Figure 1. Memory card slot 112 includes circuitry compatible with RFID card 120. Mobile computing device 110 may communicate with RFID card 120 by using a standard set of memory card access commands. For example, processor 210 may use memory card write commands to write to memory in RFID card 120, and may use memory card read commands to read from memory in RFID card 120. Mobile computing device 110 may also communicate with RFID card 120 using an ISO 7816 compatible interface or the like. For example, when RFID card 120 is a SIM card, mobile computing device 110 may communicate with a smartcard controller within the SIM card.

[0052] Mobile computing device 110 may access the RFID functionality in RFID card 120 using "hidden" commands embedded in memory card access commands. For example, a memory card write command may include a unique data string to identify the memory card write command as a command to be diverted for purposes other than a memory write. In addition, the sector address provided with the memory card write command may be set to a particular address value to further identify the memory card write command as a command to be diverted. In addition to specific address/data values to identify the memory card access command as a command to be diverted for a purpose other than a memory access, the memory access command may include data bits to further specify the type and function of hidden command. Example formats of hidden commands are described further below. In some embodiments, a read command is issued right after a write command to enable data flow from the non-memory card functions to the host, where the write command's data had the hidden commands. The combination of a memory card write command and a memory card read command can be used in this manner to form a hidden read command.

[0053] In some embodiments, memory card slot 112 is powered down after periods of inactivity to save power. For example, memory card slot 112 may be powered up when processor 210 issues a memory card write or read command, but may then be powered down to save power. When memory card slot 112 is powered down, any device coupled to the memory card slot is also powered down. For example, if RFID card 120 (Figure 1) is coupled to the memory card slot, then RFID card 120 is powered down when memory card slot 112 is powered down.

[0054] In various embodiments of the present invention, processor 210 executes software resident in memory 220 to maintain power to memory card slot 112 (and to RFID card 120). For example, periodic hidden commands may be sent to RFID card 120 for the purpose of keeping power applied while RFID card 120 is expected to be providing RFID functionality. Also for example, a hidden command may be sent to RFID card 120 for the purpose of cycling power to a smartcard controller resident on the card. These hidden commands are described further below with respect to later figures.

[0055] Figure 3A shows a block diagram of a memory card compatible RFID card with an integrated inductive element. RFID card 300 represents possible embodiments of RFID card 120 (Figure 1). RFID card 300 includes host interface 310, memory card controller 340, memory 360, smartcard controller 340, program memory 332, and small inductive element 350. RFID card 300 is capable of communicating with a memory card slot in a mobile computing device. Further, RFID card 300 does not require memory card slots to implement extended input/output functions. For example, and not by way of limitation, in SD and micro SD embodiments, RFID card 300 is operable in any SD or microSD memory card slot, and does not require a secure digital input output (SDIO) memory card slot.

[0056] Host interface 310 includes electrical contacts to interface with a memory card slot. For example, host interface 310 includes contacts such as contacts 122 (Figure 1). Also for example, in some embodiments, host interface 310 includes recessed electrical contacts. Host interface 310 may also include circuitry such as drivers, receivers, terminations, and the like.

[0057] In embodiments represented by Figure 3A, memory card controller 340 communicates with the mobile device using memory card access commands. Memory card controller 340 also communicates with memory 360. Memory card controller 340 determines whether each command should result in a memory operation with memory 360, whether a hidden command should be diverted to smartcard controller 330, or whether memory card controller 340 should take action in response to a hidden command. In some embodiments, memory card controller 340 executes instructions that are stored in an internal memory or stored in memory 360. In some embodiments, memory card controller 340 includes special purpose hardware useful to determine whether a command should be diverted. In other embodiments, memory card controller 340 may be a microcontroller identical in all respects to a controller found in memory cards, except for the program that it executes.

[0058] Memory 360 may be any type of volatile or non-volatile memory. For example, memory 360 may be volatile memory such as static random access memory (SRAM) or dynamic random access memory (DRAM). Also for example, memory 360 may be nonvolatile memory such as NOR FLASH memory or NAND FLASH memory. In various embodiments of the present invention, memory 360 represents memory that is accessed by a mobile computing device using memory card access commands defined for that purpose.

[0059] When RFID card 300 is communicating with a memory card slot in a mobile computing device, the mobile computing device may send a memory card access command in order to access memory 360. Also, for example, the mobile computing device may send a memory card access command that contains a hidden command. Memory card controller 340 detects the presence of the hidden command, and diverts all or a portion of the memory access command to smartcard controller 330 using communication bus 342. Communication bus 342 may have any number of conductors and may take any form. For example, communication bus 342 may be a serial port, a parallel port, or may include multiple data conductors, multiple address conductors, and/or conductors to carry control signals such as clock signals. In some embodiments, memory card controller 340 takes one or more actions in response to a hidden command. For example, memory card controller 340 may modify clock signals in response to a hidden command.

[0060] Memory card controller 340 can detect the hidden command in many ways. For example, in some embodiments, the memory card access command may include a specific address value or a specific data value. Memory card controller 340 detects commands that include one or both of the specific address value or specific data value and routes the command appropriately. The specific address value and specific data value used for this purpose are referred to herein as the hidden command address value and the hidden command data value.

[0061] In some embodiments, memory card controller 340 detects the presence of hidden commands based only on the hidden command address value. In these embodiments, memory card controller 340 checks the address value included in a memory card access command, and diverts the command (or takes some other action) if it matches the hidden command address value. In some embodiments, memory card controller 340 detects the presence of hidden commands based only on the hidden command data value. In these embodiments, memory card controller 340 checks a data value included in the memory card access command, and diverts all or a portion of the command if it matches the hidden command data value. In still further embodiments,

memory card controller 340 detects the presence of hidden commands based on both the hidden command address value and the hidden command data value. In these embodiments, memory card controller 340 diverts the command only if both the memory card access address and data match the hidden command address value and data value, respectively.

[0062] The hidden command address value and hidden command data value may be specified in many ways. For example, all RFID cards may be issued with fixed values. In these embodiments, each time the RFID functions are accessed, the same hidden command address and/or data value is included in the memory card access command. Also, for example, different RFID cards may be issued with unique values. In these embodiments, each RFID card may provide these values to a mobile computing device when queried. Also, for example, hidden command address and/or data values may be specified by the mobile computing device. In still further embodiments, hidden command address and data values may be dynamic. The hidden command address and data values may change each time power is applied or on a periodic basis.

[0063] Smartcard controller 330 receives hidden commands diverted by memory card controller 340. Smartcard controller 330 further interprets the hidden commands and performs actions in response thereto. Smartcard controller 330 executes instructions stored in program memory 332. In some embodiments, program memory 332 is embedded in smartcard controller 330, and in other embodiments, program memory 332 is part of memory 360.

[0064] Smartcard controller 330 is a dual interface smartcard controller with one of the interfaces including RFID functionality. In some embodiments, smartcard controller 330 is compatible with passive RFID tag readers in NFC applications. For example, smartcard controller 330 may be a device capable of implementing all or part of the ISO 14443 standard for contactless NFC devices. Also, for example, smartcard controller 330 may be a dual interface smartcard controller capable of implementing both ISO 7816 and ISO 14443 standards for contact/contactless requirements. The "SmartMX" family of controllers available from NXP Semiconductors N.V. of The Netherlands are examples of suitable dual interface smartcard controllers. These controllers provide RFID functionality at 13.56 MHz. The various embodiments of the present invention operate at 13.56 MHz, but are not limited to operation at this frequency. In some embodiments, smartcard controller interoperates with MIFARE systems for ticketing applications.

[0065] Smartcard controller 330 receives power from the host interface. By not receiving power from the interrogating RF field, the necessity of a loop antenna for power generation is negated. Smartcard controller 330 includes a contactless interface that in turn includes antenna port 334. Antenna port 334 includes at least two pads for connection to an antenna, shown as 1742 and 1744 in Figure 14 and later figures. In Figure 3A, antenna port 334 is coupled to small inductive element 350.

[0066] Small inductive element 350 includes a coil wound around a magnetic core. As described with reference to later figures, small inductive element may include one or more coils or antennas. The coil of small inductive element is too small to draw power from the interrogating RF field, but this is not necessary since smartcard controller 330 is powered by the host device through host interface 310. Small inductive element 350 interacts with an antenna in an RFID reader similar to the way that primary and secondary coils in a transformer interact. The RFID reader has a coil resonant at 13.56 MHz functioning as the primary coil of a transformer. Small inductive element 350 functions as the secondary coil of the transformer. Accordingly, the transmitter "sees" the impedance of the secondary coil (small inductive element 350). Smartcard controller 330 is able to modulate reflected RF signals using circuitry to modify the impedance at the antenna port 334.

[0067] Small inductive element 350 can be made very small. For example, in some embodiments, RFID card 120 is a miniSD card, microSD card, or SIM card, and small inductive element 350 is small enough to be completely contained in the miniSD, microSD, or SIM form factor. A specific embodiment of a small inductive element in a memory card form factor is described below with reference to Figure 4.

[0068] In various embodiments of the invention, memory card controller 340 and smartcard controller 330 are implemented in many different ways. For example, in some embodiments, the various components are implemented in hardware. In these embodiments, the various components may be implemented as separate integrated circuits, or in a combined integrated circuit. Also, for example, in some embodiments, the various components may be implemented in software, or in a combination of hardware and software. In some embodiments, RFID card 300 may include a microprocessor, and the components may be implemented as software modules running on the microprocessor. In other embodiments, RFID card 300 may

include multiple processors, and the components may be implemented as software modules distributed across the multiple processors.

[0069] Figure 3B shows a block diagram of a memory card compatible RFID card with an integrated inductive element. RFID card 302 represents possible embodiments of RFID card 120 (Figure 1). RFID card 302 includes host interface 310, memory card controller 340, memory 360, smartcard controller 340, program memory 332, and small inductive element 350, all of which are described above with reference to Figure 3A. RFID card 302 is capable of communicating with a memory card slot in a mobile computing device. Further, RFID card 302 does not require memory card slots to implement extended input/output functions. For example, and not by way of limitation, in SD and microSD embodiments, RFID card 302 is operable in any SD or microSD memory card slot, and does not require a secure digital input output (SDIO) memory card slot.

[0070] In embodiments represented by Figure 3B, smartcard controller 330 receives power from memory controller 340. In these embodiments, memory controller 340 has direct control over the power provided to smartcard controller 330. Memory controller 340 may apply and/or remove power from smartcard controller 330 in response to commands received over the host interface. For example, memory controller 340 may receive a hidden command to reset smartcard controller 330 by causing a reboot through a power cycle.

[0071] Figure 4 shows a memory card compatible RFID card with an integrated inductive element. RFID card 120 is shown in an SD card form factor, although this is not a limitation of the present invention. For example, other form factors within the scope of the present invention include, but are not limited to, microSD form factors and SIM card form factors. RFID card 120 includes electrical contacts 122, memory card controller 340, smartcard controller 330, memory 360, magnetic core 450, and coil 452, all affixed to circuit board 402.

[0072] Magnetic core 450 and coil 452 implement small inductive element 350 (Figures 3A, 3B). As can be seen in Figure 4, the small inductive element fits entirely within the memory card form factor. The small inductive element does not provide power generation for smartcard controller 330, and so does not need to be made large for that purpose.

[0073] Figure 5 shows a data portion of a memory card write command. Included are hidden command data value 510, status field 520, password field 530, device ID 532, command index 540, and hidden command related data 550. In the example of Figure 5, the data portion is

512 bytes in length, although this is not a limitation of the present invention. Any amount of data may be included in the write command, and each field shown in Figure 5 may be any length.

[0074] In the example of Figure 5, the hidden command data value is 256 bits long, although any length may be used without departing from the scope of the present invention. In some embodiments, hidden command data value 510 is used to identify a memory write command as a hidden command. When a write command is received having data in the first 256 bits that match the hidden command data value, the command is identified as one to be diverted to the smartcard controller. As described above, a hidden command address value may be used in conjunction with, or instead of, a hidden command data value to identify the memory write command as a hidden command.

[0075] The remaining fields have significance when the memory write is a hidden command. For example, if the first 256 bits do not match the hidden command data value (or if the write address does not match the hidden command address value, or both) then the remaining bits in the data field are to be treated as data in a normal memory write command. In contrast, when the memory write is a hidden command, the remaining fields are used to further interpret the hidden command.

[0076] Memory card controller 340 (Figures 3, 4) inspect the hidden command data value 510, status field 520, and possibly password field 530 and device ID 532. In some embodiments, if the command is identified as a hidden command, memory card controller 340 forwards the password 530, command index 540, and related data 550 to smartcard controller 330. In other embodiments, memory card controller 340 may directly take actions based on the hidden command.

[0077] Status field 520 may include any information relating to the status of the hidden command. For example, status field 520 may include one or more bits to signify to memory card controller 340 whether the host (mobile computing device) is expecting the smartcard controller to return data in response to the hidden command. For example, when status field 520 signifies a write, memory card controller 340 forwards the password, device ID, command index, and related data without expecting to return any data to the host. Also for example, when status field 520 signifies a read, memory card controller 340 forwards the password, device ID, command index, and related data with the expectation that smartcard controller 330 ~~will~~ may provide data to be sent to the host in response to a memory card read command. The combination of a memory card write

command followed shortly thereafter by a memory card read command may be used to provide "read" functionality to the smartcard controller. Read operations from the smartcard controller are described further below with reference to Figure 8.

[0078] Password field 530 includes a password to allow smartcard controller 330 to authenticate the host to the RFID card. In some embodiments, every hidden command includes a password. Each time the password, device ID, command index, and related data is diverted to the smartcard controller, the password is checked to authenticate the host to the RFID card.

[0079] Device ID 532 uniquely identifies the host (mobile computing device). The device ID may be checked by the smartcard controller to ensure that the RFID card is inserted in the host to which it is authenticated. Some embodiments of the present invention enforce a unique host/card pairing using the device ID, and other embodiments allow smartcard controller functions to be accessed by any host.

[0080] Command index 540 identifies the type of hidden command. The number of possible hidden commands is limited only by the number of bits allocated thereto. Any number of bits may be allocated to command index 540 without departing from the scope of the present invention. Hidden command related data 550 may be utilized differently for each type of hidden command. Any number of bits may be used for hidden command related data 550.

[0081] The data shown in Figure 5 is provided as an example, and the data field of a memory card access command may include more or fewer data fields than those shown in Figure 5. The present invention is not limited by the number or content of the fields in a memory card access command.

[0082] Figure 6 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 600 may be used by a mobile computing device to communicate with an RFID card in a memory card slot. In some embodiments, method 600, or portions thereof, is performed by a mobile computing device with a memory card slot, and in other embodiments, method 600, or portions thereof, is performed by software. The various actions in method 600 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 6 are omitted from method 600.

[0083] Method 600 begins at 610 in which a data pattern and an address value are received from an RFID card in a memory card slot. The data pattern corresponds to the hidden command data value, and the address value corresponds to the hidden command address value. In some

embodiments, the mobile device may only receives the data value and in other embodiments, the mobile device may only receives the address value. In some embodiments, the actions of 610 may occur once when the RFID card is first inserted in the memory card slot. The mobile computing device may then use the address and data values each time it creates a hidden command. In other embodiments, the actions of 610 may occur each time the RFID card is inserted in the memory slot. In still further embodiments, the actions of 610 may occur periodically. Each time the actions 610 occur, the data pattern may be the same or different, and the address value may be the same or different.

[0084] At 620, a data field of a memory card access command is populated with the data pattern to cause the command to be diverted to a smartcard controller on the RFID card. For example, the data pattern may be written to the data field as the hidden command data value 510 (Figure 5).

[0085] At 630, an address field of the memory card access command is populated with the address value to further cause the command to be diverted to the smartcard controller. In some embodiments, only one of 620 or 630 is utilized. In these embodiments, the presence of a hidden command is signified by the data pattern alone, or the address value alone.

[0086] At 640, the data field of the memory card access command is populated with a command string to specify a purpose other than a memory card access. For example, the command string may be written to the data field as the command index 540 for the smart card controller. This command may be used for any purpose. For example, one or more hidden commands may have as a sole purpose keeping power provided to the memory card slot so that the RFID card continues to receive power.

[0087] At 650, the data field of a memory card access command is populated with a password to authenticate access to the RFID card coupled to the memory card slot. In some embodiments, a password is included in the data field for every hidden command. In other embodiments, a password is only included at the beginning of an exchange.

[0088] At 660, the memory card access command is sent to the RFID card coupled to the memory card slot. For example, a mobile computing device (110, Figures 1, 2) may send the memory card access command to an RFID card (120, Figures 1, 3, 4) in a memory card slot (112, Figures 1, 2). The RFID card includes a memory card controller (340, Figure 3) to divert the command (or take some other action) based on the data fields populated in method 600.

[0089] Figure 7 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 700 may be used by an RFID card in a memory card slot. In some embodiments, method 700, or portions thereof, ~~is~~ may be performed by a memory card controller within a memory card compatible RFID card, and in other embodiments, method 700, or portions thereof, is performed by software. The various actions in method 700 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 7 are omitted from method 700.

[0090] Method 700 begins at 710 in which a memory card access command is received from a mobile computing device via a host interface. The actions of 710 correspond to an RFID card in a memory card slot of a mobile computing device receiving a memory card access command.

[0091] At 720, the memory card controller checks criteria in the memory card access command to determine if the memory card access command should be diverted to a smartcard controller resident on the RFID card. The criteria may be one or both of a hidden command data value, a hidden command address value, or both. If there is a criteria match at 730, then a hidden command is present, and at least a portion of the memory card access command is diverted at 740. If there is not a criteria match, then no hidden command is present, and a memory access is performed at 750.

[0092] Figure 8 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 800 may be used by an RFID card in a memory card slot. In some embodiments, method 800, or portions thereof, is performed by a memory card controller within an RFID card, and in other embodiments, method 800, or portions thereof, is performed by software. The various actions in method 800 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 8 are omitted from method 800.

[0093] Method 800 begins at 810 in which a memory card write command is received from a mobile computing device via a host interface. If the memory card write command is determined to be a hidden command, processing continues with 840; otherwise, a memory write is performed at 830.

[0094] At 840, the hidden command is diverted to a smartcard controller. In some embodiments, this corresponds to sending command index 540 and hidden command related data

550 (Figure 5) to the smartcard controller. If the hidden command is determined to be a "read" at 850, processing continues at 860; otherwise, the hidden command processing is done. At 860, the memory card controller retrieves non-memory data from the smartcard controller, and at 870, a memory card read command is received from the mobile computing device. At 880, the non-memory data is returned to the mobile computing device.

[0095] Method 800 demonstrates how a mobile computing device can perform a read from a smartcard controller in a memory card compatible RFID card. The mobile computing device issues a memory card write command with a hidden command having a status field designating a read, and then the mobile computing device issues a memory card read command. The processing in the card receives the hidden command, identifies it as a read, and then returns data to the mobile computing device in response to a subsequent memory card read command.

[0096] Figure 9 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 900 may be used by an RFID card in a memory card slot. In some embodiments, method 900, or portions thereof, is performed by a smartcard controller within an RFID card, and in other embodiments, method 900, or portions thereof, is performed by software. The various actions in method 900 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 9 are omitted from method 900.

[0097] Method 900 begins at 910 in which a smartcard controller receives a command from the memory card controller. This command corresponds to a hidden command received by the memory card controller. At 950, the smartcard controller determines whether the command is a "dummy" command used solely for the purpose of maintaining power to the memory card slot. If no, then the smartcard function specified in the command is performed at 930. If yes, then the command is disregarded at 960.

[0098] Method 900 allows a memory card compatible RFID card in a memory card slot to remain powered during periods when the memory card slot in the host device would otherwise remove power to save energy. This is a coordinated effort between software building hidden commands in a memory card access command, the memory card controller diverting the hidden command to the smartcard controller, and the smartcard controller disregarding the command. According to embodiments represented by Figure 3A, providing power to the RFID card also

provides power the smartcard controller, thereby allowing the use of a small inductive device such as those shown in Figures 3 and 4.

[0099] Figure 10 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 1000 may be used by an RFID card in a memory card slot. In some embodiments, method 1000, or portions thereof, is performed by a memory card controller within an RFID card, and in other embodiments, method 1000, or portions thereof, is performed by software. The various actions in method 1000 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 10 are omitted from method 1000.

[00100] Method 1000 begins at 1010 in which a memory card controller receives a hidden command from a mobile computing device. If at 1020, the memory card controller determines that the hidden command is to be diverted to the smartcard controller, then the command is diverted at 1030. In some embodiments, this corresponds to sending command index 540 and hidden command related data 550 (Figure 5) to the smartcard controller. If the command is not to be diverted, then the memory card controller does not divert the command; however, the memory card controller may take other actions at 1040 based on the hidden command. For example, the memory card controller may modify a clock signal provided to the smartcard controller. Also for example, the memory card controller may assert a reset signal to the smartcard controller. Still for example, the memory card controller may cycle power to the smartcard controller. The memory card controller is able to cycle power to the smartcard controller in embodiments represented by Figure 3B.

[00101] Cycling power to the smartcard controller may be a coordinated effort between the hosting computing device and the memory card controller in the RFID card. For example, power to the memory card slot may be maintained by supplying dummy hidden commands to the RFID card as described above with reference to Figure 9. While power is maintained to the memory card slot, hidden commands may be used to cause the memory card controller to cycle power to the smartcard controller.

[00102] Figure 11 shows a method authenticating a mobile computing device to one or more functions in a memory card compatible RFID card. Method 1100 begins at block 1110 in which an activation code is received at an RFID card from a mobile computing device. At 1120, the received activation code is compared to a code stored in the RFID card. If the activation code

matches, the RFID card receives a password from the mobile computing device at 1140, and stores the password in the RFID card for later use at 1150. If the activation code does not match, the RFID card determines whether a number of allowable tries has been exceeded at 1160. If the number of allowable tries has been exceeded, the RFID card issuer is contacted at 1170, and if the number of allowable tries has not been exceeded, the method repeats until either the activation code matches or the number of allowable tries has been exceeded.

[00103] Method 1100 may be performed when an RFID card is issued to a user. For example, the RFID card may be a mobile payment card issued by a financial institution. The user may be provided an activation code to "activate" the RFID card. When the user successfully enters the activation code, the user is prompted for a password, and that password is stored for use in future hidden commands.

[00104] In some embodiments, multiple non-memory functions in an RFID card are authenticated using method 1100. For example, each of multiple non-memory functions may have stored activation codes, and each is activated separately. Each of the separately activated functions may have a different password, or the multiple functions may share a password.

[00105] Embodiments described thus far include a power delivery mechanism from the host to the smartcard controller that allow the antenna or coil to be very small. The small antenna or coil allows for higher levels of integration, but may also reduce the maximum distance at which the RFID card ~~will~~ may function. For example, referring to Figure 14, the voltage produced by the antenna needs to overcome the diode drops of the bridge rectifier before data can be demodulated within the smartcard controller. As the antenna shrinks in size, the RFID card needs to be closer to the device producing the interrogating RF field in order to produce a large enough voltage to overcome the bridge rectifier diode drops, thereby reducing the maximum usable distance.

[00106] Figure 15 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and ~~a single~~ antenna in accordance with various embodiments of the present invention. Antenna 1542 is a small inductive element as described above. Capacitor 1544 is in parallel with antenna 1542 and together they form tuned circuit 1540 that is tuned to be resonant at the frequency of operation (e.g., 13.56 MHz). The performance enhancement circuits include an amplifier 1510, outgoing data extraction circuit 1520, and load modulation driver circuit 1530. Amplifier 1510 amplifies the voltage received at antenna1542,

and the amplified voltage is provided to the smartcard controller. This increases the maximum distance at which the RFID card can operate while receiving data, but also creates a unidirectional data path where a bidirectional data path previously existed. In other words, amplifier 1510 forms a simplex communication path where a half duplex path previously existed.

[00107] In order to restore the outgoing data path and re-create a half duplex communications system, the RFID card includes outgoing data extraction circuit 1520 and load modulation driver circuits 1530. Outgoing data extraction circuit 1520 receives a signal that is formed by the interrogating RF field having been load modulated by the smartcard controller. For example, the impedance of the antenna port is modulated by load modulation driver circuit 1410 (Figure 14), where the modulating signal is the data. Outgoing data extraction circuit 1520 recovers the data, and then load modulation driver circuit 1530 modulates the impedance of the tuned circuit 1540 to form the outgoing data path.

[00108] Outgoing data extraction circuit 1520 may include one or more filters to extract the data. For example, referring now to Figure 16, the load modulation driver circuit within the smartcard controller creates frequency sidebands 1610 about the carrier frequency 1620 of the interrogating RF field. Outgoing data extraction circuit 1520 may include conventional filters to isolate one or more sidebands and extract the data. As shown in Figure 16, in some 13.56 MHz embodiments, the bandwidth of the carrier frequency of the interrogating RF field may be on the order of 850 KHz and the bandwidth of the sidebands may be on the order of 100-200 KHz, although this is not a limitation of the present invention.

[00109] Load modulation driver circuit 1530 receives the extracted data from outgoing data extraction circuit 1520, and load modulates the tuned circuit 1540 in response thereto. Load modulation driver circuits are generally well known, and may be as simple as a switched transistor that adds and removes a reactive element from tuned circuit 1540. In some embodiments, load modulation driver circuit 1530 substantially duplicates the load modulation driver circuit 1410 within smartcard controller 330.

[00110] Amplifier 1510 is shown coupled to smartcard controller pad 1472, and data extraction circuit 1520 is shown coupled to smartcard controller pad 1474, but this is not a limitation of the present invention. For example, outgoing data extraction circuit 1520 may be coupled to smartcard controller pad 1472 while amplifier 1510 may be coupled to smartcard

controller pad 1474. Also for example, both circuit 1520 and amplifier 1510 may be coupled to either pad 1472 or pad 1474 without departing from the scope of the present invention.

[00111] Figure 17 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. Figure 17 shows smartcard controller 330, amplifier 1510, outgoing data extraction circuit 1520, and load modulation driver circuit 1530, all of which are described above. Figure 17 also shows tuned circuits 1740 and 1750. Tuned circuit 1740 includes receive antenna 1742 and capacitor 1744. Tuned circuit 1750 includes transmit antenna 1752 and capacitor 1754. In some embodiments, receive antenna 1742 and transmit antenna 1752 are small inductive elements as described above.

[00112] Separate transmit and receive antennas allow for different tuning, both in frequency and bandwidth, or "Q." For example, tuned circuit 1740 may be tuned with relatively high Q for receive as shown at 1820 in Figure 18, while tuned circuit 1750 may be tuned for a lower Q to envelope both sidebands for transmit as shown at 1830 in Figure 18. The higher Q tuning for the receive antenna may further increase the maximum usable distance when the RFID card is receiving.

[00113] Figure 19 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. Figure 19 shows smartcard controller 330, amplifier 1510, outgoing data extraction circuit 1520, load modulation driver circuit 1530, and tuned receive circuit 1740, all of which are described above. Figure 19 also shows two tuned transmit circuits 1950 and 1960. Tuned circuit 1950 includes antenna 1952 and capacitor 1954, and tuned circuit 1960 includes antenna 1962 and capacitor 1964. Antennas 1952 and 1962 may be small inductive elements as described above.

[00114] Separate transmit antennas allow separate tuning for the two sidebands. For example, tuned circuit 1950 may be tuned for the lower sideband tuned circuit 1960 may be tuned for the upper sideband as shown in Figure 20. Higher Q tuning of the transmit antennas for the separate sidebands may further increase the maximum usable distance when the RFID card is transmitting.

[00115] Figure 21 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and ~~a single~~ antenna in accordance with various

embodiments of the present invention. The circuits shown in Figure 21 are similar to Figure 15 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 may include circuits to actively transmit a signal rather than simply load modulate tuned circuit 1540. For example, active transmit driver circuit 2130 may include one or more amplifiers, filters, oscillators, modulators, etc., to form a signal that mimics the sidebands 1610 (Figure 16) as if the interrogating RF field experienced load modulation. Active transmission can make use of power available on the RFID card and can further increase the usable distance when smartcard controller 330 is transmitting.

[00116] Figure 22 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 22 are similar to Figure 17 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00117] Figure 23 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 23 are similar to Figure 19 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00118] Figure 24 shows a smartcard controller with a pad to provide a digital data output. Smartcard controller 2430 includes the antenna pads 1472 and 1474 as described above. Smartcard controller 2430 also includes pad 2410 which provides the digital data output directly. By providing the digital data output directly, smartcard controller 2430 enables various embodiments of the invention to eliminate the outgoing data extraction circuit.

[00119] Figure 25 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and ~~a single~~ antenna in accordance with various embodiments of the present invention. Figure 25 shows smartcard controller 2430, amplifier 1510, load modulation driver circuits 1530, and tuned circuit 1540, all of which are described above. Note that because smartcard controller 2430 provides digital data directly, the outgoing data extraction circuit 1520 (Figure 15) can be omitted, thereby reducing parts count and cost.

[00120] Figure 26 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. Figure 26 shows circuits similar to those shown in Figure 25, except that separate transmit and receive antennas are provided. Separate transmit and receive antennas (and associated tuned circuits) allow for a higher Q tuning of the receive antenna, thereby increasing the maximum usable distance when RFID card is receiving. See Figure 18.

[00121] Figure 27 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. Figure 27 shows circuits similar to those shown in Figure 26, except that multiple transmit antennas are provided. Multiple separate transmit antennas (and associated tuned circuits) allow for a higher Q tuning of each transmit antenna, thereby increasing the maximum usable distance when RFID card is transmitting. See Figure 20.

[00122] Figure 28 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and a single antenna in accordance with various embodiments of the present invention. The circuits shown in Figure 28 are similar to Figure 25 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21. In general, the term "driver" as used herein refers to an active transmit driver or a load modulation driver or any other method of driving the transmit output data.

[00123] Figure 29 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 29 are similar to Figure 26 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00124] Figure 30 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 30

are similar to Figure 27 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00125] Figures 31-34 show performance enhancing application specific integrated circuits (ASICs) coupled to various smartcard controllers in accordance with various embodiments of the present invention. Figures 31 and 32 show ASICs coupled to smartcard controller 330. Both ASICs include amplifier 1510 and outgoing data extraction circuits 1520. The ASIC of Figure 31 includes load modulation driver circuits 1530 and the ASIC of Figure 32 includes active transmit driver circuit 2130. Figures 33 and 34 show ASICs coupled to receive direct digital data from smartcard controller 2430. Accordingly, the outgoing data extraction circuits are omitted. The ASIC of Figure 33 includes amplifier 1510 and load modulation driver circuits 1530, and the ASIC of Figure 34 includes amplifier 1510 and active transmit driver circuit 2130.

[00126] By combining a smartcard controller and an ASIC as described herein, the performance of an RFID card may be enhanced with a reduced parts count. Further, any of ASICs shown may be used with separate receive and transmit antennas, multiple transmit antennas, or any combination. Further, one ASIC may be provided with all of the functionality shown in Figures 31-34 and the manner in which it is connected to a smartcard controller ~~will~~ may dictate which functional blocks (e.g., data extraction, load modulation, active transmit) are utilized.

[00127] Figure 35 shows a memory card with integrated smartcard controller, performance enhancement circuits, and antennas in accordance with various embodiments of the present invention. Host interface 310, memory card controller 340, and memory 360 are described above. Smartcard controller 3520 may be any smartcard controller described herein, including smartcard controller 330 or smartcard controller 2430. Enhancement circuits 3550 may include any of the enhancement circuits described herein including any combination of amplifier 1510, outgoing data extraction circuits 1520, load modulation driver circuits 1530, and active transmit driver circuit 2130. Antenna(s) 3560 may include any number or type of antennas. For example, antenna(s) 3560 may include one antenna, separate transmit and receive antennas, or a receive antenna and multiple transmit antennas.

[00128] Figure 36 shows a memory card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention. The memory card of Figure 36 shows circuits similar to Figure 35 with the exception of antenna(s) 3560. Instead, the memory card of Figure 36 is intended for use with a host device

that includes antenna(s). In some embodiments, antenna(s) 3560 are included in the memory card of Figure 36, thereby allowing the host device to decide whether to use the antennas on the memory card, or the antennas on the host device. The form factor of the memory card in Figures 35 and 36 is shown as a microSD card, but this is not a limitation of the present invention. Any form factor may be employed.

[00129] Figure 37 shows a subscriber identity module (SIM) card with integrated smartcard controller, performance enhancement circuits and antennas in accordance with various embodiments of the present invention. Smartcard controller 3520, enhancement circuits 3550, and antenna(s) 3560 are described above with reference to Figure 35.

[00130] Figure 38 shows a subscriber identity module (SIM) card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention. The SIM card of Figure 38 shows circuits similar to Figure 37 with the exception of antenna(s) 3560. Instead, the SIM card of Figure 38 is intended for use with a host device that includes antenna(s). In some embodiments, antenna(s) 3560 are included in the SIM card of Figure 38, thereby allowing the host device to decide whether to use the antennas on the SIM card, or the antennas on the host device.

[00131] Figure 39 shows a mobile device with a smartcard controller, enhancement circuits, and antenna(s). The mobile device of Figure 39 includes a built-in smartcard controller for RFID functionality as opposed to accepting a separate RFID card as described above. The mobile device may be any electronic device including a mobile phone, a tablet computer, or the like.

[00132] Although the present invention has been described in conjunction with certain embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention as those skilled in the art readily understand. Such modifications and variations are considered to be within the scope of the invention and the appended claims.

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Attorney Docket Number	18.P115.026US13

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	1	Advisory Action notified February 07, 2013 for U.S. Patent Application No. 12/960,070 (Docket No. 115.001US3).	
	2	Final Office Action notified December 11, 2012 for U.S. Patent Application No. 12/960,070 (Docket No. 115.001US3).	

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	4	International Preliminary Report & Written Opinion notified September 09, 2011 for PCT Patent Application No. PCT/US2010/025014 (Docket No. 115.024WO1).
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Name/Print	Usman Mughal	Registration Number	62887

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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

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METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INLCUDING MOBILE PAYMENTS AND TICKETING

CLAIM FOR PRIORITY

[0001] This application is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 16/791,609, filed February 14, 2020, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 16/393,275, filed April 24, 2019, now issued on March 31, 2020 as U.S. Patent No. 10,607,129, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/904,328, filed on February 24, 2018, now issued on June 11, 2019 as U.S. Patent No. 10,318,855, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/338,436, filed October 30, 2016, now issued on February 27, 2019, as U.S. Patent No. 9,904,887, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 14/517,585, filed October 17, 2014, now issued on November 08, 2016, as U.S. Patent No. 9,489,608, which is a continuation of, and claims priority to U.S. Patent Application No. 14/460,647, filed August 15, 2014, now issued on January 20, 2015, as U.S. Patent No. 8,937,549, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 13/871,849, on April 26, 2013, now issued on October 21, 2014, as U.S. Patent No. 8,866,614, which is a continuation of, and claims the benefit of priority to, U.S. Patent Application No. 13/038,341, filed March 01, 2011, now issued on May 28, 2013, as U.S. Patent No. 8,451,122, which is a continuation-in-part of, and claims the benefit of priority to U.S. Patent Application No. 12/188,346, filed August 08, 2008, now issued on June 14, 2011, as U.S. Patent No. 7,961,101 and which are incorporated by reference in their entirety.

FIELD

[0002] The present invention relates generally to contactless communications devices, and more specifically to contactless smartcard devices.

BACKGROUND

[0003] RFID "tags" can be separated into two broad categories: active tags and passive tags. Active tags are characterized by a local power source such as a battery. Active tags

generally transmit information by broadcasting on an RF carrier frequency of choice using a locally generated RF carrier. Active tags are typically used to transmit over long distances, often referred to as "far field communications" (FFC). Antennas used with active RFID tags tend to be large to allow for the communications over long distances.

[0004] Passive tags are not powered. Passive tags derive the energy needed to power the tag from an interrogating RF field, and use that energy to transmit response codes by modulating the impedance that the antenna presents to the interrogating field, thereby modulating the signal reflected back to the reader antenna. Passive tags are typically used to transmit over short distances, often referred to as "near field communications" (NFC). For example, passive tags operating at 13.56 MHz are typically designed to communicate with RFID readers a few centimeters away.

[0005] Passive tags are typically connected to "loop antennas." One example of a loop antenna is shown in U.S. Patent No. 6,568,600, issued to Carpier et al. on May 27, 2003 (the '600 patent). The device described in the '600 patent is recognizable as a "credit card sized" passive RFID card (more specifically, a card that conforms to ISO 7816 size requirements). The loop antenna is necessarily large because passive tags are powered using energy received by the antenna from signals transmitted by the RFID reader.

[0006] Figure 12 shows a power supply voltage developed over time by rectifying a voltage induced in a loop antenna in the presence of an interrogating RF field. Once the power supply voltage reaches a critical value, the tag is powered up and can operate. As the antenna size is reduced, it takes longer for the power supply voltage to reach the critical value, and the tag operation may not meet response time specifications. Below a certain antenna size, the power supply voltage may never reach the critical value, and the tag may never power up.

[0007] Antenna design for RFID applications is described in a Microchip Technology, Inc. application note entitled "Antenna Circuit Design for RFID Applications" by Youbok Lee, Ph.D., published in 2003 (no month given). Dr. Lee's application note describes in great detail how to determine size requirements for a passive RFID tag antenna to operate at 13.56 MHz. On page 5 of the application note, Dr. Lee shows that the optimum radius of the loop antenna coil is equal to 1.414 times the required read range. This analysis confirms that for a read range on the order of a few centimeters, a credit card sized loop antenna can be made near optimal.

[0008] Passive tags are seeing widespread use in many applications. For example, mobile device manufacturers are embedding passive RFID tags in mobile devices for NFC applications. Example mobile applications include, but are not limited to, ticketing and mobile payments. U.S. Patent No. 7,333,062 issued to Leizerovich et al. on February 19, 2008 (the '062 patent) shows a mobile phone with an integrated loop antenna for an NFC device. As shown in the '062 patent, the mobile phone provides the real estate necessary to implement a loop antenna at 13.56 MHz.

[0009] There have been attempts to implement passive tags in smaller mobile devices. These attempts have been met with limited success due in part to the size of the loop antenna. For example, Figure 13 shows an RFID tag implementation in a secure digital (SD) memory card manufactured by Wireless Dynamics, Inc. of Calgary, Alberta, Canada. Card 1300 includes an antenna, but the SD card is significantly oversized as a result. Also for example, U.S. Patent Application Publication No.: US 2006/0124755 A1 shows a memory card having a passive tag, but the card must be inserted into a slot to access a loop antenna on a different device. In this implementation, mobile device real estate is still relied upon for loop antenna implementation. It can be seen, therefore, that the size of antennas are proving to be a barrier to further miniaturization of passive RFID tags.

[0010] Figure 14 shows a prior art smartcard controller and antenna in combination. Smartcard controller 330 includes a contactless interface that includes two pads 1472 and 1474 intended for connection to a coil (antenna 1480). Smartcard controller 330 also includes bridge rectifier 1420 to rectify an alternating voltage present on pads 1472 and 1474 when antenna 1480 is inductively coupled to another device and in the presence of an interrogating RF field. Capacitor 1440 is typically tuned to create a resonant circuit at the frequency of interest (e.g., 13.56 MHz). When antenna 1480 is a large loop antenna, then bridge rectifier 1420 provides power to internal circuits as shown in Figure 12. Demodulator 1430 demodulates data present in the interrogating RF field, and load modulation driver circuit 1410 modulates an impedance seen by the device presenting the interrogating RF field when the coil (antenna 1480) is inductively coupled to a separate device that is presenting the interrogating RF field. This creates a half-duplex communications path between the device presenting the interrogating RF field and smartcard controller 330. Examples of smartcard controllers are the "SmartMX" controllers sold by NXP Semiconductors N.V. of Eindhoven, The Netherlands.

[0011] A need exists for a small footprint RFID tag that does not rely on an external device to house an antenna. A need also exists for a memory card compatible RFID tag that is compatible with standard memory card slots on mobile devices.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Figure 1 shows a mobile computing device and a small RFID card compatible with a memory card slot;

[0013] Figure 2 shows a block diagram of a mobile computing device;

[0014] Figures 3A-3B show block diagrams of memory card compatible RFID cards with integrated inductive elements;

[0015] Figure 4 shows a memory card compatible RFID card with an integrated inductive element;

[0016] Figure 5 shows a data portion of a memory card write command;

[0017] Figures 6-11 show flowcharts of methods in accordance with various embodiments of the present invention;

[0018] Figure 12 shows a power supply voltage developed over time by rectifying a voltage induced in a loop antenna in the presence of an interrogating RF field;

[0019] Figure 13 shows a prior art RFID tag implementation in a secure digital (SD) memory card;

[0020] Figure 14 shows a prior art smartcard controller and antenna in combination;

[0021] Figure 15 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and an antenna in accordance with various embodiments of the present invention;

[0022] Figure 16 shows frequency spectrum used in RFID communications;

[0023] Figure 17 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0024] Figure 18 shows frequency spectrum used in RFID communications;

[0025] Figure 19 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0026] Figure 20 shows frequency spectrum used in RFID communications;

[0027] Figure 21 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and an antenna in accordance with various embodiments of the present invention;

[0028] Figure 22 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0029] Figure 23 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0030] Figure 24 shows a smartcard controller with a pad to provide digital data output;

[0031] Figure 25 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and an antenna in accordance with various embodiments of the present invention;

[0032] Figure 26 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0033] Figure 27 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0034] Figure 28 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and an antenna in accordance with various embodiments of the present invention;

[0035] Figure 29 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention;

[0036] Figure 30 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention;

[0037] Figures 31-34 show performance enhancing application specific integrated circuits (ASICs) coupled to various smartcard controllers in accordance with various embodiments of the present invention;

[0038] Figure 35 shows a memory card with integrated smartcard controller, performance enhancement circuits and antennas in accordance with various embodiments of the present invention;

[0039] Figure 36 shows a memory card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention;

[0040] Figure 37 shows a subscriber identity module (SIM) card with integrated smartcard controller, performance enhancement circuits and antennas in accordance with various embodiments of the present invention;

[0041] Figure 38 shows a subscriber identity module (SIM) card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention; and

[0042] Figure 39 shows a mobile device with a smartcard controller, enhancement circuits, and antenna(s).

DESCRIPTION OF EMBODIMENTS

[0043] In the following detailed description, reference is made to the accompanying drawings that show, by way of illustration, various embodiments of an invention. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. It is to be understood that the various embodiments of the invention, although different, are not necessarily mutually exclusive. For example, a particular feature, structure, or characteristic described in connection with one embodiment may be implemented within other embodiments without departing from the spirit and scope of the invention. In addition, it is to be understood that the location or arrangement of individual elements within each disclosed embodiment may be modified without departing from the spirit and scope of the invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims, appropriately interpreted, along with the full range of equivalents to which the claims are entitled. In the drawings, like numerals refer to the same or similar functionality throughout the several views.

[0044] Figure 1 shows a mobile computing device and a small RFID card compatible with a memory card slot. Mobile computing device 110 is shown as a mobile phone in Figure 1, but this is not a limitation of the present invention. For example, mobile computing device 110 may

be a personal digital assistant (PDA), a smartphone, a mobile phone, a handheld computer, a desktop computer, or any other device capable of operating as described herein.

[0045] Mobile computing device 110 includes memory card slot 112. Memory card slot 112 is a slot capable of accepting RFID card 120. For example, memory card slot 112 may have physical dimensions compatible with RFID card 120, and may have a communications interface that operates using a protocol compatible with RFID card 120. In some embodiments of the present invention, memory card slot 112 is a memory card slot designed to accept and communicate with memory cards. As used herein, the term "memory card slot" refers to any add-on slot capable of accepting a card having memory accessible by a mobile computing device such as that shown in Figure 1. For example, a memory card slot may be compatible with an industry standard communications protocol, or may be compatible with a widely accepted communications protocol that is not necessarily formally documented as an industry standard. Examples include slots that are compatible with the Multimedia Memory Card (MMC) protocol, Memory Stick DUO protocol, secure digital (SD) protocol, and Smart Media protocol. The foregoing list is meant to be exemplary, and not exhaustive. Memory card slot 112 may be compatible with many memory card slot protocols other than those explicitly listed above without departing from the scope of the invention. Further, in some embodiments, memory card slot 112 accepts a subscriber identity module (SIM) card. Memory card slot 112 may be exposed on an edge of mobile computing device 110 as shown, or may be behind a cover. For example, memory card slot 112 may be behind a battery cover, behind a battery, or anywhere else on mobile computing device 110.

[0046] RFID card 120 includes electrical contacts 122 as part of a host interface that communicates with memory card slot 112. For example, electrical contacts 122 may provide connectivity compliant with a communications protocol for memory cards. RFID card 120 includes RFID functionality, and may also include memory accessible by mobile computing device 110. For example, in some embodiments, RFID card 120 includes a smartcard controller and an inductive element capable of interacting with an NFC reader (e.g., an ISO 14443 compliant interface). In other embodiments, RFID card 120 does not include memory accessible by mobile computing device 110. RFID card 120 may include functionality beyond memory and RFID. Electrical contacts 122 may also be compliant with a smartcard "contact" interface (e.g., ISO 7816).

[0047] In various embodiments of the present invention, the RFID functionality in RFID card 120 is accessed by mobile computing device 110 using memory card access commands already defined for use in memory card slot 112. Accordingly, the various embodiments of the present invention enable the implementation of RFID functions beyond memory accesses without defining new commands. In some embodiments, new commands for the RFID card are embedded inside the data bits subsequent to memory card read/write commands. RFID card 120 then decides if the incoming data bits are meant for regular read/write memory functions or for RFID functions. In other words, functions in addition to standard memory card functions may be accessed through commands "hidden" in the data stream that can be exchanged using existing memory card access commands and functions. According to the various embodiments of the invention, both existing memory card functions and RFID functions may be implemented without requiring changes in how the host protocol is built.

[0048] The combination of mobile computing device 110 and RFID card 120 may be used for any purpose. For example, in some embodiments, RFID card 120 may interact with a point-of-sale payment device to effect mobile payments. Also for example, in some embodiments, RFID card 120 may be used in wave-and-pay ticketing in mass transit environments, such as MIFARE.

[0049] Figure 2 shows a block diagram of a mobile computing device. Mobile computing device 110 includes antenna 240, radio circuits 230, processor 210, memory 220, and memory card slot 112. In some embodiments, mobile computing device 110 is a mobile phone, or includes mobile phone functionality. For example, antenna 240 and radio circuits 230 may be utilized to communicate with a cellular telephone network. Further, in some embodiments, mobile computing device 110 is a wireless local area network (WLAN) or wireless wide area network (WWAN) device. For example, antenna 240 and radio circuits 230 may be utilized to communicate with a wireless access point. In some embodiments, antenna 240 and radio circuits 230 are omitted, and mobile computing device 110 does not utilize wireless connectivity.

[0050] Processor 210 represents a processor capable of communicating with the other blocks shown in mobile computing device 110. For example, processor 210 may be a microprocessor, a digital signal processor (DSP), a microcontroller, or the like. Further, processor 210 may be formed from state machines or other sequential logic. In operation, processor 210 may read instructions from memory 220 and perform actions in response thereto. For example,

processor 210 may execute program instructions that influence communications between mobile computing device 110 and a device coupled to memory card slot 112.

[0051] Memory card slot 112 is described above with reference to Figure 1. Memory card slot 112 includes circuitry compatible with RFID card 120. Mobile computing device 110 may communicate with RFID card 120 by using a standard set of memory card access commands. For example, processor 210 may use memory card write commands to write to memory in RFID card 120, and may use memory card read commands to read from memory in RFID card 120. Mobile computing device 110 may also communicate with RFID card 120 using an ISO 7816 compatible interface or the like. For example, when RFID card 120 is a SIM card, mobile computing device 110 may communicate with a smartcard controller within the SIM card.

[0052] Mobile computing device 110 may access the RFID functionality in RFID card 120 using "hidden" commands embedded in memory card access commands. For example, a memory card write command may include a unique data string to identify the memory card write command as a command to be diverted for purposes other than a memory write. In addition, the sector address provided with the memory card write command may be set to a particular address value to further identify the memory card write command as a command to be diverted. In addition to specific address/data values to identify the memory card access command as a command to be diverted for a purpose other than a memory access, the memory access command may include data bits to further specify the type and function of hidden command. Example formats of hidden commands are described further below. In some embodiments, a read command is issued right after a write command to enable data flow from the non-memory card functions to the host, where the write command's data had the hidden commands. The combination of a memory card write command and a memory card read command can be used in this manner to form a hidden read command.

[0053] In some embodiments, memory card slot 112 is powered down after periods of inactivity to save power. For example, memory card slot 112 may be powered up when processor 210 issues a memory card write or read command, but may then be powered down to save power. When memory card slot 112 is powered down, any device coupled to the memory card slot is also powered down. For example, if RFID card 120 (Figure 1) is coupled to the memory card slot, then RFID card 120 is powered down when memory card slot 112 is powered down.

[0054] In various embodiments of the present invention, processor 210 executes software resident in memory 220 to maintain power to memory card slot 112 (and to RFID card 120). For example, periodic hidden commands may be sent to RFID card 120 for the purpose of keeping power applied while RFID card 120 is expected to be providing RFID functionality. Also for example, a hidden command may be sent to RFID card 120 for the purpose of cycling power to a smartcard controller resident on the card. These hidden commands are described further below with respect to later figures.

[0055] Figure 3A shows a block diagram of a memory card compatible RFID card with an integrated inductive element. RFID card 300 represents possible embodiments of RFID card 120 (Figure 1). RFID card 300 includes host interface 310, memory card controller 340, memory 360, smartcard controller 340, program memory 332, and small inductive element 350. RFID card 300 is capable of communicating with a memory card slot in a mobile computing device. Further, RFID card 300 does not require memory card slots to implement extended input/output functions. For example, and not by way of limitation, in SD and micro SD embodiments, RFID card 300 is operable in any SD or microSD memory card slot, and does not require a secure digital input output (SDIO) memory card slot.

[0056] Host interface 310 includes electrical contacts to interface with a memory card slot. For example, host interface 310 includes contacts such as contacts 122 (Figure 1). Also for example, in some embodiments, host interface 310 includes recessed electrical contacts. Host interface 310 may also include circuitry such as drivers, receivers, terminations, and the like.

[0057] In embodiments represented by Figure 3A, memory card controller 340 communicates with the mobile device using memory card access commands. Memory card controller 340 also communicates with memory 360. Memory card controller 340 determines whether each command should result in a memory operation with memory 360, whether a hidden command should be diverted to smartcard controller 330, or whether memory card controller 340 should take action in response to a hidden command. In some embodiments, memory card controller 340 executes instructions that are stored in an internal memory or stored in memory 360. In some embodiments, memory card controller 340 includes special purpose hardware useful to determine whether a command should be diverted. In other embodiments, memory card controller 340 may be a microcontroller identical in all respects to a controller found in memory cards, except for the program that it executes.

[0058] Memory 360 may be any type of volatile or non-volatile memory. For example, memory 360 may be volatile memory such as static random access memory (SRAM) or dynamic random access memory (DRAM). Also for example, memory 360 may be nonvolatile memory such as NOR FLASH memory or NAND FLASH memory. In various embodiments of the present invention, memory 360 represents memory that is accessed by a mobile computing device using memory card access commands defined for that purpose.

[0059] When RFID card 300 is communicating with a memory card slot in a mobile computing device, the mobile computing device may send a memory card access command in order to access memory 360. Also, for example, the mobile computing device may send a memory card access command that contains a hidden command. Memory card controller 340 detects the presence of the hidden command, and diverts all or a portion of the memory access command to smartcard controller 330 using communication bus 342. Communication bus 342 may have any number of conductors and may take any form. For example, communication bus 342 may be a serial port, a parallel port, or may include multiple data conductors, multiple address conductors, and/or conductors to carry control signals such as clock signals. In some embodiments, memory card controller 340 takes one or more actions in response to a hidden command. For example, memory card controller 340 may modify clock signals in response to a hidden command.

[0060] Memory card controller 340 can detect the hidden command in many ways. For example, in some embodiments, the memory card access command may include a specific address value or a specific data value. Memory card controller 340 detects commands that include one or both of the specific address value or specific data value and routes the command appropriately. The specific address value and specific data value used for this purpose are referred to herein as the hidden command address value and the hidden command data value.

[0061] In some embodiments, memory card controller 340 detects the presence of hidden commands based only on the hidden command address value. In these embodiments, memory card controller 340 checks the address value included in a memory card access command, and diverts the command (or takes some other action) if it matches the hidden command address value. In some embodiments, memory card controller 340 detects the presence of hidden commands based only on the hidden command data value. In these embodiments, memory card controller 340 checks a data value included in the memory card access command, and diverts all or a portion of the command if it matches the hidden command data value. In still further embodiments,

memory card controller 340 detects the presence of hidden commands based on both the hidden command address value and the hidden command data value. In these embodiments, memory card controller 340 diverts the command only if both the memory card access address and data match the hidden command address value and data value, respectively.

[0062] The hidden command address value and hidden command data value may be specified in many ways. For example, all RFID cards may be issued with fixed values. In these embodiments, each time the RFID functions are accessed, the same hidden command address and/or data value is included in the memory card access command. Also, for example, different RFID cards may be issued with unique values. In these embodiments, each RFID card may provide these values to a mobile computing device when queried. Also, for example, hidden command address and/or data values may be specified by the mobile computing device. In still further embodiments, hidden command address and data values may be dynamic. The hidden command address and data values may change each time power is applied or on a periodic basis.

[0063] Smartcard controller 330 receives hidden commands diverted by memory card controller 340. Smartcard controller 330 further interprets the hidden commands and performs actions in response thereto. Smartcard controller 330 executes instructions stored in program memory 332. In some embodiments, program memory 332 is embedded in smartcard controller 330, and in other embodiments, program memory 332 is part of memory 360.

[0064] Smartcard controller 330 is a dual interface smartcard controller with one of the interfaces including RFID functionality. In some embodiments, smartcard controller 330 is compatible with passive RFID tag readers in NFC applications. For example, smartcard controller 330 may be a device capable of implementing all or part of the ISO 14443 standard for contactless NFC devices. Also, for example, smartcard controller 330 may be a dual interface smartcard controller capable of implementing both ISO 7816 and ISO 14443 standards for contact/contactless requirements. The "SmartMX" family of controllers available from NXP Semiconductors N.V. of The Netherlands are examples of suitable dual interface smartcard controllers. These controllers provide RFID functionality at 13.56 MHz. The various embodiments of the present invention operate at 13.56 MHz, but are not limited to operation at this frequency. In some embodiments, smartcard controller interoperates with MIFARE systems for ticketing applications.

[0065] Smartcard controller 330 receives power from the host interface. By not receiving power from the interrogating RF field, the necessity of a loop antenna for power generation is negated. Smartcard controller 330 includes a contactless interface that in turn includes antenna port 334. Antenna port 334 includes at least two pads for connection to an antenna, shown as 1742 and 1744 in Figure 14 and later figures. In Figure 3A, antenna port 334 is coupled to small inductive element 350.

[0066] Small inductive element 350 includes a coil wound around a magnetic core. As described with reference to later figures, small inductive element may include one or more coils or antennas. The coil of small inductive element is too small to draw power from the interrogating RF field, but this is not necessary since smartcard controller 330 is powered by the host device through host interface 310. Small inductive element 350 interacts with an antenna in an RFID reader similar to the way that primary and secondary coils in a transformer interact. The RFID reader has a coil resonant at 13.56 MHz functioning as the primary coil of a transformer. Small inductive element 350 functions as the secondary coil of the transformer. Accordingly, the transmitter "sees" the impedance of the secondary coil (small inductive element 350). Smartcard controller 330 is able to modulate reflected RF signals using circuitry to modify the impedance at the antenna port 334.

[0067] Small inductive element 350 can be made very small. For example, in some embodiments, RFID card 120 is a miniSD card, microSD card, or SIM card, and small inductive element 350 is small enough to be completely contained in the miniSD, microSD, or SIM form factor. A specific embodiment of a small inductive element in a memory card form factor is described below with reference to Figure 4.

[0068] In various embodiments of the invention, memory card controller 340 and smartcard controller 330 are implemented in many different ways. For example, in some embodiments, the various components are implemented in hardware. In these embodiments, the various components may be implemented as separate integrated circuits, or in a combined integrated circuit. Also, for example, in some embodiments, the various components may be implemented in software, or in a combination of hardware and software. In some embodiments, RFID card 300 may include a microprocessor, and the components may be implemented as software modules running on the microprocessor. In other embodiments, RFID card 300 may

include multiple processors, and the components may be implemented as software modules distributed across the multiple processors.

[0069] Figure 3B shows a block diagram of a memory card compatible RFID card with an integrated inductive element. RFID card 302 represents possible embodiments of RFID card 120 (Figure 1). RFID card 302 includes host interface 310, memory card controller 340, memory 360, smartcard controller 340, program memory 332, and small inductive element 350, all of which are described above with reference to Figure 3A. RFID card 302 is capable of communicating with a memory card slot in a mobile computing device. Further, RFID card 302 does not require memory card slots to implement extended input/output functions. For example, and not by way of limitation, in SD and microSD embodiments, RFID card 302 is operable in any SD or microSD memory card slot, and does not require a secure digital input output (SDIO) memory card slot.

[0070] In embodiments represented by Figure 3B, smartcard controller 330 receives power from memory controller 340. In these embodiments, memory controller 340 has direct control over the power provided to smartcard controller 330. Memory controller 340 may apply and/or remove power from smartcard controller 330 in response to commands received over the host interface. For example, memory controller 340 may receive a hidden command to reset smartcard controller 330 by causing a reboot through a power cycle.

[0071] Figure 4 shows a memory card compatible RFID card with an integrated inductive element. RFID card 120 is shown in an SD card form factor, although this is not a limitation of the present invention. For example, other form factors within the scope of the present invention include, but are not limited to, microSD form factors and SIM card form factors. RFID card 120 includes electrical contacts 122, memory card controller 340, smartcard controller 330, memory 360, magnetic core 450, and coil 452, all affixed to circuit board 402.

[0072] Magnetic core 450 and coil 452 implement small inductive element 350 (Figures 3A, 3B). As can be seen in Figure 4, the small inductive element fits entirely within the memory card form factor. The small inductive element does not provide power generation for smartcard controller 330, and so does not need to be made large for that purpose.

[0073] Figure 5 shows a data portion of a memory card write command. Included are hidden command data value 510, status field 520, password field 530, device ID 532, command index 540, and hidden command related data 550. In the example of Figure 5, the data portion is

512 bytes in length, although this is not a limitation of the present invention. Any amount of data may be included in the write command, and each field shown in Figure 5 may be any length.

[0074] In the example of Figure 5, the hidden command data value is 256 bits long, although any length may be used without departing from the scope of the present invention. In some embodiments, hidden command data value 510 is used to identify a memory write command as a hidden command. When a write command is received having data in the first 256 bits that match the hidden command data value, the command is identified as one to be diverted to the smartcard controller. As described above, a hidden command address value may be used in conjunction with, or instead of, a hidden command data value to identify the memory write command as a hidden command.

[0075] The remaining fields have significance when the memory write is a hidden command. For example, if the first 256 bits do not match the hidden command data value (or if the write address does not match the hidden command address value, or both) then the remaining bits in the data field are to be treated as data in a normal memory write command. In contrast, when the memory write is a hidden command, the remaining fields are used to further interpret the hidden command.

[0076] Memory card controller 340 (Figures 3, 4) inspect the hidden command data value 510, status field 520, and possibly password field 530 and device ID 532. In some embodiments, if the command is identified as a hidden command, memory card controller 340 forwards the password 530, command index 540, and related data 550 to smartcard controller 330. In other embodiments, memory card controller 340 may directly take actions based on the hidden command.

[0077] Status field 520 may include any information relating to the status of the hidden command. For example, status field 520 may include one or more bits to signify to memory card controller 340 whether the host (mobile computing device) is expecting the smartcard controller to return data in response to the hidden command. For example, when status field 520 signifies a write, memory card controller 340 forwards the password, device ID, command index, and related data without expecting to return any data to the host. Also for example, when status field 520 signifies a read, memory card controller 340 forwards the password, device ID, command index, and related data with the expectation that smartcard controller 330 may provide data to be sent to the host in response to a memory card read command. The combination of a memory card write

command followed shortly thereafter by a memory card read command may be used to provide "read" functionality to the smartcard controller. Read operations from the smartcard controller are described further below with reference to Figure 8.

[0078] Password field 530 includes a password to allow smartcard controller 330 to authenticate the host to the RFID card. In some embodiments, every hidden command includes a password. Each time the password, device ID, command index, and related data is diverted to the smartcard controller, the password is checked to authenticate the host to the RFID card.

[0079] Device ID 532 uniquely identifies the host (mobile computing device). The device ID may be checked by the smartcard controller to ensure that the RFID card is inserted in the host to which it is authenticated. Some embodiments of the present invention enforce a unique host/card pairing using the device ID, and other embodiments allow smartcard controller functions to be accessed by any host.

[0080] Command index 540 identifies the type of hidden command. The number of possible hidden commands is limited only by the number of bits allocated thereto. Any number of bits may be allocated to command index 540 without departing from the scope of the present invention. Hidden command related data 550 may be utilized differently for each type of hidden command. Any number of bits may be used for hidden command related data 550.

[0081] The data shown in Figure 5 is provided as an example, and the data field of a memory card access command may include more or fewer data fields than those shown in Figure 5. The present invention is not limited by the number or content of the fields in a memory card access command.

[0082] Figure 6 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 600 may be used by a mobile computing device to communicate with an RFID card in a memory card slot. In some embodiments, method 600, or portions thereof, is performed by a mobile computing device with a memory card slot, and in other embodiments, method 600, or portions thereof, is performed by software. The various actions in method 600 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 6 are omitted from method 600.

[0083] Method 600 begins at 610 in which a data pattern and an address value are received from an RFID card in a memory card slot. The data pattern corresponds to the hidden command data value, and the address value corresponds to the hidden command address value. In some

embodiments, the mobile device may receive the data value and in other embodiments, the mobile device may receive the address value. In some embodiments, the actions of 610 may occur once when the RFID card is first inserted in the memory card slot. The mobile computing device may then use the address and data values each time it creates a hidden command. In other embodiments, the actions of 610 may occur each time the RFID card is inserted in the memory slot. In still further embodiments, the actions of 610 may occur periodically. Each time the actions 610 occur, the data pattern may be the same or different, and the address value may be the same or different.

[0084] At 620, a data field of a memory card access command is populated with the data pattern to cause the command to be diverted to a smartcard controller on the RFID card. For example, the data pattern may be written to the data field as the hidden command data value 510 (Figure 5).

[0085] At 630, an address field of the memory card access command is populated with the address value to further cause the command to be diverted to the smartcard controller. In some embodiments, only one of 620 or 630 is utilized. In these embodiments, the presence of a hidden command is signified by the data pattern alone, or the address value alone.

[0086] At 640, the data field of the memory card access command is populated with a command string to specify a purpose other than a memory card access. For example, the command string may be written to the data field as the command index 540 for the smart card controller. This command may be used for any purpose. For example, one or more hidden commands may have as a sole purpose keeping power provided to the memory card slot so that the RFID card continues to receive power.

[0087] At 650, the data field of a memory card access command is populated with a password to authenticate access to the RFID card coupled to the memory card slot. In some embodiments, a password is included in the data field for every hidden command. In other embodiments, a password is only included at the beginning of an exchange.

[0088] At 660, the memory card access command is sent to the RFID card coupled to the memory card slot. For example, a mobile computing device (110, Figures 1, 2) may send the memory card access command to an RFID card (120, Figures 1, 3, 4) in a memory card slot (112, Figures 1, 2). The RFID card includes a memory card controller (340, Figure 3) to divert the command (or take some other action) based on the data fields populated in method 600.

[0089] Figure 7 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 700 may be used by an RFID card in a memory card slot. In some embodiments, method 700, or portions thereof, may be performed by a memory card controller within a memory card compatible RFID card, and in other embodiments, method 700, or portions thereof, is performed by software. The various actions in method 700 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 7 are omitted from method 700.

[0090] Method 700 begins at 710 in which a memory card access command is received from a mobile computing device via a host interface. The actions of 710 correspond to an RFID card in a memory card slot of a mobile computing device receiving a memory card access command.

[0091] At 720, the memory card controller checks criteria in the memory card access command to determine if the memory card access command should be diverted to a smartcard controller resident on the RFID card. The criteria may be one or both of a hidden command data value, a hidden command address value, or both. If there is a criteria match at 730, then a hidden command is present, and at least a portion of the memory card access command is diverted at 740. If there is not a criteria match, then no hidden command is present, and a memory access is performed at 750.

[0092] Figure 8 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 800 may be used by an RFID card in a memory card slot. In some embodiments, method 800, or portions thereof, is performed by a memory card controller within an RFID card, and in other embodiments, method 800, or portions thereof, is performed by software. The various actions in method 800 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 8 are omitted from method 800.

[0093] Method 800 begins at 810 in which a memory card write command is received from a mobile computing device via a host interface. If the memory card write command is determined to be a hidden command, processing continues with 840; otherwise, a memory write is performed at 830.

[0094] At 840, the hidden command is diverted to a smartcard controller. In some embodiments, this corresponds to sending command index 540 and hidden command related data

550 (Figure 5) to the smartcard controller. If the hidden command is determined to be a "read" at 850, processing continues at 860; otherwise, the hidden command processing is done. At 860, the memory card controller retrieves non-memory data from the smartcard controller, and at 870, a memory card read command is received from the mobile computing device. At 880, the non-memory data is returned to the mobile computing device.

[0095] Method 800 demonstrates how a mobile computing device can perform a read from a smartcard controller in a memory card compatible RFID card. The mobile computing device issues a memory card write command with a hidden command having a status field designating a read, and then the mobile computing device issues a memory card read command. The processing in the card receives the hidden command, identifies it as a read, and then returns data to the mobile computing device in response to a subsequent memory card read command.

[0096] Figure 9 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 900 may be used by an RFID card in a memory card slot. In some embodiments, method 900, or portions thereof, is performed by a smartcard controller within an RFID card, and in other embodiments, method 900, or portions thereof, is performed by software. The various actions in method 900 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 9 are omitted from method 900.

[0097] Method 900 begins at 910 in which a smartcard controller receives a command from the memory card controller. This command corresponds to a hidden command received by the memory card controller. At 950, the smartcard controller determines whether the command is a "dummy" command used solely for the purpose of maintaining power to the memory card slot. If no, then the smartcard function specified in the command is performed at 930. If yes, then the command is disregarded at 960.

[0098] Method 900 allows a memory card compatible RFID card in a memory card slot to remain powered during periods when the memory card slot in the host device would otherwise remove power to save energy. This is a coordinated effort between software building hidden commands in a memory card access command, the memory card controller diverting the hidden command to the smartcard controller, and the smartcard controller disregarding the command. According to embodiments represented by Figure 3A, providing power to the RFID card also

provides power the smartcard controller, thereby allowing the use of a small inductive device such as those shown in Figures 3 and 4.

[0099] Figure 10 shows a flowchart in accordance with various embodiments of the present invention. In some embodiments, method 1000 may be used by an RFID card in a memory card slot. In some embodiments, method 1000, or portions thereof, is performed by a memory card controller within an RFID card, and in other embodiments, method 1000, or portions thereof, is performed by software. The various actions in method 1000 may be performed in the order presented, in a different order, or simultaneously. Further, in some embodiments, some actions listed in Figure 10 are omitted from method 1000.

[00100] Method 1000 begins at 1010 in which a memory card controller receives a hidden command from a mobile computing device. If at 1020, the memory card controller determines that the hidden command is to be diverted to the smartcard controller, then the command is diverted at 1030. In some embodiments, this corresponds to sending command index 540 and hidden command related data 550 (Figure 5) to the smartcard controller. If the command is not to be diverted, then the memory card controller does not divert the command; however, the memory card controller may take other actions at 1040 based on the hidden command. For example, the memory card controller may modify a clock signal provided to the smartcard controller. Also for example, the memory card controller may assert a reset signal to the smartcard controller. Still for example, the memory card controller may cycle power to the smartcard controller. The memory card controller is able to cycle power to the smartcard controller in embodiments represented by Figure 3B.

[00101] Cycling power to the smartcard controller may be a coordinated effort between the hosting computing device and the memory card controller in the RFID card. For example, power to the memory card slot may be maintained by supplying dummy hidden commands to the RFID card as described above with reference to Figure 9. While power is maintained to the memory card slot, hidden commands may be used to cause the memory card controller to cycle power to the smartcard controller.

[00102] Figure 11 shows a method authenticating a mobile computing device to one or more functions in a memory card compatible RFID card. Method 1100 begins at block 1110 in which an activation code is received at an RFID card from a mobile computing device. At 1120, the received activation code is compared to a code stored in the RFID card. If the activation code

matches, the RFID card receives a password from the mobile computing device at 1140, and stores the password in the RFID card for later use at 1150. If the activation code does not match, the RFID card determines whether a number of allowable tries has been exceeded at 1160. If the number of allowable tries has been exceeded, the RFID card issuer is contacted at 1170, and if the number of allowable tries has not been exceeded, the method repeats until either the activation code matches or the number of allowable tries has been exceeded.

[00103] Method 1100 may be performed when an RFID card is issued to a user. For example, the RFID card may be a mobile payment card issued by a financial institution. The user may be provided an activation code to "activate" the RFID card. When the user successfully enters the activation code, the user is prompted for a password, and that password is stored for use in future hidden commands.

[00104] In some embodiments, multiple non-memory functions in an RFID card are authenticated using method 1100. For example, each of multiple non-memory functions may have stored activation codes, and each is activated separately. Each of the separately activated functions may have a different password, or the multiple functions may share a password.

[00105] Embodiments described thus far include a power delivery mechanism from the host to the smartcard controller that allow the antenna or coil to be very small. The small antenna or coil allows for higher levels of integration, but may also reduce the maximum distance at which the RFID card may function. For example, referring to Figure 14, the voltage produced by the antenna needs to overcome the diode drops of the bridge rectifier before data can be demodulated within the smartcard controller. As the antenna shrinks in size, the RFID card needs to be closer to the device producing the interrogating RF field in order to produce a large enough voltage to overcome the bridge rectifier diode drops, thereby reducing the maximum usable distance.

[00106] Figure 15 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and an antenna in accordance with various embodiments of the present invention. Antenna 1542 is a small inductive element as described above. Capacitor 1544 is in parallel with antenna 1542 and together they form tuned circuit 1540 that is tuned to be resonant at the frequency of operation (e.g., 13.56 MHz). The performance enhancement circuits include an amplifier 1510, outgoing data extraction circuit 1520, and load modulation driver circuit 1530. Amplifier 1510 amplifies the voltage received at antenna1542, and the amplified voltage is provided to the smartcard controller. This increases the maximum distance at which the RFID

card can operate while receiving data, but also creates a unidirectional data path where a bidirectional data path previously existed. In other words, amplifier 1510 forms a simplex communication path where a half duplex path previously existed.

[00107] In order to restore the outgoing data path and re-create a half duplex communications system, the RFID card includes outgoing data extraction circuit 1520 and load modulation driver circuits 1530. Outgoing data extraction circuit 1520 receives a signal that is formed by the interrogating RF field having been load modulated by the smartcard controller. For example, the impedance of the antenna port is modulated by load modulation driver circuit 1410 (Figure 14), where the modulating signal is the data. Outgoing data extraction circuit 1520 recovers the data, and then load modulation driver circuit 1530 modulates the impedance of the tuned circuit 1540 to form the outgoing data path.

[00108] Outgoing data extraction circuit 1520 may include one or more filters to extract the data. For example, referring now to Figure 16, the load modulation driver circuit within the smartcard controller creates frequency sidebands 1610 about the carrier frequency 1620 of the interrogating RF field. Outgoing data extraction circuit 1520 may include conventional filters to isolate one or more sidebands and extract the data. As shown in Figure 16, in some 13.56 MHz embodiments, the bandwidth of the carrier frequency of the interrogating RF field may be on the order of 850 KHz and the bandwidth of the sidebands may be on the order of 100-200 KHz, although this is not a limitation of the present invention.

[00109] Load modulation driver circuit 1530 receives the extracted data from outgoing data extraction circuit 1520, and load modulates the tuned circuit 1540 in response thereto. Load modulation driver circuits are generally well known, and may be as simple as a switched transistor that adds and removes a reactive element from tuned circuit 1540. In some embodiments, load modulation driver circuit 1530 substantially duplicates the load modulation driver circuit 1410 within smartcard controller 330.

[00110] Amplifier 1510 is shown coupled to smartcard controller pad 1472, and data extraction circuit 1520 is shown coupled to smartcard controller pad 1474, but this is not a limitation of the present invention. For example, outgoing data extraction circuit 1520 may be coupled to smartcard controller pad 1472 while amplifier 1510 may be coupled to smartcard controller pad 1474. Also for example, both circuit 1520 and amplifier 1510 may be coupled to either pad 1472 or pad 1474 without departing from the scope of the present invention.

[00111] Figure 17 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. Figure 17 shows smartcard controller 330, amplifier 1510, outgoing data extraction circuit 1520, and load modulation driver circuit 1530, all of which are described above. Figure 17 also shows tuned circuits 1740 and 1750. Tuned circuit 1740 includes receive antenna 1742 and capacitor 1744. Tuned circuit 1750 includes transmit antenna 1752 and capacitor 1754. In some embodiments, receive antenna 1742 and transmit antenna 1752 are small inductive elements as described above.

[00112] Separate transmit and receive antennas allow for different tuning, both in frequency and bandwidth, or "Q." For example, tuned circuit 1740 may be tuned with relatively high Q for receive as shown at 1820 in Figure 18, while tuned circuit 1750 may be tuned for a lower Q to envelope both sidebands for transmit as shown at 1830 in Figure 18. The higher Q tuning for the receive antenna may further increase the maximum usable distance when the RFID card is receiving.

[00113] Figure 19 shows a smartcard controller with performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. Figure 19 shows smartcard controller 330, amplifier 1510, outgoing data extraction circuit 1520, load modulation driver circuit 1530, and tuned receive circuit 1740, all of which are described above. Figure 19 also shows two tuned transmit circuits 1950 and 1960. Tuned circuit 1950 includes antenna 1952 and capacitor 1954, and tuned circuit 1960 includes antenna 1962 and capacitor 1964. Antennas 1952 and 1962 may be small inductive elements as described above.

[00114] Separate transmit antennas allow separate tuning for the two sidebands. For example, tuned circuit 1950 may be tuned for the lower sideband tuned circuit 1960 may be tuned for the upper sideband as shown in Figure 20. Higher Q tuning of the transmit antennas for the separate sidebands may further increase the maximum usable distance when the RFID card is transmitting.

[00115] Figure 21 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and an antenna in accordance with various embodiments of the present invention. The circuits shown in Figure 21 are similar to Figure 15 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver

circuit 2130 may include circuits to actively transmit a signal rather than simply load modulate tuned circuit 1540. For example, active transmit driver circuit 2130 may include one or more amplifiers, filters, oscillators, modulators, etc., to form a signal that mimics the sidebands 1610 (Figure 16) as if the interrogating RF field experienced load modulation. Active transmission can make use of power available on the RFID card and can further increase the usable distance when smartcard controller 330 is transmitting.

[00116] Figure 22 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 22 are similar to Figure 17 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00117] Figure 23 shows a smartcard controller with performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 23 are similar to Figure 19 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00118] Figure 24 shows a smartcard controller with a pad to provide a digital data output. Smartcard controller 2430 includes the antenna pads 1472 and 1474 as described above. Smartcard controller 2430 also includes pad 2410 which provides the digital data output directly. By providing the digital data output directly, smartcard controller 2430 enables various embodiments of the invention to eliminate the outgoing data extraction circuit.

[00119] Figure 25 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and an antenna in accordance with various embodiments of the present invention. Figure 25 shows smartcard controller 2430, amplifier 1510, load modulation driver circuits 1530, and tuned circuit 1540, all of which are described above. Note that because smartcard controller 2430 provides digital data directly, the outgoing data extraction circuit 1520 (Figure 15) can be omitted, thereby reducing parts count and cost.

[00120] Figure 26 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. Figure 26 shows

circuits similar to those shown in Figure 25, except that separate transmit and receive antennas are provided. Separate transmit and receive antennas (and associated tuned circuits) allow for a higher Q tuning of the receive antenna, thereby increasing the maximum usable distance when RFID card is receiving. See Figure 18.

[00121] Figure 27 shows a smartcard controller with digital data output and performance enhancement circuits including a load modulation driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. Figure 27 shows circuits similar to those shown in Figure 26, except that multiple transmit antennas are provided. Multiple separate transmit antennas (and associated tuned circuits) allow for a higher Q tuning of each transmit antenna, thereby increasing the maximum usable distance when RFID card is transmitting. See Figure 20.

[00122] Figure 28 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and a single antenna in accordance with various embodiments of the present invention. The circuits shown in Figure 28 are similar to Figure 25 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21. In general, the term "driver" as used herein refers to an active transmit driver or a load modulation driver or any other method of driving the transmit output data.

[00123] Figure 29 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and separate receive and transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 29 are similar to Figure 26 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00124] Figure 30 shows a smartcard controller with digital data output and performance enhancement circuits including an active transmit driver circuit and multiple transmit antennas in accordance with various embodiments of the present invention. The circuits shown in Figure 30 are similar to Figure 27 except the load modulation driver is replaced with an active transmit driver circuit 2130. Active transmit driver circuit 2130 is described above with reference to Figure 21.

[00125] Figures 31-34 show performance enhancing application specific integrated circuits (ASICs) coupled to various smartcard controllers in accordance with various embodiments of the

present invention. Figures 31 and 32 show ASICs coupled to smartcard controller 330. Both ASICs include amplifier 1510 and outgoing data extraction circuits 1520. The ASIC of Figure 31 includes load modulation driver circuits 1530 and the ASIC of Figure 32 includes active transmit driver circuit 2130. Figures 33 and 34 show ASICs coupled to receive direct digital data from smartcard controller 2430. Accordingly, the outgoing data extraction circuits are omitted. The ASIC of Figure 33 includes amplifier 1510 and load modulation driver circuits 1530, and the ASIC of Figure 34 includes amplifier 1510 and active transmit driver circuit 2130.

[00126] By combining a smartcard controller and an ASIC as described herein, the performance of an RFID card may be enhanced with a reduced parts count. Further, any of ASICs shown may be used with separate receive and transmit antennas, multiple transmit antennas, or any combination. Further, one ASIC may be provided with all of the functionality shown in Figures 31-34 and the manner in which it is connected to a smartcard controller may dictate which functional blocks (e.g., data extraction, load modulation, active transmit) are utilized.

[00127] Figure 35 shows a memory card with integrated smartcard controller, performance enhancement circuits, and antennas in accordance with various embodiments of the present invention. Host interface 310, memory card controller 340, and memory 360 are described above. Smartcard controller 3520 may be any smartcard controller described herein, including smartcard controller 330 or smartcard controller 2430. Enhancement circuits 3550 may include any of the enhancement circuits described herein including any combination of amplifier 1510, outgoing data extraction circuits 1520, load modulation driver circuits 1530, and active transmit driver circuit 2130. Antenna(s) 3560 may include any number or type of antennas. For example, antenna(s) 3560 may include one antenna, separate transmit and receive antennas, or a receive antenna and multiple transmit antennas.

[00128] Figure 36 shows a memory card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention. The memory card of Figure 36 shows circuits similar to Figure 35 with the exception of antenna(s) 3560. Instead, the memory card of Figure 36 is intended for use with a host device that includes antenna(s). In some embodiments, antenna(s) 3560 are included in the memory card of Figure 36, thereby allowing the host device to decide whether to use the antennas on the memory card, or the antennas on the host device. The form factor of the memory card in Figures 35 and

36 is shown as a microSD card, but this is not a limitation of the present invention. Any form factor may be employed.

[00129] Figure 37 shows a subscriber identity module (SIM) card with integrated smartcard controller, performance enhancement circuits and antennas in accordance with various embodiments of the present invention. Smartcard controller 3520, enhancement circuits 3550, and antenna(s) 3560 are described above with reference to Figure 35.

[00130] Figure 38 shows a subscriber identity module (SIM) card with integrated smartcard controller and performance enhancement circuits in accordance with various embodiments of the present invention. The SIM card of Figure 38 shows circuits similar to Figure 37 with the exception of antenna(s) 3560. Instead, the SIM card of Figure 38 is intended for use with a host device that includes antenna(s). In some embodiments, antenna(s) 3560 are included in the SIM card of Figure 38, thereby allowing the host device to decide whether to use the antennas on the SIM card, or the antennas on the host device.

[00131] Figure 39 shows a mobile device with a smartcard controller, enhancement circuits, and antenna(s). The mobile device of Figure 39 includes a built-in smartcard controller for RFID functionality as opposed to accepting a separate RFID card as described above. The mobile device may be any electronic device including a mobile phone, a tablet computer, or the like.

[00132] Although the present invention has been described in conjunction with certain embodiments, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention as those skilled in the art readily understand. Such modifications and variations are considered to be within the scope of the invention and the appended claims.

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ELECTRONIC PAYMENT RECEIPT

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Title of Invention

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3258	FILED BY	Katherine Campbell
PATENT CENTER #	61301584	AUTHORIZED BY	Usman Mughal
CUSTOMER #	175023	FILING DATE	02/18/2021
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Siva G. Narendra

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 0227	E2022BDJ59062616	Katherine Campbell

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
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			TOTAL AMOUNT:	$130.00

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METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

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CUSTOMER #	175023	FIRST NAMED INVENTOR	Siva G. Narendra
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Usman Mughal

Documents

TOTAL DOCUMENTS: 8

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
18P115026US13_IDS_Transmittal.pdf		2	Transmittal Letter	22 KB
18P115026US13_ROA1.pdf		8	-	49 KB
18P115026US13_ROA1-A....pdf	(1-1)	1	Amendment/Request for Reconsideration-After Non-Final Rejection	17 KB
18P115026US13_ROA1-CLM.pdf	(2-5)	4	Claims	26 KB
18P115026US13_ROA1-REM.pdf	(6-8)	3	Applicant Arguments/Remarks Made in an Amendment	32 KB

18P115026US13_IDS_1_OF_2.pdf	9	Information Disclosure Statement (IDS) Form (SB08)	1254 KB
18P115026US13_IDS_2_OF_2.pdf	5	Information Disclosure Statement (IDS) Form (SB08)	1253 KB
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DOCUMENT	MESSAGE DIGEST(SHA-512)
18P115026US13_IDS_Transmittal.pdf	CE88496399AD3CEE0CEEA0B8F402EA04587F55DD2E1C70D758D71D3C987AB0B45C32AEF72D6E4A97976A262D4E96F6250BCAEC82AD519ECC4496AF0E26BC61E1
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18P115026US13_ROA1-CLM.pdf	8E13B1881103FCE63583B8C2FD7AD2D8E2D9CA7D21B4319F4F761385BC3D9BA3670667138A856829C85B55EB203D5E60D87AF6D4EACAFB0E1027DDA4104D2CF6
18P115026US13_ROA1-REM.pdf	74989D260F59B0F7E0F7DE631E8322FB0C1118E3EC460124E97BECF9645F5F0BB3382E2C51B12CCB54976D2A7C467871471A45CB2CFE768C37C27B6BED288C03

18P115026US13_IDS_1_OF_2.pdf	3E27BF10D1F1FF552378CE827D8DC12915AA99C85E2A2159DEC8A2C642CADD9C08A84ABFBAA6951D62EFD006277A9ED215D1D953E09AA63AC130833D4CC97F3D
18P115026US13_IDS_2_OF_2.pdf	7325DD63EADAC931AB340254350CCD189EFF2C3DF6135444C1ACB1D5B31528B747F64A22E3F8591E81C81974A053F2FEECD1B2F418EED9A3603B5330F4EB667E
115_026US13_SUB_SPEC_MARKED-SPEC.docx	5D9891B130A8012B98C5B240C5576D3AF274A1A7D402B12B9B85C5DBF2B919A033F5C44CE0768BE9644AE8721F4C6AF567A3E91DB615DFE7854A04C3D94D2389
115_026US13_SUB_SPEC_CLEAN-SPEC.docx	372F4B3C15FD8195003ABD18B4B3FC96E9C20CFA2F96B71E8A32F3380604F8D5B9BC7B4B33053B36A08D6D7588ABFF29BC41FA1B8C5DF8A68B019B431ED7DA32

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: **Siva G. Narendra**	Examiner: **PHAM, TOAN NGOC**
Application No.: 17/179,237	Art Group: 2684
Filed: February 18, 2021	Confirmation No.: 3258
For: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING	Docket No.: iC18P115.026US13

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Applicants respectfully request that this Information Disclosure Statement be entered and the documents listed on the attached form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicants request that a copy of the form, initialed as being considered by the Examiner, be returned to the Applicants with the next official communication.

Pursuant to 37 CFR § 1.97(b), it is believed that no fee or statement is required with the Information Disclosure Statement. However, if an Office Action on the merits has been mailed, the Commissioner is hereby authorized to charge the required fees to Deposit Account No. 60-4139 in order to have this Information Disclosure Statement considered.

Pursuant to 37 CFR § 1.98(d), copies of the listed documents are not provided as these references were previously cited by or submitted to the U.S. Patent Office in connection with Applicants' prior U.S. Patent Application No. 16/791,609, filed February 14, 2020, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

The Examiner is invited to contact the Applicants' Representative at the below-listed telephone number if there are any questions regarding this communication.

Pursuant to 37 C.F.R. § 1.136(a)(3), Applicants request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. § 1.16 and § 1.17, to Deposit Account No. 60-4139.

Respectfully submitted,
MUGHAL IP P.C.

December 14, 2022
Date

/Usman Mughal/
Usman Mughal
Reg. No. 62887
Attorney for Applicants

1500 NW Bethany Blvd. Suite 200
Beaverton, OR 97006
docketing@impactpatents.com

PTO/SB/08a (01-22)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17179237
Filing Date	2021-02-18
First Named Inventor	Siva G. Narendra
Art Unit	2684
Examiner Name	Toan Ngoc PHAM
Attorney Docket Number	18.P115.026US13

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

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	First Named Inventor	Siva G. Narendra
	Art Unit	2684
	Examiner Name	Toan Ngoc PHAM
	Attorney Docket Number	18.P115.026US13

	1	Notice of Allowance notified February 21, 2013 for U.S. Patent Application No. 13/651,365 (Docket No. 18. P115.026US13).	
	2	Notice of Allowance notified January 10, 2012 for U.S. Patent Application No. 13/184,240 (Docket No. 115.001US8).	
	3	Notice of Allowance notified June 18, 2020 for U.S. Patent Application No. 16/218,733 (Docket No. 115.001US9.9).	
	4	Notice of Allowance notified March 03, 2017 for U.S. Patent Application No. 14/929,297 (Docket No. 115.001US9.6).	
	5	Notice of Allowance notified May 13, 2013 for U.S. Patent Application No. 13/426,500 (Docket No. 115.001US6.3).	
	6	Notice of Allowance notified November 16, 2011 for U.S. Patent Application No. 13/114,473 (Docket No. 115.001US6.1).	
	7	Notice of Allowance notified November 20, 2020 for U.S. Patent Application No. 16/791,609 (Docket No. 18P.115.026US12).	
	8	Notice of Allowance notified October 28, 2011 for U.S. Patent Application No. 13/081,775 (Docket No. 115.022US2).	
	9	Notice of Allowance notified October 28, 2015 for U.S. Patent Application No. 14/833,133 (Docket No. 115.001US9.4).	
	10	Notice of Allowance notified September 19, 2018 for U.S. Patent Application No. 15/658,208 (Docket No. 115.001US9.8).	
	11	Official Letter notified January 26, 2010 for Taiwan Patent Application No. 95105997 (Docket No. 115.001TW1).	

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	Art Unit	2684
	Examiner Name	Toan Ngoc PHAM
	Attorney Docket Number	18.P115.026US13

	12	Restriction Requirement notified August 16, 2010 for U.S. Patent Application No. 12/188,346 (Docket No. 115.022US1).

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

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Signature	/Usman Mughal/	Date (YYYY-MM-DD)	2022-12-14
Name/Print	Usman Mughal	Registration Number	62887

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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First Named Inventor	Siva G. Narendra
Art Unit	2684
Examiner Name	Toan Ngoc PHAM
Attorney Docket Number	iC18P115026US13

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	1	10028813	DE	A1	2001-12-20	Hoffmeister	Entire Document	
	2	1801741	EP	A3	2008-07-02	Finkenzeller	Entire Document	
	3	2965082	FR	A1	2012-03-23	Charrat et al.	Entire Document	

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Patents

METHOD AND DEVICE FOR INDUCTIVE COUPLING ACTIVATED LOAD MODULATION

Abstract

The method involves extracting an antenna signal (AS) from a periodic signal i.e. external clock signal (CKe). Another periodic signal i.e. internal clock signal (CKs), is generated by an astable/digital type synchronous oscillator (SO). Bursts of the latter signal are applied to an inductive antenna circuit (ACT) to generate an active load modulation magnetic field (FLD2). The oscillator is placed in a synchronous oscillation mode before each application of one burst of the latter signal to the circuit. The oscillator is placed in a free oscillation mode during the application of the burst. Independent claims are also included for the following: (1) a device for transmitting and receiving data by inductive coupling (2) a device comprising a host processor.

Classifications

- H04B5/0031 Near field system adaptations for data transfer

View 6 more classifications

FR2965082B1

France

Find Prior Art Similar

Other languages: French

Inventor: Bruno Charrat, Florian Pemisek

Current Assignee : Inside Secure SA

Worldwide applications

2010 FR 2011 ES CA EP US WO ES CN US KR EP 2016 US 2017 US 2018 US

Application FR1003754A events

2010-09-21 Application filed by Inside Contactless SA

2010-09-21 Priority to FR1003754A

2012-03-23 Publication of FR2965082A1

2012-09-28 Application granted

2012-09-28 Publication of FR2965082B1

2014-01-17 First worldwide family litigation filed

Status Expired - Fee Related

2030-09-21 Anticipated expiration

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Patent Citations (33)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
US3701150A	1970-06-11	1972-10-24	Motorola inc	Rf transmission and detection system
CA1229926A *	1984-07-30	1987-12-01	Larry J. Conway	Intelligent broad band digital rf memory
US4916329A *	1987-10-05	1990-04-10	Square D Company	Uninterruptible power supply
US5251235A *	1988-06-14	1993-10-05	Bengt Henoch	Single receiver for receiving wireless transmission of signals is for use with a serial two-conductor data bus
US5453667A *	1992-06-30	1995-09-26	Toshiba Lighting & Technology Corporation	Inverter having frequency changing function
US5450088A	1992-11-25	1995-09-12	Texas Instruments Deutschland Gmbh	Transponder arrangement
US5453748A *	1993-11-15	1995-09-26	Westinghouse Norden Systems	Method and apparatus for responding to an interrogation signal
JPH09218263A	1995-10-11	1997-08-19	Texas Instr Inc <Ti>	Transponder system and operating method thereof
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GB2406023B	2003-10-29	2005-08-10	Innovision Res & Tech Plc	RFID apparatus
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DE102004031092A1	2004-06-28	2006-01-12	Giesecke & Devrient Gmbh	transponder unit
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EP1779680A4 *	2004-07-30	2008-09-17	Reva Systems Corpoartion	Rfid tag data acquisition system
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DE102007061361A1	2007-06-28	2009-01-02	Tamarack Products, Inc., Wauconda	In-line method of making radio frequency identification article e.g. label, involves covering kernel inlays with adhesive liner, after applying divided web pieces to carrier web
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US9513369B2	2013-02-01	2016-12-06	Nxp B.V.	Wireless communications using active modulation
KR102072522B1	2013-03-07	2020-02-03	삼성전자주식회사	Contactless communication device and user device including the same
US9727767B2	2013-03-12	2017-08-08	Nxp B.V.	Clock synchronization in an RFID equipped device
EP2816737B1 *	2013-06-19	2016-06-01	ST-Ericsson SA	Secure near field communication
EP2824612B1	2013-07-08	2018-04-18	STMicroelectronics International N.V.	RFID transponder device and method for production of an RFID transponder device
FR3010817B1 *	2013-09-13	2016-12-23	Inside Secure	METHOD AND DEVICE FOR DATA TRANSMISSION BY CONTROLLED AUTO-OSCILLATION INDUCTIVE COUPLING
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US10211887B2	2015-02-10	2019-02-19	Sony Corporation	Receiver and communication system
US9673964B2 *	2015-02-18	2017-06-06	Qualcomm Incorporated	Active load modulation in near field communication
EP3273609B1 *	2015-03-17	2021-03-03	Sony Corporation	Communication device and communication method
EP3076582B1 *	2015-03-30	2019-01-30	Nxp B.V.	Digital synchronizer
EP3121755B1 *	2015-07-21	2019-03-13	STMicroelectronics International N.V.	Radio-frequency identification transponder and method for data transmission by means of radio-frequency identification technology
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EP3223374B1 *	2016-04-14	2019-12-04	STMicroelectronics International N.V.	Radio-frequency identification transponder and method for sending a radio-frequency identification message
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US10756881B2 *	2016-08-01	2020-08-25	Nxp B.V.	Method and system for operating a communications device that communicates via inductive coupling
US9935689B2	2016-08-01	2018-04-03	Nxp B.V.	Method and system to measure the phase offset based on the frequency response in a NFC system
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US9883383B1	2017-01-27	2018-01-30	Microsoft Technology Licensing, Llc	Secure near field communications
EP3399655B1 *	2017-05-02	2020-07-01	STMicroelectronics razvoj polprevodnikov d.o.o.	Synchronization method of an active load modulation clock within a transponder, and corresponding transponder
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EP3429087B1	2017-07-12	2021-08-25	STMicroelectronics razvoj polprevodnikov d.o.o.	Method for synchronizing an active load modulation clock within a transponder, and corresponding transponder
US11387685B2	2017-08-14	2022-07-12	The Regents Of The University Of California	Load-induced resonance-shift-keying modulation scheme for simultaneous near-field wireless power and data transmission through a pair of inductive coils
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FR3077174B1 *	2018-01-19	2021-04-09	St Microelectronics Sa	SYNCHRONIZATION BETWEEN A READER AND AN OBJECT COMMUNICATING WITHOUT CONTACT WITH THE READER BY ACTIVE CHARGE MODULATION
FR3080476A1 *	2018-04-24	2019-10-25	Stmicroelectronics (Rousset) Sas	METHOD FOR ADJUSTING THE PHASE OF THE SIGNAL EMITTED BY AN OBJECT CAPABLE OF COMMUNICATING WITHOUT CONTACT TO A DRIVE BY ACTIVE LOAD MODULATION AND CORRESPONDING OBJECT
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EP3703269B1	2019-02-26	2022-06-08	Nxp B.V.	Phase alignment of a controller clock to a field
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* Cited by examiner, † Cited by third party, ‡ Family to family citation

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WO2007027482A8	2007-11-22	Methods and apparatus for asset tracking
JP2010178137A5	2012-03-08	Semiconductor device
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JP2012515377A5	2012-11-01	
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WO2010045360A3	2010-06-10	Electronic devices for communication utilizing energy detection and/or frequency synthesis
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NO20121043A1	2012-11-07	Method and apparatus for synchronizing clocks
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WO2012074711A3	2012-08-16	Integrated circuit device having an injection-locked oscillator
JP2011220998A5	2014-01-30	Correlation operation method, satellite signal acquisition method, correlation operation circuit and electronic device
TR201807722T4	2018-06-21	Wireless inductive power transmission.
JP2010118051A5	2012-11-22	
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PH12018502582A1	2019-09-30	Data transmission method, data transmitter, data receiver, and system
MX2016010059A	2016-06-06	Global-positioning system (gps) update interval based on sensor.

Priority And Related Applications

Priority Applications (25)

Application	Priority date	Filing date	Title
FR1003754A	2010-09-21	2010-09-21	METHOD AND DEVICE FOR INDUCTIVE COUPLING ACTIVATED LOAD MODULATION
EP11181127.9A	2010-09-21	2011-09-13	NFC card for handheld device
CA2752716A	2010-09-21	2011-09-13	Nfc card sensitive to foucault currents
ES11181112ST	2010-09-21	2011-09-13	Procedure and active load modulation device by inductive coupling
EP11181125.3A	2010-09-21	2011-09-13	Method and device for active load modulation by inductive coupling
CA2752757A	2010-09-21	2011-09-13	Method and apparatus for active load modulation by inductive coupling
CA2752609A	2010-09-21	2011-09-13	Nfc card for portable device
EP11181130.3A	2010-09-21	2011-09-13	Eddy currents sensitive NFC card
US13/232,346	2010-09-21	2011-09-14	NFC card for handheld device
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PCT/FR2011/052183	2010-09-21	2011-09-21	Method and device for modulating an active load with damping of auto oscillation
KR1020110095238A	2010-09-21	2011-09-21	Method and device for active load modulation by inductive coupling
ES11771252T	2010-09-21	2011-09-21	Procedure and active load modulation device with auto oscillation damping
US13/976,527	2010-09-21	2011-09-21	Method and device for modulating an active load with damping of auto oscillation
CN201110281066.9A	2010-09-21	2011-09-21	NFC card for handheld device
KR1020110095265A	2010-09-21	2011-09-21	Nfc card sensitive to eddy currents
CN201110280874.3A	2010-09-21	2011-09-21	Method and apparatus by active load modulation inductively

CN201110280904.0A	2010-09-21	2011-09-21	To the nfc card of vortex flow sensitivity
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US15/144,034	2010-09-21	2016-05-02	Method and device for modulating an active load
US15/433,884	2010-09-21	2017-02-15	Method and device for modulating an active load
US15/947,384	2010-09-21	2018-04-06	Method and device for modulating an active load

Applications Claiming Priority (1)

Application	Filing date	Title
FR1003754A	2010-09-21	METHOD AND DEVICE FOR INDUCTIVE COUPLING ACTIVATED LOAD MODULATION

Legal Events

Date	Code	Title	Description
2014-02-28	CA	Change of address	**Effective date**: 20140129
2014-02-28	CD	Change of name or company name	**Owner name**: INSIDE SECURE, FR **Effective date**: 20140129
2015-09-17	PLFP	Fee payment	**Year of fee payment**: 6
2015-11-27	CL	Concession to grant licences	**Name of requester**: FRANCE BREVETS, FR **Effective date**: 20151027
2017-06-30	ST	Notification of lapse	**Effective date**: 20170531

Concepts

machine-extracted

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Name	Image	Sections	Count	Query match
inductive effect		title,abstract	3	0.000
coupling		title,abstract	2	0.000
coupling process		title,abstract	2	0.000
coupling reaction		title,abstract	2	0.000
modifying		title,abstract	2	0.000
periodic		abstract	2	0.000
synchronised		abstract	2	0.000

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Patents

Active chip card used in wireless data transmission, has battery for supplying power to memory, transmitter, contact unit and control unit while transmitter sends data in mobile radio frequency range

Abstract

The active chip card has a battery (4) arranged to supply power to the memory (7), transmitter (2), contact unit (3), and control unit (1). The transmitter sends data in the mobile radio frequency range. The contact unit is provided for the transmission of data. The control unit regulates the data storage in the memory and the data transmission. An independent claim is also included for the communication system using the active chip card.

Classifications

≋ H01Q1/2225 Supports; Mounting means by structural association with other equipment or articles associated with components used in interrogation type services, i.e. in systems for information exchange between an interrogator/reader and a tag/transponder, e.g. in Radio Frequency Identification [RFID] systems used in active tags, i.e. provided with its own power source or in passive tags, i.e. deriving power from RF signal

View 6 more classifications

DE10028813A1
Germany

Find Prior Art Similar

Other languages: German

Inventor: Marc Hoffmeister

Current Assignee : MIDITEC DATENSYSTEME GmbH

Worldwide applications

2000 DE

Application DE2000128813 events

2000-06-10 Application filed by MIDITEC DATENSYSTEME GmbH

2000-06-10 Priority to DE2000128813

2001-12-20 Publication of DE10028813A1

Status Withdrawn

Info: Patent citations (3), Cited by (2), Legal events, Similar documents, Priority and Related Applications

External links: Espacenet, Global Dossier, DPMA, Discuss

Claims (15)

Hide Dependent ^
translated from German

1. Chip card with a storage unit for storing data, with a transmission unit for wireless transmission of data, with a contact unit for contact-based transmission of data and with a control unit for controlling data storage and data transmission, **characterized** in that on and / or in the Chip card a power supply unit for power supply to the units of the chip card is arranged and that the transmission unit is designed to transmit data in the mobile radio frequency range. 2. Chip card according to claim 1, characterized in that the power supply unit is a battery or a Accumulator is. 3. Chip card according to claim 1 or 2, characterized in that the chip card is designed in ID-1 format. 4. Chip card according to one of the preceding claims, characterized in that the transmission unit has an antenna structure, in particular a circular antenna as a transmitting and / or receiving element has. 5. Chip card according to claim 4, characterized in that the antenna structure as Lambda / 4- or Lambda / 2- Dipole is formed. 6. Chip card according to claim 4 or 5, characterized in that the antenna structure as a thin film structure or Foil is formed in or on the chip card. 7. Chip card according to one of the preceding claims, characterized in that the transmission unit for data transmission in a frequency range above 100 MHz, in particular above 400 MHz and in the ISM band. 8. Chip card according to one of the preceding claims, characterized in that the transmission unit is a modulation unit for Has modulation and / or demodulation of a data signal. 9. Chip card according to one of the preceding claims, characterized in that the storage unit and the control unit for a multifunctional, changeable and expandable use of the chip card are. 10. Chip card according to one of the preceding claims, characterized in that the control unit means for encryption and / or decryption of data. 11. Chip card according to one of the preceding claims, characterized in that the control unit has a programmable micro processor has. 12. Chip card according to one of the preceding claims, characterized in that the control unit is compatible with the ISO norms 7816-4 , 7816-7 and 7816-8 . 13. Chip card according to one of the preceding claims, characterized in that the control unit selection means for selecting the Has transmission type. 14. System for communication with chip cards according to one of the preceding the claims, wherein a receiving unit for receiving the from a chip card wirelessly transmitted data is provided. 15. System according to claim 14, characterized in that a reading unit for reading data when touched the contact unit of a chip card with the reading unit is provided.

Description

translated from German

The invention relates to a chip card with a memory unit for storing Data, with a transmission unit for the wireless transmission of data, with a contact unit for the contact-related transmission of data and with one Control unit for controlling data storage and data transmission.

Such a chip card is used by Philips Semiconductors as a MIFARE Pro Card IC offered under the designation MF2ICD80. With such a passive chip card the energy through inductive coupling with coils from the outside into the chip card coupled. The data transmission can, on the one hand, involve contact via a Contact unit according to ISO7816 or, on the other hand, wirelessly using a transmission unit. The wireless data transmission also takes place through inductive coupling at an operating frequency of 13.56 MHz, whereby to the Modula tion of the data a load modulation is applied in the chip card.

Both the energy transmission and the data transmission can be at knew passive chip card wirelessly only over a short distance of maximum a few centimeters. However, it would be desirable for many applications worth wirelessly transferring data from a smart card to a corresponding one Reader or from a reader to a chip card even over a greater distance to be able to transmit. The invention is therefore based on the object to design a chip card so that data can be transmitted wirelessly over long distances can be transferred.

This invention is based on the chip card mentioned above solved that on and / or in the chip card an energy supply unit for Power supply to the units of the chip card is arranged and that the over support unit for transmitting data in the mobile radio frequency range is.

Only by arranging an energy supply unit, preferably a battery or a rechargeable battery, on and / or in the chip card possible, active without external energy supply Data from the chip card wireless even over longer distances, d. H. more than a few centimeters to a reading frame advises to be able to transmit. According to the invention, the data transmission takes place in one Frequency range of mobile radio technology, that is, in a frequency range above half from 100 MHz to a maximum of 20 GHz. Wireless data transmission can thereby from any location within a certain radius of the reading unit and not only in the immediate vicinity as with the well-known passive chip card from the reading unit, since on the one hand no energy is inductively fed into the chip card must be pelt and because on the other hand also the data transmission through inductive coupling takes place. Rather, a suitable one is on the chip card itself Mobile radio transmitter is provided, with which the data for wireless transmission to the Reader are sent.

In addition to the possibility of wireless transmission, there is also contact Unit for contact-based transmission of data to the chip card to be as multifunctional as possible and for different applications.

So then numerous applications such as use require Health insurance card or bank card entering the chip card in a terminal Reading out data via the contact unit while in other applications such as access control or time recording wireless transmission of data over longer distances can be used preferentially. Through the The application areas of chip cards can also be expanded, for example point to applications in which to register whether a person is a certain control point has passed, then charges from its account add, for example highway or toll fees.

In one embodiment it is provided that the chip card has the ID-1 format has. This is the usual chip card format. According to the invention, the energy supply unit and the transmission unit designed so small that they are such a chip card only about 1 mm thick.

For the transmission and, if necessary, for the reception of data, the Über support unit preferably an antenna structure, in particular a circular Antenna on, which is advantageously designed as a lambda / 4 or lambda / 2 dipole is. Such an antenna structure can preferably be a thin-film structure or provide as a thin film on a chip card, the antenna structure for example be evaporated onto the chip card or integrated into the chip card itself can. The size and design of the antenna structure essentially depends depends on the frequency at which the wireless data transmission should take place. According to the invention, the ISM band with a frequency is preferably provided for this above 400 MHz. In a practical implementation are wireless data Transmission frequencies of 433 MHz and 868 MHz are provided.

In order to be able to transmit the data at such a high frequency, the Transmission unit in a development of the invention, a modulation unit for modulating and / or demodulating a data signal.

It is further provided in one embodiment of the invention that the memory unit and the control unit for a multifunctional, changeable and expandable bare use of the chip card are designed. In a chip according to the invention card can therefore combine numerous desired applications with each other , which previously required several different chip cards. Also can easily add future functions to be added be, for example, by entering the chip card in a contact Reading unit is modified in software so that the chip card for the new Application can be used. For this purpose, the control unit preferably has a program mable microprocessor on or is designed as such, which is based on a reprogrammed in a simple way. According to the invention, this is no longer necessary That all chip cards that are used for a new application should be collected by the respective users and on a special pro must be reprogrammed, but this new program can be done easily and quickly on any reader, for example, when the user puts his chip card back in for the first time enters a reader after the new application is set up. The Users do not need to notice anything about this reprogramming.

In a further development of the invention it is provided that the control unit has means for encrypting and / or decrypting data. By the Use of such means can be prevented, in particular wirelessly Data that has been carried is intercepted by unauthorized persons and used without authorization become.

The control unit is preferably designed to support the ISO standard 7816 , in particular the ISO standards 7816-4 , 7816-7 and 7816-8 , and is compatible with these standards. In particular, the operating system provided in the control unit for the chip card operates in accordance with this standard, and both the contact-related and thus the wireless data to be transmitted are provided by the control unit in accordance with this ISO standard.

In a further embodiment it is provided that the control unit has means for Selection of the transmission type. This is particularly necessary because not all data should and may also be transmitted wirelessly. For example wise for the use of the chip card as a health insurance card personal data stored on the chip card, which is only via the contact-based transmission to be transmitted away to a reader while a wireless over Such data should be avoided due to the risk of eavesdropping. With help the selection means can therefore prevent the wireless transmission of critical data be changed. Individual data records can also have a corresponding identifier have the transmission path through which they may be transmitted, whereby the identifier is evaluated by the selection means.

The invention also relates to a system for communication with chip cards, wherein at least one receiving unit for receiving wirelessly from a chip card transmitted data is provided. Are preferred in such a system several such receiving units and also at least one reading unit for reading data when touching the contact unit of a chip card with the Reading unit provided. The number, arrangement and design of the reception and reading units depend in particular on the type and design of the Applications for which the chip card is intended.

Further advantageous embodiments result from the subclaims.

The invention is explained in more detail below with reference to the drawings. Show it:

Fig. 1 is a block diagram of a smart card according to the invention,

Fig. 2 is a block diagram for explaining the wireless data transmission in an inventive chip card,

Fig. 3 is a simplified layout of a chip card according to the invention,

Fig. 4 is a block diagram of a system according to the invention for com communication with a chip card and

Fig. 5 is a block diagram of the control unit of a chip card according to the invention.

In Fig. 1, the essential elements of an inventive smart card are shown in a block diagram. This chip card, also referred to as a wireless smart card, comprises a microcontroller 1 designed as a control unit, a transmission unit 2 for the wireless transmission of data and a contact unit 3 according to ISO7816-2 for the contact-based transmission of data. To supply energy to the chip card, a battery 4 is provided, which is shown in the example shown as part of the control unit 1 , but this is not mandatory. The control unit 1 has a central processing unit 5 , a read-only memory unit 6 essentially for storing the operating system, a readable and writable memory unit 7 as data memory and a readable and writable memory unit 8 as working memory, in particular also as a file and program memory for Applications that are loaded onto the chip card. Furthermore, the control unit has contact connections 9 , via which the control unit 1 is connected to other units 2 , 3 of the chip card. Kon contact connections are provided for a supply voltage Vcc, for a reference voltage GND, for a reset signal RST and for a clock signal CLK. Furthermore, a serial connection I / O for connection with the contact unit 3 and a further serial connection I / O for connection with the transmission unit 2 are provided.

The transmission unit 2 has corresponding contact connections 10 for connection to the control unit 1 . Furthermore, the transmission unit 2 has a clock module 11 for clock generation, a reset module 12 for generating a reset and a transmitting / receiving module (transceiver) 13 for transmitting and receiving data. The transmission / reception module 13 is also connected to an antenna 14 as a transmission / reception element.

The chip card microcontroller 1 according to the invention thus has two real I / O channels which are used for communication with the periphery. This periphery consists of the contact field 3 and the RF interface 2 as a transmission unit. The contact field 3 is used to communicate with ISO-compliant chip cards, while the RF interface 2 is used for wireless data transmission. The RF interface 2 and the contact surface 3 are peripheral devices with equal rights, both of which can be controlled in parallel and directly by the control unit 1 .

The RF interface 2 comprises, as an essential element, the transceiver 13 , which preferably operates at a frequency in the ISM band. In a practical embodiment, frequencies of 433 and 868 MHz are provided, frequencies generally in the range from 100 MHz to 20 GHz being considered. The clock signal and the reset signal for the control unit 1 are also derived from the modulated RF signal. Characterized in that a separate power supply is provided in the form of a battery 4 and that means for sending data on a mobile radio frequency are provided on the chip card, data can be transmitted over significantly greater distances than with the known passive chip cards with the chip card according to the invention . The operating system is preferably designed in such a way that it can be determined for individual data via which transmission path - contact-based or wireless - it may or should be transmitted. Fast anti-collision protocols are also preferably provided for the wireless data transmission, so that the data transmitted wirelessly from several different chip cards to a receiving unit can be processed and distinguished in parallel.

In Fig. 2 essential elements of the unit 2 are shown in more detail in a block diagram. When a signal is received by the antenna 14 , it is first fed via a switch 131 to a low-noise amplifier 133 (LNA = Low Noise Amplifier), where it is amplified. The output signal of the amplifier 133 is then fed to a demodulator 135 , which is designed depending on the type of modulation used, for example as a frequency demodulator, to demodulate the amplified received signal and then output it to the control unit for further processing. In parallel, a clock signal generator 11 generates a digital synchronization signal from the output signal of the amplifier 133 , which is also output to the control unit 1 .

If a signal is to be sent, this is transferred from the control unit 1 to the modulator 134 , where the signal is modulated onto the transmission frequency. This is followed by the amplification of the signal in the power amplifier 132 (PA = Power Amplifier), which is then transferred to the antenna 14 via the switching unit 131 , which can be implemented in semiconductor technology, and transmitted from there.

The layout of a chip card according to the invention is shown in FIG. 3. The design of the chip card 15 in the ID1 format, which is defined in the ISO7810 standard, can be seen. The contact unit 3 is arranged as in known chip cards at the locations prescribed by the standard. Above or below is the control unit 1 designed as an IC, which is connected to the battery 4 and the transmission unit 2 also designed as an IC via connecting lines. In the layout shown, the antenna 14 is designed as a thin metal foil which is applied to the surface of the chip card 15 . The antenna 14 can, for example, be glued to the surface of the chip card 15 as a thin copper foil. However, other electrically conductive materials which are suitable as antennas in the mobile radio frequency range, other attachment options (for example by vapor deposition or insertion as a position in the chip card), other attachment locations and other embodiments of the antenna 14 are also conceivable. However, the antenna is preferably designed such that it is suitable for emitting electromagnetic waves as a lambda / 4 or lambda / 2 dipole. In the chip card according to the invention, neither the energy for supplying the chip card nor the data are transmitted by capacitive or inductive coupling between the chip card and the reader. It is thus possible to be able to bridge greater distances than in known chip cards.

In Fig. 4, a system for communication with an inventive chip card is shown simplified. Depending on the application, such a system has one or more reading units for the contact-based transmission of data and / or one or more receiving units for the wireless transmission of data. By way of example, two different reading units 16 , 17 are shown, in which the chip card 15 must be inserted into a reading slot or passed over a reading sensor in order to transmit data via the contact unit to the reading unit 16 , 17 or to receive data from the reading unit 16 , 17 to be transferred to the chip card 15 . A receiving unit 18 is also shown in order to receive data from the chip card 15 wirelessly. Depending on the application, it can also be provided that the receiving units 18 are also designed to send data to the chip card 15 .

Such a system could advantageously be used, for example, in a larger company building with numerous employees. Each employee has a chip card 15 according to the invention on which different data are stored. Access control and time recording could be implemented by means of reception units 18 in the entrance area of the company building, so that no employee has to take his card out of his pocket or wallet when entering the building and manually enter it into a reader. To access control in special rooms could be realized by means of readers 16 , for which an access password is stored on the chip card, for example, which should only be transmitted with contact. A monetary value store could also be provided on the chip card in order to be able to pay at a reading unit 16 or 17 in the canteen. Furthermore, personal data such as insurance data, health insurance data, access data for a cash dispenser or other money storage device for payment in shops could be provided on the chip card.

Also a money store for paying for road use, toll or bridges user fees can be integrated into the chip card. Charging this For example, money could be stored centrally at an ATM. The expansion of applications and reprogramming can also be started a central reader or centrally controlled on any reader under certain circumstances without the user noticing.

In FIG. 5, the essential elements of the unit 1 as a control designed microcontroller are shown in an inventive chip card in a block diagram. The chip card controller initially has a non-rewritable memory area 6 which does not allow any changes and therefore no manipulations. The operating system of the chip card is also stored in this memory area 6 and supports, among other things, the standards from the ISO / IEC 7816 series. This operating system enables the multifunctional use of the chip card, which is why several different applications can be supported. The chip card according to the invention also has additional operating system commands which relate to the choice of the communication path. An operating system in a chip card controller is therefore used for two transmission methods.

The microcontroller 1 furthermore has a rewritable memory unit (RAM) 81 for loading special commands and applications and a further writable memory unit (RAM) 82 for starting a virtual machine. Furthermore, an interface for application programs (API = Application Program Interface) 19 and a unit for authentication and authorization 20 are provided. A protection unit (firewall) 21 is intended to prevent critical data, which are to be transmitted only by contact, from being interrogated by a receiving unit and transmitted wirelessly. A suitable cryptography unit 22 is provided for encrypting and decrypting data before or after transmission. Data itself is stored in a storage unit 7 . Finally, an interface 91 for contact-based transmission and an interface 92 for wireless transmission are provided, via which the data are forwarded to the transmission unit or the contact unit.

The chip card according to the invention is characterized in particular by the fact that it depending on the application for wireless and contact-based transmission of data can be used, depending on the application, the appropriate type of transmission is selected. The selection is made using the corresponding command sets of the Operating system. Unlike the known chip cards, the invention is appropriate chip card for the active transmission of data in the mobile radio frequency range designed, whereby the range is significantly larger than with passive chip cards. As a result, the chip card according to the invention can be used with a large number of new ones Use applications to advantage.

Patent Citations (3)

Publication number	Priority date	Publication date	Assignee	Title

DE4205556A1 *	1992-02-24	1993-08-26	Angewandte Digital Elektronik	Smart electronic card with external switch control
DE19807227A1 *	1998-02-20	1999-09-02	Meinen	Current supply arrangement for a mobile telephone made of one or more IC cards
DE19942217A1 *	1999-09-03	2001-03-08	Assion Electronic Gmbh	Antenna curtain to read transponders on goods unloaded from lorry with antenna in each band making up curtain
Family To Family Citations				

* Cited by examiner, † Cited by third party

Cited By (2)

Publication number	Priority date	Publication date	Assignee	Title
DE10343734A1 *	2003-09-22	2005-04-21	Austria Card	Data carrier card e.g. chip card, has rechargeable battery and switch-on key integrated into data carrier
US7742741B2	2005-04-29	2010-06-22	Globalfoundries Inc.	Portable wireless data storage device
Family To Family Citations				

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
EP1801741B1	2009-07-22	Portable data carrier with active noncontact interface
EP2982046B1	2018-05-30	Device having communications means and a receptacle for a chip card
EP2278532B1	2015-07-29	Portable data carrier
DE60033235T2	2007-11-08	INFORMATION INPUT / OUTPUT UNIT
EP1186150A1	2002-03-13	Interchangeable battery pack for a mobile telephone
DE112006002666T5	2008-08-14	Means for deactivating a contactless device
WO2007073904A2	2007-07-05	Method for authorised granting of a service and device for carrying out said method
DE112008001187T5	2010-03-25	Energy and time management in a smart card device
DE102008016913A1	2008-11-20	Mobile electronic device and method for energy management
DE102009006872A1	2009-08-27	Contactless chip module, contactless device, contactless system and method for contactless communication
DE102011112031A1	2012-11-15	Method for data exchange between terminal and chip card
EP0815530B1	1999-01-13	Method and device for adapting a chip card to different card terminals
EP2879102A1	2015-06-03	Cash box and ATM
DE102016111407A1	2017-01-19	Electronic hand-held device with near-field communication element and associated sensor
DE19629351A1	1998-01-29	Mobile chip card reading module
EP2272025B1	2019-07-24	System and method for providing user media
EP1053532A1	2000-11-22	Portable microprocessor-assisted data carrier that can be used with or without contacts
DE102010003404A1	2010-10-14	Non-contact high-speed communication
DE102004058165A1	2006-06-08	Portable data carrier such as a chip card with separate contact free data and power receiving circuits
DE10028813A1	2001-12-20	Active chip card used in wireless data transmission, has battery for supplying power to memory, transmitter, contact unit and control unit while transmitter sends data in mobile radio frequency range
DE102009031554A1	2010-10-14	Data transmission device i.e. mobile phone, for contactless transmission of data, has internal contactless interface communicating with plug-in card, and external contactless interface communicating with external device
WO2018161102A1	2018-09-13	Deactivatable shielding element
DE102010064257A1	2012-02-02	Remote control key for controlling locking system in motor car, has operating unit emitting signals for locking system, and security element arranged at or in housing component and including data memory for storing user-specific information

WO2009033688A2	2009-03-19	Mass memory card
DE102004004128A1	2005-08-18	Invalidating method for canceling chip cards uses an electric effect for reducing electronic components in a chip card to a lasting passive condition unable to read out data any more

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
DE2000128813	2000-06-10	2000-06-10	Active chip card used in wireless data transmission, has battery for supplying power to memory, transmitter, contact unit and control unit while transmitter sends data in mobile radio frequency range

Applications Claiming Priority (1)

Application	Filing date	Title
DE2000128813	2000-06-10	Active chip card used in wireless data transmission, has battery for supplying power to memory, transmitter, contact unit and control unit while transmitter sends data in mobile radio frequency range

Legal Events

Date	Code	Title	Description
2001-12-20	OP8	Request for examination as to paragraph 44 patent law	
2005-04-07	8139	Disposal/non-payment of the annual fee	

Concepts

machine-extracted

Download Filter table

Name	Image	Sections	Count	Query match
biological transmission		title,claims,abstract,description	63	0.000
memory		title,abstract,description	14	0.000
transmitter		title,abstract,description	5	0.000
communication		claims,abstract,description	7	0.000
modifying		claims,description	10	0.000
thin film		claims,description	3	0.000
controlling effect		claims,description	2	0.000
foil		claims,description	2	0.000

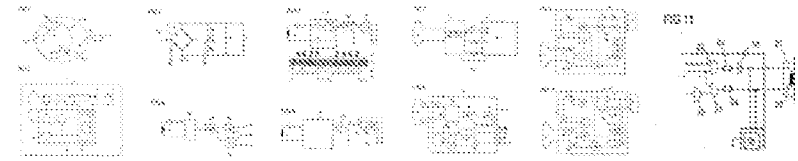
Show all concepts from the description section

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Patents

Portable data carrier with active noncontact interface

Images (10)



Classifications

» G06K7/0008 General problems related to the reading of electronic memory record carriers, independent of its reading method, e.g. power transfer

View 7 more classifications

EP1801741B1
European Patent Office

Download PDF Find Prior Art Similar

Other languages: German, French

Inventor: Klaus Finkenzeller

Current Assignee : Giesecke and Devrient Mobile Security GmbH

Worldwide applications

2006 DE 2006 DE AT EP ES ES ES EP

Application EP06025811A events

2006-12-13 Application filed by Giesecke and Devrient GmbH

2006-12-13 Priority to EP06025811A

2007-06-27 Publication of EP1801741A2

2008-07-02 Publication of EP1801741A3

2009-07-22 Application granted

2009-07-22 Publication of EP1801741B1

2010-04-21 First worldwide family litigation filed

Status Active

2026-12-13 Anticipated expiration

Show all events

Info: Patent citations (8), Cited by (24), Legal events, Similar documents, Priority and Related Applications

External links: Espacenet, EPO GPI, EP Register, Global Dossier, Discuss

Claims (26) Hide Dependent

1. A method for transmitting data from a portable data carrier (1, 120) with a contactless interface to a reading device (100) to which data can be transmitted by transponders through load modulation of a field of the reading device, **characterized in that** the portable data carrier (1, 120), for transmitting the data to the reading device (100), generates its own field in an active operating mode and transmits it as a signal which is evaluable for the reading device (100) as a load modulation of the reading device field (110) by a transponder, and **in that** the portable data carrier (1, 120) is inserted in a terminal (127) and receives a supply voltage from the terminal (127) via a contact-type interface (126).

2. The method according to claim 1, **characterized in that** the portable data carrier (1) is a mass storage card.

3. The method according to claim 1 or 2, **characterized in that** the portable data carrier (1) carries out a load modulation of the reading device field in a passive operating mode.

4. The method according to claim 3, **characterized by** selecting the active and/or passive operating mode.

5. The method according to claim 4, **characterized in that** the selecting step is effected in dependence on an internal selection signal of the portable data carrier (1), the internal selection signal being generated in dependence on a power supply of the portable data carrier (1).

6. The method according to either of claims 4 to 5, **characterized in that** the selecting step is effected in dependence on an external selection signal which the portable data carrier receives.

7. The method according to any of claims 4 to 6, **characterized in that** the selecting step is effected in dependence on a received external command.

8. The method according to any of claims 4 to 7, **characterized in that** a control of the selecting step is used to selectively increase or lower the range for a certain time window of a transaction.

9. The method according to any of claims 1 to 8, **characterized by** deactivating the active operating mode for contactless data transmission, the deactivation being effected in addition to the selection of the operating mode.

10. The method according to any of claims 1 to 9, **characterized by** deactivating the contactless data transmission, in particular the active operating mode and the passive operating mode for contactless data transmission.

11. The method according to either of claims 9 and 10, **characterized in that** the deactivating step is effected in dependence on an internal deactivation signal of the portable data carrier (1).

12. The method according to claims 9 to 11, **characterized in that** the deactivating step is effected in dependence on an application active on the portable data carrier (1).

13. The method according to any of claims 9 to 12, **characterized in that** the deactivating step is effected in dependence on an external deactivation signal which the portable data carrier receives.

14. The method according to claims 9 to 13, **characterized in that** the deactivating step is effected in dependence on a user setting.

15. The method according to claims 9 to 14, **characterized in that** the deactivating step is effected in dependence on a contactless operating mode of a terminal in which the portable data carrier (1) is inserted.

16. The method according to any of claims 1 to 15, **characterized by** toggling between an antenna of the portable data carrier (1) and an antenna of the terminal in which the portable data carrier (1) is inserted, for contactless data transmission.

17. The method according to claim 16, **characterized in that** the portable data carrier (1) internally generates a toggle signal for toggling between available antennae.

18. The method according to claim 16 or 17, **characterized in that** the portable data carrier (1) receives an external toggle signal.

19. The method according to claims 16 to 18, **characterized in that** the portable data carrier (1) carries out the toggling in response to a received external command.

20. The method according to any of claims 1 to 19, **characterized by** determining whether the portable data carrier (1) is inserted in the terminal.

21. The method according to claims 1 to 20, **characterized in that** the portable data carrier (1) transmits the signal such that it simulates a load modulation of the reading device field to the reading device.

22. The method according to any of claims 1 to 20, **characterized by** the step of coupling an oscillator signal with a signal received from the reading device (100), via a phase locked loop (PLL) circuit which is switchable between a receive mode and a transmit mode by a switching signal.

23. An interface unit for signal modulation which is effected for a transmission of data to a reading device (100) to which data can be transmitted by transponders through load modulation of a field of the reading device, **characterized by** means for generating its own field and for transmitting as an output signal which is evaluable for the reading device as a load modulation by a transponder in order to transmit the data to the reading device in an active operating mode of the interface unit which is adapted to receive a supply voltage for the active operating mode from a terminal.

24. A portable data carrier, **characterized by** an interface unit according to claim 23 adapted for carrying out a method according to any of claims 1 to 22.

25. A value document, such as bank note, check or the like, **characterized by** an interface unit according to claim 23 adapted for carrying out a method according to any of claims 1 to 22.

26. A system for data transmission comprising a portable data carrier and the terminal in which the portable data carrier is insertable, **characterized in that** the portable data carrier and the terminal are adapted for carrying out a method according to any of claims 1 to 22.

Description

translated from German

The present invention relates to a portable data carrier, such as a mass storage card, a method for contactless data transmission between the portable data carrier and a reading device and a system comprising the portable data carrier and a terminal, in which the portable data carrier is used.

Portable data carriers, such as chip cards or mass storage cards, for example a MultiMediaCard (MMC) or a Secure Digital Card (SD Card), have meanwhile increasingly both a contact interface and a contactless interface. The portable data carriers can thus also be used, for example, as transponders in RFID systems.

Conventionally, both the power supply of a transponder in an RFID system and the data exchange between the transponder and a reader using magnetic or electromagnetic fields. RFID transponders have an electronic circuit and, depending on the frequency range, an antenna coil (e.g., 13.56 MHz) or an electromagnetic antenna (e.g., 868 MHz). About the antenna can be taken from the field of the reader, the energy required to operate the transponder and the data transmission can be performed.

Up to a certain distance between reader and transponder, which is also referred to as energy range, the transponder the field of the reader just enough energy for own operation of its circuit. Typical energy ranges of such systems are about 10 cm for ISO 14443 and up to 1 m for ISO 15693 compatible systems.

The range within which communication in the system is possible through data transmission can be increased by using active transponders, ie transponders with their own energy supply. The power supply of the active transponder, for example in the form of a battery, operates its electronic circuit. Conventional transponders without their own power supply are referred to as passive transponders.

RFID systems, for example for different types of coupling, as well as a load modulation using a subcarrier in inductively coupled RFID systems are described in particular in Chapter 3.2 in the "RFID Handbook" by Klaus Finkenzeller.

For easy and fast contactless communication between two devices, Philips and Sony developed an inductive transmission technique known as Near Field Communication (NFC). For example, this technique integrates with mobile devices or PDAs to facilitate communication between devices or with a computer. The coupling of the two devices takes place via coils, the carrier frequency being 13.56 MHz, as in RFID systems. As further described in the NFC standard ISO / IEC 18092, there is an active communication mode and a passive communication mode in NFC systems. In the active mode, two NFC units alternately generate their own RF field as signal carriers, thus switching between transmission and reception mode, as in a classic mobile radio system, both coordinated back and forth. In passive mode,

however, the two NFC units must agree on which unit acts as a reader and creates a field that can then influence the other unit by means of load modulation. Primarily due to the small antenna diameters used, in NFC systems - especially in passive mode - only low communication ranges are possible. According to WO 2004/063971 A1 If a unit recognizing a corresponding request in the context of contactless communication, a mode switching, in particular between a Tag Talk First mode and a Reader Talk First mode, make.

Even with active transponders, there is the problem that the data transmission from the transponder to the reader is limited by the signals weakening with increasing distance between reader and transponder.

For RFID systems that work on the principle of backscatter, however, typically communication ranges of 10 m are achieved. In WO 2005/073906 A1 the range of such a transponder is further increased by providing an actively transmitting element.

US 6161762 A1 FIG. 12 shows a card which switches between a contactless and a contact mode of the card depending on the presence of an external contactless communication field.

As a rule, with inductively coupled systems which transmit data to the reading device according to the principle of load modulation, no longer ranges than 1 to 2 m can be achieved even with an active transponder.

It is therefore an object of the invention to increase the range of data transmission in a load modulation system comprising a reading device and a portable data carrier compared to conventional systems with active or passive transponders.

The object is solved by the features of the independent claims. In dependent claims advantageous embodiments and developments of the invention are given.

According to the invention, a portable data carrier, preferably a mass storage card, sends a self-generated field as a signal to a reading device with which transponders can communicate by modulating the reading device field, such that the reader can evaluate the signal as a modulation by a conventional transponder. Without having to carry out a load or backscatter modulation of the reader field, so the portable data carrier itself sends out a field which simulates a modulation of the reader field by a transponder the reader. A transponder unit according to the invention has means for transmitting the correspondingly modulated signal. The total range of the system is therefore no longer limited by the Kommunikationsreichweite the reader, but is also extended to a transmission range of the transponder unit.

In a preferred embodiment, the active operating mode and / or a passive operating mode can be selected in the portable data carrier, in which the portable data carrier carries out a modulation of the reading device field.

Preferably, the selection of the operating mode is dependent on a power supply of the portable data carrier. To make the choice of the operating mode alternatively or additionally influenced by a terminal in which the portable data carrier is used, the operating mode can be dependent on an external selection signal or a command received from the data carrier.

Likewise, in addition or as an alternative to selecting the operating mode, the active operating mode for the contactless data transmission can be deactivated.

It is particularly advantageous if the deactivation takes place depending on an application executed on the portable data carrier. Thus, can on a portable data carrier, a first application will use the increased range of the active operating mode, and a second application, once run on the portable data carrier, will disable the active operating mode to achieve the increased security associated with the shorter range.

It is particularly advantageous if the portable data carrier can switch between its own antenna and an antenna of a terminal which the portable data carrier for contactless data transmission can use. The switching between the antennas can be done both in response to a command received by the portable data carrier and in response to an internally generated switching signal.

In particular, the portable data carrier may be adapted to detect if it is built into a terminal and modify its behavior accordingly.

Figur 1
ein System umfassend eine Transpondereinheit und ein Lesegerät,
Figur 2
eine Transpondereinheit schematisch mit einer erfindungsgemäßen Schaltung,
Figur 3
ein Prinzipschaltbild eines analogen Ringmodulators,
Figur 4
eine Ausführungsform eines Senders für eine Transponderein heit mit digitalem Ringmodulator,
Figur 5
ein Sender für eine Transpondereinheit mit ASK_Modulator als Trägerfrequenzmodulator,
Figur 6
eine Sender für eine Transpondereinheit mit ASK_Modulator als Trägerfrequenzmodulator und einem modifizierten Hilfs-trägermodulator,
Figur 7
eine Transpondereinheit, in welcher ein Sicherheitsmodul über eine S^2C-Schnittstelle an einen Interfacebaustein angebunden ist,
Figur 8
ein Interfacebaustein für eine Transpondereinheit gemäß Figur 7,
Figur 9
eine Transpondereinheit, in welcher ein Chip mit herkömmlicher HF-Schnittstelle an einen Interfacebaustein in einer weiteren Ausführungsform angebunden ist,
Figur 10
eine Transpondereinheit, in welcher ein Chip mit herkömmlicher HF-Schnittstelle an einen modifizierten Interfacebaustein angebunden ist,
Figur 11
einen Ausschnitt einer Transpondereinheit, in welcher ein Chip mit herkömmlicher HF-Schnittstelle induktiv an einen Interfacebaustein gekoppelt ist,
Figur 12
ein System aus einem Endgerät und einer Massenspeicherkarte mit zusätzlicher kontaktloser Schnittstelle,
Figur 13
ein Interface-Baustein mit Mitteln zur Auswahl eines aktiven oder passiven Betriebsmodus,
Figur 14
ein System aus einem tragbaren Datenträger mit interner Antenne sowie einem Endgerät mit einer weiteren für den tragbaren Datenträger nutzbaren Antenne in einer ersten Ausführungsform,
Figur 15

aus einem tragbaren Datenträger mit interner Antenne sowie einem Endgerät mit einer weiteren für den tragbaren Datenträger nutzbaren Antenne in einer zweiten Ausführungsform,

Figur 16

die Beschaltung einer kontaktbehafteten Schnittstelle einer MMC-Karte in einem ersten Betriebsmodus,

Figur 17

die Beschaltung der kontaktbehafteten Schnittstelle einer MMC-Karte in einem zweiten Betriebsmodus,

Figur 18

ein System aus einem Endgerät und einem tragbaren Datenträger, der erkennt, ob er in ein Endgerät eingebaut ist, und

Figur 19

ein Interface-Baustein mit einer bevorzugten PLL-Schaltung.

Further features and advantages of the invention will become apparent from the following description of inventive embodiments in conjunction with the accompanying drawings. Show:

FIG. 1

a system comprising a transponder unit and a reader,

FIG. 2

a transponder unit schematically with a circuit according to the invention,

FIG. 3

a schematic diagram of an analog ring modulator,

FIG. 4

an embodiment of a transmitter for a transponder unit with digital ring modulator,

FIG. 5

a transmitter for a transponder unit with ASK_Modulator as a carrier frequency modulator,

FIG. 6

a transmitter for a transponder unit with ASK_Modulator as a carrier frequency modulator and a modified auxiliary carrier modulator,

FIG. 7

a transponder unit in which a safety module is connected to an interface module via an S^2C interface,

FIG. 8

an interface module for a transponder unit according to FIG. 7 .

FIG. 9

a transponder unit in which a chip with a conventional RF interface is connected to an interface module in a further embodiment,

FIG. 10

a transponder unit in which a chip with a conventional RF interface is connected to a modified interface module,

FIG. 11

a section of a transponder unit in which a chip with a conventional RF interface is inductively coupled to an interface module,

FIG. 12

a system of a terminal and a mass storage card with additional contactless interface,

FIG. 13

an interface module with means for selecting an active or passive mode of operation,

FIG. 14.

a system comprising a portable data carrier with an internal antenna as well as a terminal with a further antenna usable for the portable data carrier in a first embodiment,

FIG. 15

from a portable data carrier with an internal antenna and a terminal device with a further antenna usable for the portable data carrier in a second embodiment,

FIG. 16

the connection of a contact-type interface of an MMC card in a first operating mode,

FIG. 17

the connection of the contact-type interface of an MMC card in a second operating mode,

FIG. 18

a system of a terminal and a portable data carrier, which detects whether it is installed in a terminal, and

FIG. 19

an interface module with a preferred PLL circuit.

The following is first referring to Fig. 12 a field of application for the present invention is described. A portable disk is over its contact-type interface with a terminal connected and also has a transponder unit according to the invention improved means for contactless communication. The basic principle for increasing the range in a system with a transponder unit and a corresponding reader is then based on Fig. 1 described.

Further options and possibilities for improvement for such contactless communication with increased range are described with reference to Fig. 2 to 11 detailed. Improvements, in particular for those in Fig. 12 Finally, with reference to the Fig. 13 to 19 described.

Fig. 12 shows a secure mass storage card (MultiMediaCard - MMC) 120, which is reversibly connectable via its contact interface (contact interface) 126 with a terminal 127. The mass storage card 120 has a mass storage 122 and an associated first control unit 124. A second control unit 125, which is preferably in the form of a chip card controller, is connected to an interface unit (interface module) 121, to which an antenna 123 of the mass storage card 120 is connected, and to the first control unit 124.

The control of the mass storage card 120 does not necessarily have to be divided into the first control unit 124 and the second control unit 125, but the two storage units and optionally also the interface module 121 may be formed as a single component. The mass storage card 120 may be equipped with a battery, not shown, preferably a foil battery.

The mass storage card 120 generates, as with respect to Fig.1 to 11 described in more detail, for a wireless communication with a second device its own electromagnetic field. The mass memory card field is generated and sent, regardless of a modulation of the second device's field, so that it appears to the second device as a modulation of its field. The mass storage card can thus communicate with the second device over distances that are not dependent on the communication range of the second device. As a transponder unit in the sense of the present invention, the mass memory card and / or the system can act from the mass memory card and the terminal.

FIG. 1 shows a system for data transmission comprising a transponder unit 1 and a cooperating with the transponder unit 1 reader 100th

The conventional reader 100 can exchange data within the energy range ER with conventional passive transponders 200 and within the communication range KR with conventional active transponders 300.

Depending on a system type used, data may be transmitted from the transponders 200, 300 to the reader 100 either by load modulation (inductive coupling) or by modulated return beam cross-section (electromagnetic backscatter coupling). Embodiments for systems which transmit data to the reading device according to the principle of load modulation will be described below. However, the individual aspects of the embodiments are largely analogously applicable to systems that operate on the principle of modulated return cross sections of the transponder unit.

The transponder unit 1 sends to the reading device 100 for data transmission a signal that the reading device 100 can evaluate as a signal of a transponder, which performs a load modulation of the field 110 of the reading device 100. In contrast to the conventional transponders 200, 300, which modulate the field 110 of the reader 100 into a modulated reader field 102, 103, the transponder unit 1 thus generates and transmits its own modulated field 20 as the signal for data transmission. The transponder unit 1 thus uses its own energy for the purpose of data transmission.

In order to achieve a better signal-to-noise ratio, in an inductive system with a carrier frequency $f_{T\,0f}$ the RFID reader of, for example 13.56 MHz in a known manner, a subcarrier f_H with $f_H < f_T$, so for example f_H = 848 kHz (ISO / IEC 14443). The load resistance in the transponder unit is switched on and off with the frequency f_H, so that in the signal spectrum in addition to the strong signal of the carrier frequency $f_{T\,0f}$ the reading device two subcarrier signals at a distance of +/- f_H arise. If now the subcarrier in the transponder unit 1 is modulated in accordance with the data to be transmitted, the modulation sidebands carrying the information are produced in the spectrum below and above the two subcarriers. The data to be transmitted are thus equally contained in the sidebands of the subcarriers, which are respectively arranged on both sides of the two corresponding spectral lines. The data transmission takes place here by ASK, FSK or PSK modulation of the subcarrier in time with the data flow. In contrast to subcarrier load modulation, where the data in sidebands are transmitted around the carrier frequency of the reader, the subcarrier signal in the reader can be better filtered and demodulated to recover the data.

The transponder unit 1 generates and transmits correspondingly a separate field 20 which comprises at least the modulation sidebands around the carrier frequency f_T or the modulation sidebands around an auxiliary carrier frequency f_H, but generally the modulation sidebands of both auxiliary carriers together with the two subcarriers.

Such a system can be used in many ways and avoids the need for a further interface in the reader in many applications.

For example, in a building in which the system is set up as an access system, each person authorized to access can contactlessly authenticate by means of a transponder unit 1 in the form of a chip card. Doors equipped with RFID readers of the access system in the building, including access gates, can be opened by the smart card so early that no waiting period for an automatic opening of the door is ensteht.

Another example is the use in department stores, storage or transport systems in which respective articles, storage or transport containers are equipped with a transponder unit according to the invention. This makes it possible, in particular, to automatically register the articles or containers without any major range restrictions.

Furthermore, a mobile terminal comprising a transponder unit according to the invention could be used as a maintenance or monitoring unit to check a variety of RFID readers, for example, at the cash registers of a supermarket or an access system, on functionality or to maintain remotely.

FIG. 2 shows purely schematically the transponder unit 1, for example in the form of an inductively coupled chip card, which includes the usual, not explicitly shown components. For simplicity, only an inventive RFID transponder unit is shown in a chip card. The transponder unit has a battery 2, an inductive antenna 3 and an electronic circuit 4, 5, 6, 7. The electronic circuit consists essentially of three function blocks, a receiver 4, a controller 5 and a transmitter 6. A switch 7 is used for switching the antenna 3 between the receiver 4 and the transmitter 6.

The receiver 4 is intended to demodulate a signal transmitted by the reader 100 to extract data therefrom. The extracted data is forwarded to the controller 5, which processes it and generates data to be sent to the reader 100. Furthermore, the controller 5 transmits a control signal to the switch 7, which switches between receiving and transmitting the transponder unit. However, it may instead be provided for sending a separate antenna. For example, part of the operating system of a portable data carrier, such as a chip card, can be used as the controller 5.

The transmitter 6 consists of an oscillator 8, a modulator, wherein first an embodiment is described as a ring modulator 9, and a power amplifier 10. Furthermore, the transmitter 6 of in FIG. 2 illustrated transponder unit with an electronic module 11 for generating and modulating a subcarrier signal extended to perform the data transmission from the transponder unit to a reader 100 with a subcarrier signal. The subcarrier signal may have different frequencies depending on the use of the transponder unit, for example 848 kHz according to ISO 14443,424 kHz according to ISO 15693 and 212 kHz for LEGIC, but possibly even completely omitted.

In the in FIG. 2 shown transponder unit is provided that the assembly 11 divides the oscillator frequency by a certain factor by means of a frequency divider 12, for example by binary division. The subcarrier signal generated thereby is modulated with the data to be transmitted, which are supplied to the assembly 11 from the controller 5.

The modulation of the subcarrier in the assembly 11 takes place for example in an AND gate 13 by a so-called 100% amplitude keying (ASK). In this case, the amplitude of the signal generated by frequency division is switched on the basis of the data to be transmitted between two states "on" and "off". Alternatively, a (B) PSK modulation, for example according to ISO 14443 type B, or an FSK modulation can take place.

In order to at least partially supply energy to the active components of the transponder unit and to increase the energy range between the transponder unit 1 and the reading device 100, the transponder unit according to the invention has a battery 2.

Both the oscillator signal as well as the ASK-modulated signal generated in the assembly 11 are fed to the ring modulator 9, whose circuit construction is described below with reference to FIG FIG. 3 will be described in more detail.

The ring modulator 9 has the peculiarity that it performs a special form of amplitude modulation. As with the usual amplitude modulation are considered in the frequency spectrum two spectral lines at a distance of the frequency of the ASK-modulated signal to the frequency of the oscillator signal, the so-called carrier frequency generated. in the amplitude modulation in the ring modulator 9, the carrier frequency of the strong and high-energy oscillator signal is largely suppressed. The data to be transmitted contained in the ASK-modulated signal are located after the amplitude modulation in the ring modulator 9 in sidebands around the two spectral lines of the subcarrier frequency. Such a modulation is called Double Side Band (DSB) modulation or Double Side Band Supressed Carrier (DSSC) modulation. The carrier frequency does not transmit data. On the contrary, the use of the ring modulator 9, which suppresses the carrier frequency, achieves the goal of being able to transmit data to the reading device 100 either with a lower transmission power or with a significantly increased range. The increased range is especially possible if the entire transmission power is plugged into the sidebands in which the data to be sent are located. Although the carrier frequency is basically required to demodulate the signal in order to extract the data transmitted by the transponder unit in the reading device. Since the carrier frequency is present anyway in the reader, it is not necessary that the transponder signal itself contains this frequency.

At the output of the ring modulator 9, an output signal is then available which contains the two modulation sidebands and is identical to a signal generated by load modulation or backscatter modulation (with sufficient accuracy). The output signal generated by the ring modulator 9 may then be further amplified by means of the amplifier 10 and the antenna 3 are sent to the transmission of the data to be transmitted via the switch 7, which is switched by a signal of the controller 5 to the transmission mode of the transponder unit ,

The direct connection of the output of the ring modulator to the antenna is also possible. Then, however, the antenna must be adjusted accordingly and a possible repercussion of the signal coupled by the reader to the ring modulator be considered, since usually for transmitting and receiving the same antenna is used and because the reader is constantly transmitting.

The transponder unit 1 is operated in a first (active) operating mode as an actively transmitting transponder. In a second (passive) operating mode, however, the transponder unit operates like an ordinary passive transponder, which performs a load modulation on the field of the reader.

For example, the receiver 4 may additionally be designed as a conventional load modulator controlled by the controller 5. The controller 5 then switches either the transmitter 6 on and off the load modulator or the load modulator and the transmitter 6 from. The switch 7 is switched accordingly: As a criterion for switching from a passive to an active operating state, for example, the received signal strength, the presence and / or sufficiency of an external power supply (at an optional terminal Vcc not shown) or the sufficiency of an internal power supply (Charge state of the battery 2) serve. It is thus possible, for example, to first passively operate a transponder unit 1 and, for example, to unintentionally increase the distance to the reading device in an active operating mode.

The type of application for which the data is transmitted may also be a criterion for the operating mode. So should the transponder unit For safety-critical applications, only work in passive mode. In contrast, a less critical application, such as a conditional access to premises or buildings, will preferably operate in active mode of operation. A default value for the generally or currently preferred operating mode should, for example, be selectable for the owner of the transponder unit via a terminal into which the transponder unit is inserted or integrated. Switching between the active and passive modes of operation preferably takes place during the reception of data by the transponder unit, ie in active or passive reception mode.

In FIG. 3 a block diagram of a ring modulator 9 is shown. As already described, the essence of the use of the ring modulator 9 is that it performs an amplitude modulation, although the modulation sidebands of a subcarrier are generated in the usual way, but the carrier frequency is suppressed as much as possible. For example, in the transponder unit according to the invention, an MC1496 balanced modulator from ON Semiconductor can be used, which is particularly well suited for carrier suppression. The ring modulator can be completely integrated on a transponder chip, whereby a transponder chip according to the invention with complete integration of all components only requires connections for the antenna 3 and the power supply.

The input HF of the ring modulator 9 is fed with the high-frequency output signal of the oscillator 8. The frequency of the oscillator signal preferably corresponds exactly to the transmission frequency of the reader 100 (eg 13.56 MHz). The input NF of the ring modulator 9 is connected to a data signal in baseband (eg for Felica system) or with a modulated subcarrier (eg ISO 14443, ISO 15693) as described above.

Four diodes 14 are connected together in the ring modulator 9 to form a ring, in each case one anode is connected to a cathode of the following diode 14. One corner of the diode bridge is connected to ground and the signal at input NF is capacitively coupled in at the opposite corner.
In order to achieve a good carrier suppression, the oscillator signal is coupled via the input HF via an adjustable resistance bridge.

The data signal in the baseband or modulated subcarrier signal fed into the ring modulator 9 at the input NF is switched in the rhythm of the oscillation of the oscillator signal between actual and inverted form, whereby the carrier frequency is canceled by the thus opposite symmetrical voltages. An in FIG. 3 shown circuit is also referred to as a balance modulator.

FIG. 4 schematically shows an alternative construction of the transmitter of a transponder unit with a digital ring modulator.

Unchanged compared to the structure according to Fig. 2 For example, the binary data signal A is linked to an auxiliary carrier signal B by an AND gate 43. The linked signal is applied to a ring modulator 49. As the digital ring modulator 49, an XOR gate can be used. In contrast to the structure of the transmitter in Fig. 2 a carrier signal C is not applied directly to the input of the ring modulator 49. Rather, the carrier signal C is first combined in an AND gate 46 with a data signal A. This arrangement achieves a better, as described in more detail below Efficiency. The output signal of the ring modulator 49 is amplified in an amplifier 40 before being transmitted via the antenna 3 as a field of the transponder unit. The signal types A to C will be described below by way of example with reference to FIG Fig. 5 described in more detail.

FIG. 5 schematically shows an alternative transmitter of a transponder unit without ring modulator.

The transmitter is used to generate an amplitude-modulated signal, wherein the illustrated transmitter is preferably used for binary data signals A, whereby an OOK signal (on-off-keying) or a 2-ASK signal is formed. The data signal A in the baseband (eg an NRZ or Manchester signal), a subcarrier signal B (eg 848 kHz in ISO / IEC 14443) and a carrier signal C (eg 13.56 MHz in ISO / IEC 14443) are provided by means of suitable logic circuits 53 , 59 AND-linked, wherein first the signals A and B are AND-connected by means of the circuit 53, from which the signal E is formed. The signal E is then ANDed with the signal C by means of the circuit 59, from which the signal D is produced. Functionally takes over the circuit 59, the function of the modulator and the circuit 53, the role of the AND gate 13 from Fig. 2 ,

The signal D originating from an antenna 3 to a reading device in this case has a frequency spectrum which is similar to a frequency spectrum produced by means of load modulation. The signal D may optionally be amplified by means of an amplifier 40. The amplifier 40 may be, for example, a push-pull amplifier with digital push-pull output amplifiers.

FIG. 6 schematically shows a slight modification of the transmitter of FIG. 5 ,

In the transmitter according to FIG. 5 an amplitude-modulated subcarrier signal is generated, however, the generated in FIG. 6 shown transmitter a phase modulated subcarrier signal. This transmitter, as well as the transmitter of the FIG. 5 is preferably used in a transponder unit according to the invention only when the data signal A is a binary signal. Accordingly, the illustrated transmitter generates a BPSK signal (2-PSK, Binary Phase Shift Keying). In this case, a subcarrier signal B (eg 848 kHz in ISO / IEC 14443) and a carrier signal C (eg 13.56 MHz in ISO / IEC 14443) are AND-linked by means of the circuit 69. The data signal A in the baseband (eg, NRZ or Manchester signal) thereby switches - with the aid of a switch 63 and an inverter 64 - the subcarrier signal B between an inverted and a non-inverted state. This corresponds to the effect of a phase modulation of 180 ° (BPSK, binary phase shift).

A signal D, which is produced by a simple AND operation of the phase-modulated subcarrier signal E with the carrier signal C and emitted by means of the antenna 3, advantageously has a frequency spectrum which is similar to a load modulation with a BPSK modulated subcarrier.

The following table gives an overview of the logical connection of the signals, the current consumption and the range for different digital modulation circuits (carrier frequency TF = 13.56 MHz, carrier frequency HT = 868 kHz, modulation signal MS in baseband and HiB = high baud rate according to ISO / IEC14443: 212) , 424 and 868 kbps are identical for type A and B). modulation circuit Logical connection power consumption Range ISO / IEC 1443 A (Manchester code, 106 kbps, ASK) Digital Ring Modulator XOR (HT ∩ MS) XOR TF 100% 100% Optimized ring modulator (HT ∩ MS) XOR (TF ∩ MS) 50% 100% ASK modulator TF ∩ (HT ∩ MS) 25% 83% ISO / IEC 14443 B (NRZ, 106 kbps, BPSK) and HiB Digital Ring Modulator XOR ((HT ∩ MS) ∪ (HT \ ∩ MS \)) XOR TF 100% 100% ASK modulator ((HT ∩ MS) ∪ (HT \ ∩ MS \)) ∩ TF 50% 83%

When transferring data from a transponder to the reader, an ASK-modulated subcarrier (OOK, HTO MS) is used in accordance with ISO / IEC 14443-3 / Type A at the initialization bit rate of 106 kbps. If this signal is actively simulated according to the method according to the invention, then the required sidebands can be generated most effectively with a ring modulator. The resulting double sideband modulation (DSB) should show the best results in terms of communication range, as it suppresses the carrier frequency (13.56 MHz) and provides the available energy in the sidebands.

Would you just an XOR gate as a digital ring modulator in the circuit according to FIG. 2 This would be due to the fact that the carrier signal is transmitted even in the modulation pauses, ie 100% of the time, and to an unnecessarily high power consumption ,

When using an ASK-modulated subcarrier (OOK, eg 14443 / Type A), it makes sense in each case to link the carrier frequency signal TF provided for feeding into the digital ring modulator with the baseband signal MS by means of a logical AND operation (TF ∩ MS) and to feed the resulting signal into the one input of the digital ring modulator. This results in a reduction of power consumption to 50%, compared to the simple ring modulator. The RF signal is then transmitted only at the times when the subcarrier is also turned on. The communication range of this circuit corresponds exactly to the range of the simple digital ring modulator. The carrier frequency is now clearly suppressed in the output spectrum, as expected from a ring modulator. Such a circuit arrangement has already been described with reference to FIG. 4 described.

The ASK modulator becomes, as in Fig. 4 shown, realized by an AND connection of all input signals. The output signal consists only of carrier frequency bursts at the rate of the subcarrier frequency and the modulation signal in the baseband. In terms of range, losses must be accepted, the range drops to 83% compared to the ring modulator. The current consumption, however, is only 25% compared to the simple ring modulator. This modulation circuit thus appears to be particularly advantageous since the power consumption of the circuit can be reduced to 25% with a small reduction in range.

For an external RF interface - for example, with the S2C interface described in more detail later - an ASK modulator should preferably be used, since this is the lowest power consumption. If the RF interface is integrated into a smart card chip or if an HF interface is used which provides the signal (TF ∩ MS), the optimized ring modulator will preferably be used with sufficient energy. If, on the other hand, energy is to be saved, the ASK modulator can also be used here.

In the case of a data transmission from a transponder to the reader according to ISO / IEC 14443-3 / Type B, as well as at baud rates of 212 kBit / s and higher, a BPSK-modulated subcarrier (Binary Phase Shift Keying) is used for the two interface types A and B. ,

In the active simulation of such a signal, a ring modulator also provides the best results in terms of communication range. The digital ring modulator shows good behavior in terms of carrier suppression. However, the relative current consumption is 100% because RF energy is radiated throughout the duration of one bit.

The ASK modulator shows poor carrier suppression behavior. The power consumption drops to 50% compared to the digital ring modulator.

For BPSK or FSK-modulated subcarrier preferably an ASK modulator should be used, since the transmitter in this case the lowest power consumption needed. If sufficient energy is available, however, the simple digital ring modulator can also be used. An optimized digital ring modulator is not possible because with PSK or FSK modulation of the subcarrier, this must be sent during the entire duration of a bit.

The following is with reference to the FIGS. 7 to 11 received on advantageous ways to realize a circuit according to the invention in conjunction with known components.

There are smart card chips, which have a so-called S^2C interface defined by Philips, in order to connect the smart card chip to an HF interface of an NFC device. Although such smart card chips have hardware means for generating and decoding signals required on an ISO / IEC 14443 interface (Miller code, Manchester code, subcarrier 848 kHz). However, such a chip does not have its own RF interface unit.

FIG. 7 schematically shows a transponder unit according to the invention, formed by an interface module (interface unit) 71 connected to an antenna 3 and a chip 75 with a suitable interface, for example an S^2C interface. Such a transponder unit can be formed, for example, in a mobile device with the aid of the SIM card as a chip 75, which is then preferably connected to the interface module 71 via one or more unoccupied contact surfaces (C6 and / or C4, C8) of the SIM card ,

Both the interface module 71 and the chip 75 can draw their supply voltage from the device in which they are preferably reversible are arranged. The interface module 71 can act as a conventional transponder in a second operating mode and supply the chip with an operating voltage Vcc_RF.

FIG. 8 schematically shows a more detailed structure of an interface module for a chip with S^2C interface.

The interface module 71 is provided with a signal input SIGIN and a signal output SIGOUT to route signals from the antenna to the chip (not shown) and from the chip which generates the modulated subcarrier signal to the antenna. A signal to SIGOUT consists of a 13.56 MHz TTL signal, which optionally contains a modulation signal of a remote reading device.

The interface module 71 includes an amplifier 80, an AND gate 89, an oscillator 88, a frequency divider 82, a signal conditioner 84, and a switch 87. The amplifier 80 may be, for example, a push-pull amplifier with (digital) push-pull output amplifiers (not shown) , Furthermore, the interface module has two antenna terminals LA and LB and a series capacity 81, in addition, the interface module 71 has terminals Vcc-in and GND for power supply and a control input CTRL to switch between a transmission and reception operation of the interface module by means of the switch 87.

The externally modulated subcarrier signal is fed via a suitable interface (eg S2C interface from Philips) to the signal input SIGIN of the interface module 71 and further processed there as described below. The subcarrier signal is for example a 848kHz TTL signal, which ASK (ISO / IEC 14443 A, Manchester Code) or BPSK (ISO / IEC 14443 B, NRC Code) is modulated.

If the interface module is in transmission mode, i. there is a contactless data transmission to an external reader or an NFC device instead, then a modulated subcarrier signal is fed to the signal input SIGIN by the smart card chip and optionally inverted in an inverter 86. The inverted signal E is combined in the AND gate 89 as a carrier frequency modulator with a 13.56 MHz carrier frequency signal and supplied to the amplifier 80.

The antenna 3 and the series capacitance 81 form a series resonant circuit, which is connected to the outputs LA 'and LB' of the amplifier 80, so that the resonant RF current in the antenna resonant circuit is limited only by the ohmic resistances in the lines and in the amplifier 80 becomes. This achieves the greatest possible transmission power of the interface module.

Furthermore, the smart card chip via the switch 87 in the transmission mode via the output SIGOUT a constant 13.56 MHz clock signal from the oscillator 88 are supplied, if he needs such an (external) clock signal to operate to a precise clock (timing) observed. As already described, this is necessary for communication according to the ISO 14443 type A standard.

In the receive mode, the smart card chip is supplied via the switch 87 and the output SIGOUT a digitized, tapped from the antenna 1 received signal. The signal shaper 84 functions as an amplifier in order to be able to receive even weak signals, and as a threshold switch, to provide a digital output signal at the output of the signal conditioner. For example, as a threshold switch, a Schmitt trigger can be used, which outputs a definite high or low level depending on whether it exceeds or falls below a predetermined threshold value.

The push-pull outputs of the output drivers (see amplifier units in FIG Fig. 5) Switched to GND, so that from the antenna 3 and the capacitor 41, a parallel resonant circuit is formed. In order to save energy, the amplifier 80 can be switched to a power-saving mode in the receiving mode of the interface module.

The oscillator 88 generates the 13.56 MHz carrier frequency signal required in the transmission mode. If the oscillator can not be switched off in receive mode since its transient process may take too long, then the oscillator is preferably operated at a multiple N of the carrier frequency signal (eg 27.120 MHz) in the receive mode of the interface module in order not to crosstalk the possibly weak receive signal to disturb. In the transmission mode, the required 13.56 MHz signal can then be generated by dividing the oscillator signal by N by means of an optional divider 82.

The control signal input CTRL for a control signal is optional, since the control signal for switching the operating mode can also be derived from the input signal at the signal input SIGIN. For example, a monostable timer (monoflop) can generate a control signal from the input signal to SIGIN. It only gives an active input if the chip wants to send data. Triggert now with the first edge of the input signal, the monostable timer, you get as an output of the timer a control signal. In particular, the timer should be retriggered realized and set so that it falls back to the initial state, for example after a time of 1 to 2 times the bit duration (maximum of the FGT, Frame Guard Time). Thus, the control signal again asserts a receive operation when no data is sent.

FIG. 9 schematically shows the structure of an interface module for connection to a chip with conventional RF interface.

The active transponder unit according to the invention has a receiving branch and a transmitting branch. The reception branch consists of an antenna 3, an input amplifier 91, an automatic gain control 92, and an amplifier which is preferably designed as a push-pull amplifier (V +, V-). Furthermore, a transponder chip CL is connected via its antenna connections to the push-pull amplifier.

The transponder chip CL is a conventional RFID chip according to the prior art. It is usually connected to its terminals with an antenna, e.g. B. in a smart card connected. Furthermore, the transponder chip CL is designed so that the data transmission from the transponder unit to a reading device is carried out by means of load modulation. This is almost always the case with the usual RFID systems used on 13.56 MHz or also 125 kHz (eg ISO / IEC 14443, ISO / IEC 15693, ISO / IEC 18000-3).

The transmission branch consists of a demodulation circuit 97, a modulator circuit 9, an oscillator 8 (eg 13.56 MHz), a controller 95, and a transmission amplifier 80 connected to the antenna 3 Demodulation circuit 98 may consist of, for example, a rectifier 96 and a threshold switch 97.

In the receiving mode, a voltage is induced in the antenna 3 by the magnetic field of a remote RFID reader. Together with the capacitor 81, the antenna 3 forms a parallel resonant circuit whose resonant frequency corresponds approximately to the transmission frequency of the RFID reader. The voltage applied to the resonant circuit is supplied via the switch 7 to the input amplifier 91. Via a gain excitation 92, the gain of the input amplifier 91 is adjusted so that the output amplitude of the amplified by the input amplifier 91 voltage remains largely constant. The time constant of the control is preferably set so that the output voltage of the amplifier 91 remains constant at different distances to the reading device (ie different induction voltage in the coil 3, modulation signals, however, (eg 10% ASK with 106 kbit / s) can not be suppressed by a too fast control.

The output signal of the amplifier 91 is fed to a further amplifier, preferably a push-pull amplifier (V +, V-). The output signal of the push-pull amplifier is fed via (at least) a series resistor 93 to the terminals of the contactless RFID chip CL. The amplitude of the output signal of the push-pull amplifier V + / V- is chosen so that the RFID chip CL can be supplied by the output signal with sufficient energy for operation.

The RFID chip CL thus receives a signal which corresponds to the signal of the remote reading device over time and behaves proportionally in amplitude. The RFID chip is thus also able to do this Reader received commands to evaluate, evaluate and possibly work off.

As soon as the RFID chip CL has received a command and has processed it, it tries to return a response to the remote reading device. For this purpose, the RFID chip usually uses a load modulation, d. H. An additional parallel resistor in the chip is switched on and off in time with the modulation signal. This results in measurable variations in the voltage drop across the resistors 93, 94. In other words, the RF AC voltage at the terminals is modulated in amplitude. The demodulator circuit 98 demodulates this amplitude-modulated AC voltage signal and thus neither reconstructs the original modulation signal.

The demodulation circuit 98 consists in the simplest case of a bridge rectifier 96 and a threshold value switch 97. Another possibility is to implement the demodulation circuit from an A / D converter and a subsequent signal processing (eg a DSP processor with software). In RFID systems using load modulation with subcarriers, it is also possible to filter out a subcarrier band formed by the load modulation (upper subcarrier band 13.56 MHz + f_{HT} , lower subcarrier band -13.56 Mhz - f_{HT}) and subsequent processing.

The modulation signal reconstructed by the demodulation circuit 97 is also supplied to a controller 95. This switches the circuit according to the invention with the first edge of the modulation signal as quickly as possible in a transmit mode, so that the data generated by the RFID chip CL data can also be transmitted to the remote reader.

For this purpose, first the switch 7 is switched from the antenna 3 to the oscillator 8 (13.56 MHz). This is necessary in order to continue to supply the RFID chip CL with an AC voltage of the correct frequency. At the same time, the controller 80 activates the amplifier 80.

The reconstructed modulation signal and the signal of the oscillator 8 is fed to the modulator circuit 9. The exact function of such a circuit has already been described in detail. The output signal of the modulator circuit 9 is supplied to the amplifier 80 and sent via the antenna 3 to the remote reader.

If the control unit 95 is no longer supplied with a modulation signal for a defined time t, it is provided according to the invention that it automatically switches the circuit according to the invention back into the reception mode. The duration of the time t is expediently set between the duration of one bit (ISO 14443-A: ~ 10 µs) and the Frame Delay Time (minimum time until the next signal of a reading device, ISO 14443-A: ~ 86 µs).

An important role is played by the signal arriving at the controller 95 from the receiving branch (91, 92, V +, V-). If a reader sends data to the transponder unit by means of an amplitude modulation of the transmitted field (eg, 150 / IEC 14443-A: 100% ASK, ISO / IEC 14443-B: 10% ASK), this modulation is also forwarded to the transponder chip CL , The demodulation circuit 98 may not distinguish between a modulation signal from a reading device and a load modulation of the RFID chip CL, since both express themselves as amplitude modulation of the RF signal at the terminals of the RFID chip CL.

A load modulation of the transponder chip CL is, however, only at the terminals, a modulation signal of the reader, however, already in the receiving branch (91, 92, V +, V-) of the circuit according to the invention to recognize. It is therefore intended to switch the circuit according to the invention only in the transmission mode, if a modulation signal (amplitude modulation) exclusively at the terminals of the RFID chip CL, but not im.Empfangszweig can be detected, since it is only in this case to a Load modulation is. In FIG. 9 this is indicated by the fed into the controller 95 from the receiving branch (91, 92, V +, V-) signal.

A second possibility for distinguishing is the evaluation of the modulation depth of the signal at the terminals of the RFID chip. Load modulation achieves a modulation depth of less than 100%. Approximately 25% was determined in the laboratory setup, other values result from the combination of different resistors 93, 94 with different RFID chips CL. It is therefore intended to make the distinction between the load modulation and the modulation of the reading device by determining the modulation depth based on predetermined switching thresholds. If the strength of the modulation signal is above a first, high threshold, then a signal of the reading device is present.

On the other hand, if the modulation signal is smaller than the first switching threshold and optionally greater than a second switching threshold, it is detected that a load modulation is present. A changeover to the transmit mode takes place if the modulation was caused by a load modulation.

FIG. 10 shows schematically the structure of a simplified interface module for connection to a chip with conventional RF interface.

In this embodiment, instead of a linear amplifier, a TTL driver in push-pull circuit 23, 24, 25 is used. A modulation detector 22 serves to detect an amplitude modulation sent by the reading device and, according to the invention, switches both outputs of the push-pull circuits 23, 24 to a low level during the modulation pulses of the reading device which carries out a 100% ASK modulation. If, on the other hand, the transponder chip CL and the reader use a 10% ASK modulation for the data transmission (for example according to ISO / IEC 14443-B), it is provided that the modulation detector 22 switches between two push-pull circuits with different levels of the output signal in time with the received modulation signals ,

Another way of coupling the transponder chip CL is a capacitive or inductive coupling. FIG. 11 shows the relevant section of a simplified interface module for inductive connection to a transponder.

For an inductive coupling, the circuit has an additional antenna 29, which can be brought into resonance by means of a capacitor 26 to the operating frequency (eg 13.56 MHz). A transponder consisting of a transponder chip CL and an antenna 28 is positioned in the immediate vicinity of the antenna 29, so that the best possible magnetic coupling between the antennas 28 and 29 can be achieved. Even with this arrangement, a load modulation of the transponder chip CL can be easily detected.

The inductively couplable interface module and a further antenna connected thereto (see reference numeral 3 in FIG Figure 10) can be arranged in a terminal be. The range of an ordinary transponder can be increased with the help of such a terminal. The owner of a mobile device could, for example, establish a communication between his transponder and an unfavorably arranged or for other reasons not easily accessible reader by holding the transponder to be provided according to the invention with an inductively coupled interface module mobile device.

The following table shows the results of performed range measurements: transponder antenna size Range Contactless chip card 80 x 50 mm ^{2} 7 cm Optimized digital ring modulator XOR 80 x 50 mm ^{2} 50 cm Optimized digital ring modulator XOR 20 x 20 mm ^{2} 25 cm

As can be seen from the table, large communication ranges are achieved with the method according to the invention, even with very small antennas.

It has been found that small antennas, eg in a SIM card with its own antenna (about 15x25 mm ^{2}), with a conventional load modulation reach only very low reading ranges. Often it is even impossible to communicate with a contactless reader when the SIM card is arranged with an antenna, for example in a mobile device. If one of the transmitters according to the invention is used in a mobile terminal, not only is the range significantly increased. In addition, advantage can be exploited be that mobile devices such as mobile devices, PDAs, etc. have their own power supply (battery), which can also be used to power a circuit according to the invention.

The described solutions can be seen as an alternative to the use of NFC units that alternately emit their field in the active mode of the NFC system. However, the present solutions can also serve as an advantageous supplement to the passive mode in an NFC system.

Thus, an NFC unit could be adapted, in its passive mode in the role ("Being Card"), in which the NFC unit is to perform a load modulation, to behave in the sense of the present solutions. For example, the NFC unit could always act as an active field-sending component. Likewise, however, the NFC unit could also distinguish between and possibly switch between a first sub-mode corresponding to a conventional load modulation and an actively transmitting second sub-mode in which the load modulation is simulated. Such an improved NFC unit can also communicate with ordinary RFID readers over a longer range using the modified passive mode of operation. Since NFC units for autonomous transmission in their conventional active mode will already have certain units - such as an oscillator, an amplifier and a controller - relatively few modifications of an NFC circuit are required to form a circuit according to the present application to realize an NFC unit.

Partial aspects of the individual embodiments can be combined with one another, as becomes clear from the examples in the following paragraphs.

A suitable modulator circuit can be selected based on the application in, for example, the above-mentioned component combinations. Also, the various types of subcarrier modulator and carrier frequency modulators shown can theoretically be arbitrarily combined in a modulator. Whether a passive mode of operation is provided, and under what conditions and how a switchover occurs, is also selectable depending on the application.

The individual functional components of the transponder unit: antenna, interface unit, chip and possibly power supply unit can be arranged separately in a variety of combinations or integrated together in one unit. A transponder unit according to the invention can be formed, for example, as a specially designed transponder, in a portable data carrier, in particular a chip card, which optionally has a battery. A portable data carrier, in particular a SIM card, with chip and interface unit can be connected in a mobile terminal to an external voltage source and / or an external antenna. The interface unit can be arranged in a terminal, connected to its own or an external antenna, and communicate with a chip that is arranged reversibly or fixed in the terminal or temporarily on the terminal.

With reference to the Fig. 13 to 19 in the following, improvements will be described, especially for the in Fig. 12 shown application are advantageous. In Fig. 12 becomes a mass storage card connectable to a terminal shown as a transponder unit. The following portable data carriers can be seen as analogous applications: a SIM card, a security module for a payment transaction terminal, a security module (TPM - Trusted Platform Module) for a computer or a USB token connectable to a terminal, provided that it is also adapted according to the invention Have means for wireless data communication. Therefore, the generic term "portable data carrier" is at least partially used in the following and dispenses with the representation of the optional existing components mass memory 122 and associated control unit 124.

Figure 13 shows the structure of the interface module 121 Figure 12 , The interface module 131 comprises an amplifier 130, a signal processing unit 136, a conventional passive mode circuit unit 134, which typically includes a rectifier, a demodulator and a load modulator, and a selector 135. The interface module receives an external supply voltage Vcc_MMC via an input Vcc_MMC and provides its own supply voltage optionally via an output Vcc_out ready.

The mass storage card 120 off Fig. 12 can thus be supplied from two possible sources of energy. It receives its supply voltage either from the power supply 128 of the terminal 127 (VCC-MMC) or from an external high-frequency field (VCC-HF).

In the Fig. 13 Selector unit 135 shown evaluates whether a supply voltage VCC-MMC is present and switches an internal selection signal (e-nable) of the interface module 131, preferably depending on the presence of the provided by the terminal power supply. Depending on the internal selection signal, the interface module 138 uses either a passive mode of operation (passive interface unit 134 activated and amplifier 130 and signal processing 136 deactivated) or the active operating mode according to the invention (passive interface unit 134 deactivated and amplifier 130 and signal processing 136 activated). The selection unit 135 can further evaluate whether the external power supply Vcc-MMC is present in a sufficient amount and possibly even evaluate its temporal evolution.

If the mass storage card 120 is off Figure 12 in the terminal 127, it draws its supply voltage from the power supply 128. The selection unit 135 turns on the amplifier 130 and the signal processing unit 136 to send the data to be transmitted in the active mode of operation.

On the other hand, if the mass storage card 120 is not inserted in a terminal or if it does not receive sufficient power from a terminal, the mass memory card 120 is supplied from the energy of the received radio-frequency field. The selecting unit 135 turns off the amplifier 130 and the signal processing unit 136, and activates the

communication unit 134 to perform, for example, a conventional load modulation of a present high frequency field.

Optionally, a battery of the mass memory card can be used in addition to the power supply. In the passive mode of operation, the mass storage card 120 thus operates as a conventional active or passive transponder. The selection unit 135 may be adapted to design the selection signal depending on an available battery voltage and / or energy capacity of the battery.

Alternatively or additionally, the signal for selecting the operating mode can be specified independently of a measured voltage supply. The select signal may be generated in response to a command received from the mass storage card 120, as well as generated in response to the application currently executing on the controller 125. The selection of the passive operating mode can be selected for certain applications, which should exchange data contactlessly only over very short distances for safety reasons. Such an application could be, for example, an electronic purse. On the other hand, a second application on the control unit 125, such as a public transport ticket, may select the active mode of operation to take advantage of the increased range.

It may even be useful to provide a default value for the selection signal. For example, for a mass storage card that uses a ticket application as a default application after its activation and has no battery, it makes sense to select the default value so that the passive mode of operation is preset. If, on the other hand, the mass memory card has a battery that is sufficiently powerful at least in the fully charged state, the default value should be used to select the active operating mode of the mass storage card.

Control of the selection signal may also be used to selectively increase or decrease the range for a particular time window of a transaction. The time window may be an introductory phase, a central phase or a final phase of the transaction. For example, in the introductory phase, a structure of the communication connection and an authentication take place in the central phase Debiting (of a ticket) and, in the final phase, logging the transaction and removing the communication link.

For example, if a ticket application initially operates in active mode, that mode may be used for a phase of the mass memory card 120 approaching a ticket machine reader. Since the communication associated with a ticket transaction can already commence at a greater relative distance, the time required for the ticket transaction is shortened.

As soon as the selection unit 135 of the mass storage card 120 detects a predetermined value for a contactless power supply by an RF field, it generates a corresponding selection signal in order to switch the mass memory card into the passive operating mode. The predetermined value can be selected to ensure that the mass storage card is within the communication range of the reader sending the RF field.

In addition or as an alternative to a switchover by the selection unit 135, for example, the ticket application can force a switch to the passive operating mode for at least a certain period of time, preferably the central phase, of the transaction. Thus, it could be ensured, in particular, that a ticket is not accidentally canceled in a random approach to a ticket reader, but only if after a rough approach also a targeted approach in the communication area of the reader takes place.

Finally, it is also possible to use the active mode of operation for the period of time at the end of a transaction to avoid having one successful transaction can not be fully completed. Different combinations of the time-dependent selection of the operating mode for specific phases may make sense depending on the transaction type.

Regarding Fig. 14 in particular, ways to selectively deactivate an operating mode are described. Deactivation can be done in addition or as an alternative to a selection of the operating mode.

Fig. 14 shows a portable data carrier 140, which is reversibly connected to a terminal 147 with its own contactless interface for short-range communication 148,149. The terminal 147 has, in addition to a power supply 128 and a control unit 129, an interface unit 149, which is preferably an NFC interface unit and to which an antenna 148 is connected. The terminal 147 may thus occur in different roles in an NFC system or an RFID system, depending on the selected mode of operation ("being reader", "being card" and "peer-to-peer") of the contactless interface unit 149.

In the portable data carrier 140, the antenna 123, the interface module 121 and the control unit 125 are arranged. The portable data carrier 140 is optionally supplied with a supply voltage VCC-MMC by the power supply unit 128. The control unit 129 of the terminal 147 is connected at least to the interface module 121 and optionally also to the control unit 125 of the portable data carrier.

When the interface unit 149 of the terminal 147 operates in the "BeingReader" mode, a portable data carrier 140 not inserted in the terminal 147 could wirelessly communicate with the terminal 147.

If, on the other hand, the portable data carrier 140 is inserted into the terminal 147 as shown, such contactless communication is generally undesirable. A contactless communication between the portable data carrier 140 in its inserted state and the terminal 147 would even be harmful because the reading of other contactless data carriers, which are also in the response field of the terminal 147, difficult or even prevented. In any case, at least the performance of the contactless interface of the terminal would suffer because first a collision between the then existing two contactless transponders (inserted portable data carrier 140 and external RFID transponder) would have to be resolved. Furthermore, it may be undesirable for both the portable data carrier 140 and the terminal 147 to communicate as an NFC unit in the BeingCard mode with an external reader.

It is envisaged to give one of the two contactless interfaces 148, 149 and 121, 123 existing in the system comprising terminal 147 and portable data carrier 140 an increased communication priority. The other contactless interface may optionally be deactivated permanently or temporarily. The priority of an interface should preferably be assigned temporarily. For example, it may be advantageous to assign a higher priority to an NFC interface of the terminal at a first time when it is in a certain mode, in particular the mode "BeingReader". At a second time, however, the contactless interface of the portable data carrier 140 should be assigned a higher priority. For the prioritization of the interfaces, a deactivation signal for one of the two contactless interfaces is generated in the system of terminal 147 and portable data carrier 140.

A first criterion which interface is to be preferred may be the application to be executed. For example, it may be useful to communicate with some applications preferably via the portable data carrier 140, for example for payment transaction applications. On the other hand, other applications will preferably communicate via the contactless interface of the terminal when, for example, software for the terminal 147 is to be loaded. Another criterion may also be the location of the application being executed. Thus, it may be easy for an application running on the control unit 125 of the portable data carrier 140 to communicate with an external contactless reader via its own contactless interface 121. Conversely, for application software executed by the control unit 129 of the terminal 147, it may be easier to use the (NFC) interface unit 149 of the terminal 147.

Another criterion for determining the priority of the contactless interfaces may be the Being Reader, Being Card, and Peer-to-Peer (NFC) interface unit 149 of the terminal 147. Also, specifications that the user of the terminal 147 has selected, for example, in the context of a device configuration can be used as a criterion.

Various methods can be used to switch the priority between the two contactless interfaces.

According to a first approach, the control unit 125 of the portable data carrier 145 sends a command via the internal communication interface 141 to deactivate or (re) activate the contactless interface to the interface unit 121. The contactless interface of the terminal 147 attains a higher priority because the contactless interface of the portable volume 125 is completely deactivated. A reconnection of the contactless interface of the portable data carrier 140 by the control unit 125 can be carried out automatically with the receipt of any other command or a command specifically for this purpose via the contact interface 143.

According to a second approach, the interface unit 121 of the portable data carrier 140 is activated or deactivated by means of a special release or deactivation signal, bypassing the control unit 125. The enable signal may be, for example, a logic signal (level high or low). Again, the contactless interface of the terminal 147 attains a higher priority by deactivating the contactless interface of the portable data carrier 140. Such a deactivation signal can also be applied for a short time, for example, at a time when the terminal's contactless interface unit 149 sends a REQUEST signal, to establish a communication connection to a possibly present external transponder.

According to a third approach, the internal supply voltage VCC_MMC, which is supplied to the portable data carrier, is interrupted. In addition to the interruption of the power supply, however, further steps must be taken to prevent the activation of the contactless interface of the portable data carrier by an external high-frequency field of a reading device or by the high-frequency field of the terminal. For example, means, not shown, may be provided in the portable data carrier 140 to recognize that the portable data carrier is inserted into a terminal. Such "built-in recognition" will be described later.

Fig. 15 FIG. 12 shows a portable data carrier 150 with an internal antenna 123, which is equipped with a terminal 157 with an external antenna 158 which can be used for the portable data carrier. The portable data carrier may optionally use the internal antenna 123 or the external antenna 158 of the terminal 157 for contactless data transmission.

In the in Fig. 15 in the embodiment shown, the portable data carrier 150 has checking means 151 which are adapted to check whether the portable data carrier 150 is connected to an external antenna 158. The illustrated exemplary embodiment of such a test device 151 makes use of the typical property of an RFID antenna for the frequency range 13,56 MHz, according to which the DC resistance of such an antenna is generally only a few ohms. For testing a connection of the antenna is placed with a high-impedance pull-up resistor 153 to the supply voltage VVC. The second terminal is temporarily grounded (GND) to a switching transistor 156. If there is a galvanic connection between the two connection clocks through a low-impedance antenna 158, the switching operation of the transistor can be detected as a potential change (voltage jump) at the input of an evaluation circuit 154, for example in the form of a Schmitt trigger.

It is another possibility to send the portable data carrier 150 at least for a first time, for example after switching on the terminal 157, via the contact interface, a special command for selecting the antenna. If such a command is not sent because, for example, an external antenna 158 is not available or because the user of the terminal has selected a corresponding user configuration, the internal antenna 123 of the portable data carrier remains selected. Another special command should be provided for switching back from the external antenna 158 to the internal antenna 123 to allow multiple switching between the antennas.

A third approach to switching between the available antennas is to use a simple switching signal (high or low level) which can be applied to an explicitly provided port on the portable data carrier interface. For example, this switching signal may be set to a fixed level to indicate the presence or absence of an external antenna. Such a switching signal allows the terminal as needed, so in particular depending on the operating state of the terminal 157 or the user configuration to make a selection of the antenna.

Means for detecting whether the portable data carrier is built into a terminal (built-in recognition) are first generally explained and then with reference to the Fig. 16 to 18 described in more detail.

For a variety of functions it may be important to know whether the portable data carrier is installed in a terminal or whether the portable data carrier is operated independently of a terminal. It is therefore intended to provide at least two modes of operation ("independent" operation and "dependent" (built-in) operation) in the portable data carrier. These two modes of operation may initially be selectable independently of a possible active or passive mode of operation of the portable data carrier. Usually, however, the independent mode of operation is fixed be connected to the passive mode of operation, since the power supply of the portable data carrier is carried by the field of contactless reader.

After a start of operation (startup) of the terminal, the terminal is in accordance with the MMC specification in the so-called "Card Identification Mode". In this mode the terminal searches for (new) connected cards. A mass storage card according to the invention is therefore initially started in the independent operating mode. If a command SET_RCA is received via the contact interface, the mass storage card changes to the dependent operating mode.

For a SIM card as a portable data carrier can be used as a switching criterion of independent in the dependent mode of operation, the application of a reset sequence on the contact interface or the reception of a first APDU via this interface.

Optionally, a change from an independent to a dependent operating state can be made dependent on a successful authentication. The authentication may be a mutual authentication between the terminal and the portable data carrier, but it should at least include an authentication of the terminal to the portable data carrier. Such an authentication before switching the operating state may be useful, in particular, if the terminal, for example, for the purpose of PIN entry must be particularly trustworthy.

In the FIGS. 16 and 17 are the electrical connections of the contact interface of an MMC 162, 172 as a mass storage card by a host 161,171 shown as the terminal for the MMC mode or the SPI mode according to MultiMediaCard specification.

In another method for detecting a built-in state of a portable data carrier, the state of at least one of the contacts of the contact interface is checked in order to select the operating mode accordingly.

In the case of the mass storage cards 162, 172 shown, at least one of the lines CMD, DAT, CLK, VCC_MMC, VCC1, VSS1, VSS2 is checked at a time which is after the startup of the terminal 161, 171. For example, the lines CMD, DAT are at a high level by a pull-up resistor in the idle state. The line VCC1 is at a high level and the line VSS1 is at a low level. When at least one of the levels is equal to that expected for the built-in state, the mass memory card 162, 172 switches to the dependent ("built-in") mode of operation. Otherwise, or if, for example, the measured level values do not correspond to an expected combination of the level values, the mass memory card 162, 172 remains in the independent mode of operation.

In Fig. 18 Another possibility for a built-in detection is shown. In order to detect whether a portable data carrier 180 is installed in a terminal 187, the logic level of a contact, which may be connected, for example, with a pull-up resistor 181, is queried. When the contact is pulled low (GND) by a switch 188 in the terminal 187, it can be detected by the portable data carrier 180.

Instead of the switch 188, a direct connection to ground (GND) in the terminal 187 can also be used. The switch 188 may be adjustable by a user configuration of the terminal 187. Further, the switch 188 may be configured to ground the contact for detection of a built-in condition only at battery voltage present in the terminal 187 by the power supply 128. Such a configuration is particularly advantageous since the portable data carrier 180 always detects the state "built-in" and selects the dependent mode of operation when there is battery voltage in the terminal - regardless of whether the terminal is currently on or off. On the other hand, with a discharged battery, the independent mode of operation is selected so that other software features may become available in the portable data carrier 180 (eg, an emergency mode). The possibility of setting the switch via a user configuration as well as the monitoring of the battery voltage can also be logically linked and thus combined with each other.

In a further variant, the switch 188 is a mechanical switch, for example a DIP switch or slide switch.

The portable data carrier 180 should behave differently in the dependent mode of operation than in the independent mode of operation. In particular, access rights to program parts and / or data of the file system can be designed depending on the operating mode. Thus, it may be useful, for example, to be able to describe certain data via the contactless interfaces 121, 123 only if the portable data carrier 180 is installed in a terminal 187 and the portable data carrier 180 has also recognized this state.

The changes in the data may be displayed to the user via a display device, not shown, of the terminal 187. On the portable data carrier 180 program parts and / or data are provided with complex access permissions. These access authorizations can be used to specify in which operating mode (independent, dependent, active, passive, active dependent, passive dependent or passively independent) a particular program part may be called, or whether data in this operating state may be read, written, deleted or used ,

Figure 19 shows an improved circuit for an interface module, for example in the sense of Fig. 8 , which makes it possible to synchronize the required oscillator via a PLL circuit with the received signal of a reader. Therefore, the oscillator does not need its own quartz crystal.

An interface module 191 is connected to an antenna 3. The interface module 191 comprises an amplifier 80, a signal processing unit 198 and a modified oscillator circuit. The modified oscillator circuit 192-197 includes a voltage controlled oscillator 193, a first binary divider 194 (1 / n), a second binary divider 195 (1 / m), a phase comparator 196, a low pass filter 197, and a sample-and-hold circuit 192. As sample-and-hold circuit 192, for example, a conventional circuit named LF 198 from National Semiconductor may be used.

The oscillator circuit 192 to 197 can be switched between the states "receive mode" and "transmit mode" by a switching signal 199 received from the signal processor 191, which is applied to the sample-and-hold circuit 192.

Via the antenna 3, the 13.56 MHz signal of a remote reading device is received and fed via a signal conditioning 84, for example in the form of a Schmitt trigger, the signal processing. By the second binary divider 195, a reference signal, for example, with the frequency 6.87 MHz, generated from the received signal and fed to the phase comparator 196. The voltage controlled oscillator 193 generates a second frequency, which is preferably higher than 13.56 MHz and may be 27.12 MHz, for example. By the first binary divider 194, a second reference signal, for example with the frequency 6.87 MHz, generated from the signal of the oscillator and also supplied to the phase comparator 196. The phase comparator 196 generates from the phase and frequency difference of the two reference signals, a control voltage, which is smoothed in a low-pass filter 197 and then the sample-and-hold circuit 192 is supplied.

The sample-and-hold circuit 192 is operated according to the invention in the receive mode in the sample mode and acts as a voltage follower, so that the control voltage is supplied unchanged to the voltage-controlled oscillator 193. This has the consequence that the oscillator 193 phase-locked after a short control period - in the frequency ratio m to n of the two binary divider - coupled to the frequency of the external reader (synchronized).

In the transmission mode, the sample-and-hold circuit 192 is operated according to the invention in the hold mode. The control voltage previously determined in the receive mode is now held, so that the oscillator 193 maintains the set frequency. By the first binary divider 194, the frequency of the oscillator 193 is divided down to 13.56 MHz and fed to the signal conditioning.

For the benefit of the present description, the individual advantageous features and arrangements have not been repeatedly illustrated, discussed, and combined in each embodiment.

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EP1801741B1	2009-07-22	Portable data carrier with active noncontact interface
EP2280371B1	2014-05-21	Interface unit
EP0774144B1	2004-08-04	Chip-card
EP1723575B1	2011-10-19	Method for recognizing identification media
DE60133755T2	2009-05-14	CONTACTLESS COMMUNICATION MEDIUM AND SYSTEM
DE102014204088A1	2014-09-11	CONTACTLESS COMMUNICATION DEVICE AND USER DEVICE CONTAINING THEREOF
DE112006002666T5	2008-08-14	Means for deactivating a contactless device

DE102004062132A1	2006-07-13	Backscatter transponder
EP2553624A1	2013-02-06	System and method for detecting the presence of a second portable data storage medium by a first portable data storage medium
DE102011112031A1	2012-11-15	Method for data exchange between terminal and chip card
EP1410319B1	2004-11-24	Portable data carrier assembly comprising a security device
EP2141637B1	2012-10-10	Portable data carrier with active contactless interface and operating method
WO2009135722A1	2009-11-12	Rfid transponder having dual interface
EP3290948B1	2020-03-25	Position detecting sensor and system
EP3259700B1	2022-10-12	Wireless card reader
EP2437203B1	2013-11-06	Portable data carrier and method for displaying the existence of an external NFC unit
DE10028813A1	2001-12-20	Active chip card used in wireless data transmission, has battery for supplying power to memory, transmitter, contact unit and control unit while transmitter sends data in mobile radio frequency range
EP1906363A1	2008-04-02	Access control system
DE10318052A1	2004-11-04	Portable data carrier and method for communicating with a portable data carrier

Priority And Related Applications

Child Applications (2)

Application	Priority date	Filing date	Relation	Title
EP09007006.1A	2005-12-22	2006-12-13	Division	Portable data carrier with contactless interface
EP11002348.8A	2005-12-22	2006-12-13	Division	Portable data carrier with active contactless interface

Priority Applications (2)

Application	Priority date	Filing date	Title
EP09007006.1A	2005-12-22	2006-12-13	Portable data carrier with contactless interface
EP11002348.8A	2005-12-22	2006-12-13	Portable data carrier with active contactless interface

Applications Claiming Priority (1)

Application	Filing date	Title
DE102005061660A	2005-12-22	Portable data carrier with active contactless interface

Legal Events

Date	Code	Title	Description
2007-05-25	PUAI	Public reference made under article 153(3) epc to a published international application that has entered the european phase	Free format text: ORIGINA CODE: 0009012
2007-06-27	AK	Designated contracting states	Kind code of ref documen A2 Designated state(s): AT BE BG CH CY CZ DE DK EE ES FR GB GR HU IE IS IT LI LT LV MC NL PL PT RO SE SI TR
2007-06-27	AX	Request for extension of the european patent	Extension state: AL BA HR MK YU
2008-05-30	PUAL	Search report despatched	Free format text: ORIGINA CODE: 0009013
2008-07-02	AK	Designated contracting states	Kind code of ref documen A3

			Designated state(s): AT BE BG CH CY CZ DE DK EE ES FR GB GR HU IE IS IT LI LT LV MC NL PL PT RO SE SI TR
2008-07-02	AX	Request for extension of the european patent	**Extension state:** AL BA HR MK RS
2008-07-02	RIC1	Information provided on ipc code assigned before grant	**ipc:** G06K 7/00 20060101ALI20080523BH **ipc:** G06K 19/07 20060101AFI20080523BH
2009-02-25	17P	Request for examination filed	**Effective date:** 20090105
2009-03-11	AKX	Designation fees paid	**Designated state(s):** AT BE BG CH CY CZ DE DK EE ES FR GB GR HU IE IS IT LI LT LV MC NL PL PT RO SE SI TR
2009-03-24	GRAP	Despatch of communication of intention to grant a patent	**Free format text:** ORIGINAL CODE: EPIDOSNIGR1
2009-05-15	GRAS	Grant fee paid	**Free format text:** ORIGINAL CODE: EPIDOSNIGR3
2009-06-19	GRAA	(expected) grant	**Free format text:** ORIGINAL CODE: 0009210
2009-06-19	STAA	Information on the status of an ep patent application or granted ep patent	**Free format text:** STATUS: THE PATENT HAS BEEN GRANTED
2009-07-22	AK	Designated contracting states	**Kind code of ref document:** B1 **Designated state(s):** AT BE BG CH CY CZ DE DK EE ES FR GB GR HU IE IS IT LI LT LV MC NL PL PT RO SE SI TR
2009-07-22	REG	Reference to a national code	**Ref country code:** GB **Ref legal event code:** FG4D **Free format text:** NOT ENGLISH
2009-07-31	REG	Reference to a national code	**Ref country code:** CH **Ref legal event code:** EP
2009-08-19	REG	Reference to a national code	**Ref country code:** IE **Ref legal event code:** FG4D
2009-09-03	REF	Corresponds to:	**Ref document number:** 502006004295 **Country of ref document:** DE **Date of ref document:** 20090903 **Kind code of ref document:** P
2009-10-14	REG	Reference to a national code	**Ref country code:** ES **Ref legal event code:** FG2A **Ref document number:** 2326547 **Country of ref document:** ES

			Kind code of ref document: T3
2010-01-04	NLV1	NL: lapsed or annulled due to failure to fulfill the requirements of art. 29p and 29m of the patents act	
2010-01-29	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** SE **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722 **Ref country code:** IS **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20091122 **Ref country code:** LT **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722 **Ref country code:** FI **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722
2010-02-26	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** LV **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722 **Ref country code:** NL **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722 **Ref country code:** PL **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722 **Ref country code:** SI **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722
2010-03-03	REG	Reference to a national code	**Ref country code:** IE

			Ref legal event code: FD4[
2010-03-31	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** BG **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20091022 **Ref country code:** PT **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20091122
2010-04-23	PLBI	Opposition filed	**Free format text:** ORIGINA CODE: 0009260
2010-04-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** IE **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722 **Ref country code:** RO **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722 **Ref country code:** DK **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722 **Ref country code:** CZ **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722 **Ref country code:** EE **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722
2010-05-26	26	Opposition filed	**Opponent name:** INSIDE CONTACTLESS **Effective date:** 20100421
2010-05-31	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** SK **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO

			PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722
2010-06-24	PLAX	Notice of opposition and request to file observation + time limit sent	**Free format text:** ORIGINA CODE: EPIDOSNOBS2
2010-06-30	BERE	Be: lapsed	**Owner name:** GIESECKE & DEVRIENT G.M.B.H. **Effective date:** 20091231
2010-07-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** MC **Free format text:** LAPSE BECAUSE OF NON-PAYME OF DUE FEES **Effective date:** 20100701
2010-10-29	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** GR **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20091023 **Ref country code:** BE **Free format text:** LAPSE BECAUSE OF NON-PAYME OF DUE FEES **Effective date:** 20091231
2010-11-09	PLAF	Information modified related to communication of a notice of opposition and request to file observations + time limit	**Free format text:** ORIGINA CODE: EPIDOSCOBS2
2011-01-05	PLAF	Information modified related to communication of a notice of opposition and request to file observations + time limit	**Free format text:** ORIGINA CODE: EPIDOSCOBS2
2011-03-22	PLAF	Information modified related to communication of a notice of opposition and request to file observations + time limit	**Free format text:** ORIGINA CODE: EPIDOSCOBS2
2011-04-06	PLBB	Reply of patent proprietor to notice(s) of opposition received	**Free format text:** ORIGINA CODE: EPIDOSNOBS3
2011-04-29	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** LU **Free format text:** LAPSE BECAUSE OF NON-PAYME OF DUE FEES **Effective date:** 20091213
2011-05-31	PGRI	Patent reinstated in contracting state [announced from national office to epo]	**Ref country code:** IT **Effective date:** 20110501
2011-06-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** HU **Free format text:** LAPSE BECAUSE OF FAILURE TO SUBMIT A TRANSLATION THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20100123
2011-07-29	REG	Reference to a national code	**Ref country code:** CH **Ref legal event code:** PL
2011-09-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** CY **Free format text:** LAPSE BECAUSE OF FAILURE TO

			SUBMIT A TRANSLATION OF THE DESCRIPTION OR TO PAY THE FEE WITHIN THE PRESCRIBED TIME-LIMIT **Effective date:** 20090722
2011-10-31	PGFS	Lapsed in a contracting state [announced via postgrant information from national office to epo]	**Ref country code:** CH **Free format text:** LAPSE BECAUSE OF NON-PAYME OF DUE FEES **Effective date:** 20101231 **Ref country code:** LI **Free format text:** LAPSE BECAUSE OF NON-PAYME OF DUE FEES **Effective date:** 20101231
2014-05-16	REG	Reference to a national code	**Ref country code:** DE **Ref legal event code:** R082 **Ref document number:** 502006004295 **Country of ref document:** I
2015-05-06	PLAB	Opposition data, opponent's data or that of the opponent's representative modified	**Free format text:** ORIGINA CODE: 0009299OPPO
2015-06-10	R26	Opposition filed (corrected)	**Opponent name:** INSIDE CONTACTLESS **Effective date:** 20100421
2015-08-12	RIC2	Information provided on ipc code assigned after grant	**Ipc:** G06K 19/06 20060101ALI20150706BH **Ipc:** G06K 7/00 20060101ALI20150706BH **Ipc:** G06K 19/07 20060101ALI20150706BH **Ipc:** G06K 19/077 20060101ALI20150706BH **Ipc:** G06K 7/10 20060101AFI20150706BH
2015-10-21	APBM	Appeal reference recorded	**Free format text:** ORIGINA CODE: EPIDOSNREFNO
2015-10-21	APBP	Date of receipt of notice of appeal recorded	**Free format text:** ORIGINA CODE: EPIDOSNNOA2O
2015-11-04	APAH	Appeal reference modified	**Free format text:** ORIGINA CODE: EPIDOSCREFNO
2015-12-18	REG	Reference to a national code	**Ref country code:** FR **Ref legal event code:** PLFF **Year of fee payment:** 10
2016-09-02	APBQ	Date of receipt of statement of grounds of appeal recorded	**Free format text:** ORIGINA CODE: EPIDOSNNOA3O
2016-12-21	REG	Reference to a national code	**Ref country code:** FR **Ref legal event code:** PLFF **Year of fee payment:** 11
2017-08-23	RAP2	Party data changed (patent owner data changed or rights of a patent transferred)	**Owner name:** GIESECKE+DEVRIENT MOBILE SECURITY GMBH

2017-10-09	REG	Reference to a national code	**Ref country code:** DE **Ref legal event code:** R081 **Ref document number:** 502006004295 **Country of ref document:** I **Owner name:** GIESECKE+DEVRIENT MOBILE SECURITY GMBH, DE **Free format text:** FORMER OWNER: GIESECKE & DEVRIENT GMBH, 81677 MUENCHEN, DE
2017-12-19	REG	Reference to a national code	**Ref country code:** FR **Ref legal event code:** PLFP **Year of fee payment:** 12
2018-01-31	PGFP	Annual fee paid to national office [announced via postgrant information from national office to epo]	**Ref country code:** TR **Payment date:** 20171213 **Year of fee payment:** 12
2018-02-14	REG	Reference to a national code	**Ref country code:** GB **Ref legal event code:** 732E **Free format text:** REGISTERED BETWEEN 20180118 AND 20180124
2018-05-15	REG	Reference to a national code	**Ref country code:** AT **Ref legal event code:** PC **Ref document number:** 437417 **Country of ref document:** A **Kind code of ref document** **Owner name:** GIESECKE+DEVRIENT MOBILE SECURITY GMBH, DE **Effective date:** 20180326
2018-07-20	REG	Reference to a national code	**Ref country code:** FR **Ref legal event code:** TP **Owner name:** GIESECKE+DEVRIENT MOBILE SECURITY GMBH, DE **Effective date:** 20180619
2020-02-28	PGFP	Annual fee paid to national office [announced via postgrant information from national office to epo]	**Ref country code:** IT **Payment date:** 20191216 **Year of fee payment:** 14
2020-03-31	PGFP	Annual fee paid to national office [announced via postgrant information from national office to epo]	**Ref country code:** AT **Payment date:** 20191213 **Year of fee payment:** 14
2021-05-27	REG	Reference to a national code	**Ref country code:** DE **Ref legal event code:** R10(**Ref document number:** 502006004295 **Country of ref document:** I

2021-05-29	APBU	Appeal procedure closed	Free format text: ORIGINA CODE: EPIDOSNNOA9O
2021-08-15	REG	Reference to a national code	Ref country code: AT Ref legal event code: MM(Ref document number: 437417 Country of ref document: / Kind code of ref documen Effective date: 20201213
2021-10-29	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	Ref country code: AT Free format text: LAPSE BECAUSE OF NON-PAYME OF DUE FEES Effective date: 20201213
2021-11-29	PLAG	Information modified related to despatch of communication that opposition is rejected	Free format text: ORIGINA CODE: EPIDOSCREJ1
2021-11-29	PLCK	Communication despatched that opposition was rejected	Free format text: ORIGINA CODE: EPIDOSNREJ1
2021-11-29	STAA	Information on the status of an ep patent application or granted ep patent	Free format text: STATUS: OPPOSITION REJECTED
2021-12-03	PLBN	Opposition rejected	Free format text: ORIGINA CODE: 0009273
2021-12-03	STAA	Information on the status of an ep patent application or granted ep patent	Free format text: STATUS: OPPOSITION REJECTED
2022-01-05	27O	Opposition rejected	Effective date: 20210527
2022-01-31	PGFP	Annual fee paid to national office [announced via postgrant information from national office to epo]	Ref country code: DE Payment date: 20211231 Year of fee payment: 16 Ref country code: FR Payment date: 20211220 Year of fee payment: 16 Ref country code: GB Payment date: 20211222 Year of fee payment: 16
2022-06-01	PGFP	Annual fee paid to national office [announced via postgrant information from national office to epo]	Ref country code: ES Payment date: 20220119 Year of fee payment: 16
2022-06-30	PG25	Lapsed in a contracting state [announced via postgrant information from national office to epo]	Ref country code: TR Free format text: LAPSE BECAUSE OF NON-PAYME OF DUE FEES Effective date: 20201213

Concepts

machine-extracted

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Name	Image	Sections	Count	Query match

≫ carrier	title,claims,description	146	0.000
≫ modifying	claims,description	189	0.000
≫ biological transmission	claims,description	44	0.000
≫ coupling	claims,description	9	0.000
≫ coupling process	claims,description	9	0.000
≫ coupling reaction	claims,description	9	0.000
≫ response	claims,description	7	0.000

Show all concepts from the description section

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/179,237	**01/17/2023 07:02:43 PM ET**	**iC18P115026US13**

Title of Invention

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3258	FILED BY	Katherine Campbell
PATENT CENTER #	61447161	FILING DATE	02/18/2021
CUSTOMER #	175023	FIRST NAMED INVENTOR	Siva G. Narendra
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Usman Mughal

Documents

TOTAL DOCUMENTS: 4

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
iC18P115026US13_IDS.pdf	4	Information Disclosure Statement (IDS) Form (SB08)	1252 KB
Charrat_FR2965082B1.pdf	6	Foreign Reference	184 KB
Finkenzeller_EP1801741B1.pdf	22	Foreign Reference	376 KB
Hoffmeister_DE10028813A1.pdf	5	Foreign Reference	160 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
iC18P115026US13_IDS.pdf	E8DA4F4737CD09AD992BFCC84E3D69FC34FB56A76B4870D8B981E7BD403C2E0D4A4F8237D60F5B7AF2508D5C7B0798C7407996FF429DE1D72478104B053B234F
Charrat_FR2965082B1.pdf	7D50BBC1AABDF846E16582830B7ACF62CD4E04BB9A96675E8BA9D17EF89FB93F211F1A18E42AE6089CF4A651E46FBD898BBAFB450E3101D2E1DB78017C331B23
Finkenzeller_EP1801741B1.pdf	69B010E2389B48CEF5F5DD761F730819488E0E2A505AD7AD4266A86BBB461C61C85908CDF920C1DC6754A38F808F51C1ADAE59557C77233B1FF39183BB24A1F2
Hoffmeister_DE10028813A1.pdf	5DA536973EF99788EDD44CC8808723899B19863395FA07397B6060E08BFC94895FA1E678F6AF6FD28502B1140F91F7915EB354E335337FD590F2436C966C6A35

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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NOTICE OF ALLOWANCE AND FEE(S) DUE

175023 7590 02/15/2023

Mughal IP P.C.
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

EXAMINER	
PHAM, TOAN NGOC	
ART UNIT	PAPER NUMBER
2684	

DATE MAILED: 02/15/2023

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/179,237	02/18/2021	Siva G. Narendra	iC18P115026US13	3258

TITLE OF INVENTION: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	05/15/2023

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 40% the amount of undiscounted fees, and micro entity fees are 20% the amount of undiscounted fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
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Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

175023 7590 02/15/2023

Mughal IP P.C.
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/179,237	02/18/2021	Siva G. Narendra	iC18P115026US13	3258

TITLE OF INVENTION: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	05/15/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAM, TOAN NGOC	2684	340-572100

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/179,237	02/18/2021	Siva G. Narendra	iC18P115026US13	3258

175023 7590 02/15/2023

Mughal IP P.C.
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

EXAMINER	
PHAM, TOAN NGOC	
ART UNIT	PAPER NUMBER
2684	

DATE MAILED: 02/15/2023

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 17/179,237	Applicant(s) Narendra et al.	
	Examiner TOAN N PHAM	Art Unit 2684	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to amendment and Terminal Disclaimer (TD) filed on 12/14/22.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-20 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/TOAN N PHAM/
Primary Examiner, Art Unit 2684

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Allowable Subject Matter

Claims 1-20 are allowed.

The following is an examiner's statement of reasons for allowance: The present invention is directed to contactless communications devices and specifically to contactless smartcard devices. The prior art fail to teach: "an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile phone device; and an active transmit driver circuit coupled to the power source to receive power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader".

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TOAN NGOC PHAM whose telephone number is (571)272-2967. The examiner can normally be reached M - F (7 AM - 3:30 PM).

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quan-Zhen Wang can be reached on (571) 272-3114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of published or unpublished applications may be obtained from Patent Center. Unpublished application information in Patent Center is available to registered users. To file and manage patent submissions in Patent Center, visit: https://patentcenter.uspto.gov. Visit https://www.uspto.gov/patents/apply/patent-center for more information about Patent Center and https://www.uspto.gov/patents/docx for information about filing in DOCX format. For additional questions, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TOAN N PHAM/
Primary Examiner, Art Unit 2684
2/9/23

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/179,237	Narendra et al.
	Examiner	**Art Unit**
	TOAN N PHAM	2684

CPC								
Symbol							**Type**	**Version**
G06K	/	19	/	0727			F	2013-01-01
G06K	/	19	/	0701			I	2013-01-01
G06K	/	19	/	07732			I	2013-01-01
G06K	/	19	/	07769			I	2013-01-01
G06K	/	19	/	0723			I	2013-01-01
G06K	/	19	/	073			I	2013-01-01
G06K	/	19	/	0726			I	2013-01-01
G06Q	/	20	/	204			I	2013-01-01
H04B	/	1	/	3816			I	2013-01-01
H04B	/	5	/	0025			I	2013-01-01
G06K	/	19	/	07749			I	2013-01-01
G06K	/	19	/	0715			I	2013-01-01
G06Q	/	20	/	3278			I	2013-01-01
H04B	/	5	/	0062			I	2013-01-01
Y02D	/	30	/	70			A	2020-08-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/TOAN N PHAM/ Primary Examiner, Art Unit 2684	09 February 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3A

U.S. Patent and Trademark Office — Part of Paper No.: 20230209

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/179,237	Narendra et al.
	Examiner	**Art Unit**
	TOAN N PHAM	2684

INTERNATIONAL CLASSIFICATION				
CLAIMED				
G08B	/	13	/	14

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	20	
/TOAN N PHAM/ Primary Examiner, Art Unit 2684	09 February 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3A

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/179,237	Narendra et al.
	Examiner	**Art Unit**
	TOAN N PHAM	2684

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		10		19										
	2		11		20										
	3		12												
	4		13												
	5		14												
	6		15												
	7		16												
	8		17												
	9		18												

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	20	
/TOAN N PHAM/ Primary Examiner, Art Unit 2684	09 February 2023	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3A

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	17/179,237	Narendra et al.
	Examiner	Art Unit
	TOAN N PHAM	2684

CPC - Searched*		
Symbol	Date	Examiner
G06K19/0723; GO6K19/0727P; G06K19/07732; GO6K19/07749	08/03/2022	TNP

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
SEARCH	,8/3/22; 9/9/22	TNP

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
SAME AS ABOVE	SAME AS ABOVE	09/09/2022	TNP

/TOAN N PHAM/ Primary Examiner, Art Unit 2684	

IPR2025-00641 Page 00402

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-22)
Approved for use through 05/31/2024. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17179237
Filing Date	2021-02-18
First Named Inventor	Siva G. Narendra
Art Unit	2684
Examiner Name	Toan Ngoc PHAM
Attorney Docket Number	iC18P115026US13

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

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FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	10028813	DE	A1	2001-12-20	Hoffmeister	Entire Document	
	2	1801741	EP	A3	2008-07-02	Finkenzeller	Entire Document	
	3	2965082	FR	A1	2012-03-23	Charrat et al.	Entire Document	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Application Number	17179237
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First Named Inventor	Siva G. Narendra
Art Unit	2684
Examiner Name	Toan Ngoc PHAM
Attorney Docket Number	iC18P115026US13

If you wish to add additional Foreign Patent Document citation information please click the Add button [Add]

NON-PATENT LITERATURE DOCUMENTS [Remove]

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		

If you wish to add additional non-patent literature document citation information please click the Add button [Add]

EXAMINER SIGNATURE

Examiner Signature	/TOAN N PHAM/	Date Considered	02/09/2023

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17179237
Filing Date	2021-02-18
First Named Inventor	Siva G. Narendra
Art Unit	2684
Examiner Name	Toan Ngoc PHAM
Attorney Docket Number	iC18P115026US13

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Usman Mughal/	Date (YYYY-MM-DD)	2023-01-17
Name/Print	Usman Mughal	Registration Number	62887

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	17179237
Filing Date	2021-02-18
First Named Inventor	Siva G. Narendra
Art Unit	2684
Examiner Name	Toan Ngoc PHAM
Attorney Docket Number	18.P115.026US13

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5386106	A	1995-01-31	Kumar	Entire Document

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	1	2000010668	JP	A	2000-01-14	Funatsu et al.	Entire Document	
	2	2005018671	JP	A	2005-01-20	Okawa et al.	Entire Document	
	3	2007199847	JP	A	2007-08-09	Nakao et al.	Entire Document	

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	Attorney Docket Number	18.P115.026US13

	4	2007328689	JP	A	2007-12-20	Yamada et al.	Entire Document	
	5	1998012674	WO	A3	1998-07-23	Field	Entire Document	
	6	2001088659	WO	A9	2003-01-03	Wong et al.	Entire Document	
	7	2003029942	WO	A3	2004-02-26	Burger et al.	Entire Document	
	8	2003081519	WO	A3	2004-01-22	Thomas et al.	Entire Document	
	9	2006091709	WO	A2	2006-08-31	Narendra et al.	Entire Document	
	10	9626500	WO	A1	1996-08-29	Peek	Entire Document	

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Advisory Action notified February 07, 2013 for U.S. Patent Application No. 12/960,070 (Docket No. 115.001US3).	
	2	Final Office Action notified December 11, 2012 for U.S. Patent Application No. 12/960,070 (Docket No. 115.001US3).	

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	3	Final Office Action notified October 25, 2014 for U.S. Patent Application No. 12/960,070 (Docket No. 115.001US3).
	4	International Preliminary Report & Written Opinion notified September 09, 2011 for PCT Patent Application No. PCT/US2010/025014 (Docket No. 115.024WO1).
	5	International Preliminary Report on Patentability & Written Opinion notified August 28, 2007 for PCT Patent Application No. PCT/US2006/006361 (Docket No. 115.001WO1).
	6	International Preliminary Report on Patentability and Written Opinion notified August 02, 2007 for PCT Patent Application No. PCT/US2006/006361 (Docket No. 115.001WO1).
	7	International Preliminary Report on Patentability and Written Opinion notified August 02, 2007 for PCT Patent Application No. PCT/US2006/013603 (Docket No. 115.002WO1).
	8	International Preliminary Report on Patentability and Written Opinion notified August 02, 2007 for PCT Patent Application No. PCT/US2006/027847 (Docket No. 115.012W01).
	9	International Preliminary Report on Patentability and Written Opinion notified October 06, 2009 for PCT Patent Application No. PCT/US2008/057588 (Docket No. 115.019W01).
	10	International Search Report & Written Opinion notified January 11, 2006 for PCT Patent Application No. PCT/US2005/019988 (DocketNo. 115.001US3).
	11	International Search Report & Written Opinion notified September 22, 2006 for PCT Patent Application No. PCT/US2006/006361 (Docket No. 115.001WO1).
	12	International Search Report and Written Opinion notified April 15, 2010 for PCT Patent Application No. PCT/US2010/025014 (Docket No. 115.024WO1).
	13	International Search Report notified August 07, 2008 for PCT Patent Application No. PCT/US2008/057588 (Docket No. 115.019W01).

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	Examiner Name	Toan Ngoc PHAM
	Attorney Docket Number	18.P115.026US13

	14	International Search Report notified December 16, 2005 for PCT Patent Application No. PCT/US2005/019988 (Docket No. 115.004WO1).	
	15	International Search Report notified January 09, 2006 for PCT Patent Application No. PCT/US2006/013603 (Docket No. 115.002WO1).	
	16	International Search Report notified March 29, 2007 for PCT Patent Application No. PCT/US2006/027847 (Docket No. 115.012W01).	
	17	International Search Report notified October 09, 2007 for PCT Patent Application No. PCT/US2006/013603 (Docket No. 115.002WO1).	
	18	International Search Report notified October 21, 2005 PCT for PCT Patent Application No. PCT/US2005/022993 (Docket No. 115.P003WO1).	
	19	International Search Report notified September 22, 2006 for PCT Patent Application No. PCT/US2006/006361 (Docket No. 115.001WO1).	
	20	International Search Report notified September 22, 2006 for PCT Patent Application No. PCT/US2006/006361 (Docket No. 115.00WO1).	
	21	International Written Opinion notified August 07, 2008 for PCT Patent Application No. PCT/US2008/057588 (Docket No. 115.019WO1).	
	22	International Written Opinion notified October 09, 2007 for PCT Patent Application No. PCT/US2006/013603 (Docket No. 115.002WO1).	
	23	LEE, Y., "Antenna Circuit Design For RFID Applications", Microchip, AN710, 2003, Microchip Technology Inc., 50 pages.	
	24	Non-Final Office Action notified April 03, 2013 for U.S. Patent Application No. 13/426,500 (Docket No. 115.001US6.3).	

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	25	Non-Final Office Action notified August 03, 2011 for U.S. Patent Application No. 13/114,473 (Docket No. 115.001US6.1).	
	26	Non-Final Office Action notified December 20, 2012 for U.S. Patent Application No. 13/593,492 (Docket No. 115.001US9.1).	
	27	Non-Final Office Action notified February 01, 2013 for U.S. Patent Application No. 13/184,227 (Docket No. 115.001US7).	
	28	Non-Final Office Action notified February 03, 2011 for U.S. Patent Application No. 12/962,953 (Docket No. 115.001US6).	
	29	Non-Final Office Action notified January 18, 2013 for U.S. Patent Application No. 13/651,365 (Docket No. 115.001US4.4).	
	30	Non-Final Office Action notified July 03, 2012 for U.S. Patent Application No. 13/184,227 (Docket No. 115.001US7).	
	31	Non-Final Office Action notified June 22, 2012 for U.S. Patent Application No. 13/184,204 (Docket No. 115.001US5).	
	32	Non-Final Office Action notified June 27, 2012 for U.S. Patent Application No. 12/960,070 (Docket No. 115.001US3).	
	33	Non-Final Office Action notified March 15, 2013 for U.S. Patent Application No. 13/304,662 (Docket No. 115.001US6.2).	
	34	Non-Final Office Action notified March 18, 2011 for U.S. Patent Application No. 12/941,410 (Docket No. 115.001US2.1)	
	35	Non-Final Office Action notified March 30, 2011 for U.S. Patent Application No. 12/960,070 (Docket No. 115.001US3).	

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	Examiner Name	Toan Ngoc PHAM
	Attorney Docket Number	18.P115.026US13

	36	Non-Final Office Action notified November 05, 2015 for U.S. Patent Application No. 14/866,998 (Docket No. 115.001US9.5).	
	37	Non-Final Office Action notified November 09, 2012 for U.S. Patent Application No. 13/552,633 (Docket No. 115.001US6.4).	
	38	Non-Final Office Action notified November 25, 2011 for U.S. Patent Application No. 13/184,240 (Docket No. 115.001US8).	
	39	Non-Final Office Action notified November 29, 2019 for U.S. Patent Application No. 16/218,733 (Docket No. 115.001US9.9).	
	40	Non-Final Office Action notified September 20, 2016 for U.S. Patent Application No. 14/948,325 (Docket No. 115.001US9.7).	
	41	Non-Final Office Action notified September 21, 2012 for U.S. Patent Application No. 13/311,247 (Docket No. 115.022US3).	
	42	Non-Final Office Action notified September 24, 2015 for U.S. Patent Application No. 14/833,113 (Docket No. 115.001US9.4).	
	43	Non-Final Office Action notified September 29, 2020 for U.S. Patent Application No. 16/791,609 (Docket No. 18P.115.026US12).	
	44	Non-Final Office Action notified September 30, 2010 for U.S. Patent Application No. 12/188,346 (Docket No. 115.022US1)	
	45	Notice of Allowance notified April 14, 2011 for U.S. Patent Application No. 12/941,410 (Docket No. 115.001US2.1).	
	46	Notice of Allowance notified April 18, 2011 for U.S. Patent Application No. 12/962,953 (Docket No. 115.001US6).	

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	Art Unit	2684
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	Attorney Docket Number	18.P115.026US13

	47	Notice of Allowance notified April 25, 2011 for U.S. Patent Application No. 12/188,346 (Docket No. 115.P022US1).	
	48	Notice of Allowance notified August 15, 2011 for U.S. Patent Application No. 13/081,775 (Docket No. 115.022US2).	
	49	Notice of Allowance notified December 21, 2015 for U.S. Patent Application No. 14/866,998 (Docket No. 115.001US9.5).	
	50	Notice of Allowance notified February 14, 2013 for U.S. Patent Application No. 13/311,247 (Docket No. 115.022US3).	

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Examiner Signature	/TOAN N PHAM/	Date Considered	02/09/2023

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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Examiner Name	Toan Ngoc PHAM
Attorney Docket Number	18.P115.026US13

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Usman Mughal/	Date (YYYY-MM-DD)	2022-12-14
Name/Print	Usman Mughal	Registration Number	62887

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

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Doc code: IDS
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	1	Notice of Allowance notified February 21, 2013 for U.S. Patent Application No. 13/651,365 (Docket No. 18. P115.026US13).	
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	3	Notice of Allowance notified June 18, 2020 for U.S. Patent Application No. 16/218,733 (Docket No. 115.001US9.9).	
	4	Notice of Allowance notified March 03, 2017 for U.S. Patent Application No. 14/929,297 (Docket No. 115.001US9.6).	
	5	Notice of Allowance notified May 13, 2013 for U.S. Patent Application No. 13/426,500 (Docket No. 115.001US6.3).	
	6	Notice of Allowance notified November 16, 2011 for U.S. Patent Application No. 13/114,473 (Docket No. 115.001US6.1).	
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	10	Notice of Allowance notified September 19, 2018 for U.S. Patent Application No. 15/658,208 (Docket No. 115.001US9.8).	
	11	Official Letter notified January 26, 2010 for Taiwan Patent Application No. 95105997 (Docket No. 115.001TW1).	

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	Examiner Name	Toan Ngoc PHAM
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	12	Restriction Requirement notified August 16, 2010 for U.S. Patent Application No. 12/188,346 (Docket No. 115.022US1).

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Examiner Signature	/TOAN N PHAM/	Date Considered	02/09/2023

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Signature	/Usman Mughal/	Date (YYYY-MM-DD)	2022-12-14
Name/Print	Usman Mughal	Registration Number	62887

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/179,237	02/18/2021	Siva G. Narendra	iC18P115026US13	3258

175023 7590 03/07/2023

Mughal IP P.C.
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

EXAMINER	
PHAM, TOAN NGOC	

ART UNIT	PAPER NUMBER
2684	

NOTIFICATION DATE	DELIVERY MODE
03/07/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@impactpatents.com
eofficeaction@appcoll.com

Supplemental ***Notice of Allowability***	**Application No.** 17/179,237	**Applicant(s)** Narendra et al.	
	Examiner TOAN N PHAM	**Art Unit** 2684	**AIA (FITF) Status** No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to IDS filed on 7/28/21.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☐ The allowed claim(s) is/are _____ . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/TOAN N PHAM/
Primary Examiner, Art Unit 2684

Examiner-Initiated Interview Summary	**Application No.** 17/179,237	**Applicant(s)** Narendra et al.		
	Examiner TOAN N PHAM	**Art Unit** 2684	**AIA (First Inventor to File) Status** No	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
TOAN N PHAM	Primary Examiner	Telephonic
USMAN MUGHAL	Attorney of Record	

Date of Interview: 02 March 2023

Issues Discussed:

Other

Mr. Mughal indicated that the correct reference number is U.S. Patent No. 7,559,464. See correction on the IDS form.

/TOAN N PHAM/ Primary Examiner, Art Unit 2684	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	Toan Pham
	Attorney Docket Number	18.115.026US13

U.S. PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		4701601		1987-10-20	Francini et al.	
		4786791		1988-11-22	Hodama	
		4791283		1988-12-13	Burkhardt	
		4864109		1989-09-05	Minematsu et al.	
		5212478		1993- 05-18	Moseley	
		5378887		1995-01-03	Kobayashi	
		5537584		1996-07-16	Miyai et al.	
		5574273		1996-11-12	Nakagawa et al.	
		5585787		1996-12-17	Wallerstein	
		5629981		1997- 05-13	Nerlikar	
		5700037		1997-12-23	Keller et al.	

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		5710421		1998-01-20	Kokubu et al.	
		5834756		1998-11-10	Gutman et al.	
		5909491		1999-06-01	Luo	
		5940510		1999-08-17	Curry et al.	
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		5955961		1999-09-21	Wallerstein	
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		6021944		2000-02-08	Arakaki	
		6039260		2000-03-21	Eisele	
		6045043		2000-04-04	Bashan et al.	
		6068184		2000- 05-30	Barnett	

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		6105013		2000-08-15	Curry et al.	
		6182891		2001-02-06	Furuhashi et al.	
		6189786		2001-02-20	Itou et al.	
		6206293		2001-03-27	Gutman et al.	
		6219439		2001-04-17	Burger	
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		6315195		2001-11-13	Ramachandran	
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		6481623		2002-11-19	Grant et al.	
		6568600		2003- 05-27	Carpier et al.	
		6588660		2003-07-08	Buescher et al.	
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		RE41352		2010- 05-25	Wood, Jr.	
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		7789303		2010-09-07	Fukasawa	
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U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		20010001035		2001- 05-31	Kayanakis	

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		20010006902		2001-07-05	Ito	
		20010013551		2001-08-16	Ramachandran	
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		20020007434		2002-01-17	Campardo	
		1178450		2002-02-06	Vazvan	
		20020025796		2002-02-28	Taylor et al.	
		20020043566		2002-04-18	Goodman et al.	
		20020044043		2002-04-18	Chaco et al.	
		20030115126		2002-06-29	Pitroda	
		20020095588		2002-07-18	Shigematsu et al.	
		20020096570		2002-07-25	Wong et al.	
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		20020130187		2002-09-19	Berg et al.	
		20020138422		2002-09-26	Natsuno	
		20020138735		2002-09-26	Felt et al.	
		20020139849		2002-10-03	Gangi	
		20020148892		2002-10-17	Bardwell	
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
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		Final Office Action notified December 12, 2012 for U.S. Patent Application No. 13/184,204 (Docket No. 115.001US5).	
		Final Office Action notified February 4, 2013 for U.S. Patent Application No. 13/552,633 (Docket No. 115.001US6.4).	
		Final Office Action notified September 30, 2014 for U.S. Patent Application No. 13/592,323 (Docket No. 115.001US9).	
		International Preliminary Report & Written Opinion notified December 04, 2006 for PCT Patent Application No. PCT/US2005/019988 (Docket No. 115.004WO1).	
		International Preliminary Report & Written Opinion notified December 04, 2006 for PCT Patent Application No. PCT/US2005/022993 (Docket No. 115.003WO1).	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

PTO/SB/08a (01-10)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		International Preliminary Report & Written Opinion notified January 22, 2008 for UPCT Patent Application No. PCT/US2006/027847, 10 pages (Docket No. 115.001US3).	
		International Preliminary Report & Written Opinion notified September 09, 2011 for PCT Patent Application No. PCT/US2010/025014, 6 pages (Docket No. 115.001US4.1).	
		International Preliminary Report on Patentability & Written Opinion notified August 28, 2007 for UPCT Patent Application No. PCT/US2006/006361, 8 pages (Docket No. 115.001US3).	
		, International Preliminary Report on Patentability and Written Opinion notified August 2, 2007 for PCT Patent Application No. PCT/US2006/006361 (Attorney Docket No. 115.001WO1).,	
		International Preliminary Report on Patentability and Written Opinion notified August 2, 2007 for PCT Patent Application No. PCT/US2006/013603 (Attorney Docket No. 115.002WO1).	
		International Preliminary Report on Patentability and Written Opinion notified August 2, 2007 for PCT Patent Application No. PCT/US2006/027847 (Attorney Docket No. 115.012WO1).	
		International Preliminary Report on Patentability and Written Opinion notified October 06, 2009 for PCT Patent Application No. PCT/US2008/057588 (Attorney Docket No. 115.019WO1).	
		International Search Report & Written Opinion notified September 22, 2006 for UPCT Patent Application No. PCT/US2006/006361, 13 pages (Docket No. 115.001US4.1).	

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		International Search Report and Written Opinion notified April 15, 2010 for PCT Patent Application No. PCT/US2010/025014 (Attorney Docket No. 115.024WO1).	
		International Search Report notified August 07, 2008 for PCT Patent Application No. PCT/US2008/057588 (Attorney Docket No. 115.019WO1)	
		International Search Report notified December 16, 2005 for PCT Patent Application No. PCT/US2005/019988 (Docket No. 115.004WO1).	
		International Search Report notified January 09, 2006 for PCT Patent Application No. PCT/US2006/013603, 3 pages (Docket No. 115.001US3).	
		International Search Report notified March 29, 2007 for PCT Patent Application No. PCT/US2006/027847 (Attorney Docket No. 115.012WO1).	
		International Search Report notified October 09, 2007 for PCT Patent Application No. PCT/US2006/013603 (Attorney Docket No. 115.002WO1).	
		International Search Report notified October 21, 2005 PCT Patent Application No. PCT/US2005/022993 (Attorney Docket No. 115.P003WO1).	
		International Search Report notified September 22, 2006 for PCT Patent Application No. PCT/US2006/006361 (Attorney Docket No. 115.001WO1).	

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		International Written Opinion notified August 7, 2008 for PCT Patent Application No. PCT/US2008/057588, 5 pages (Docket No. 115.001US4.2).	
		International Written Opinion notified October 9, 2007 for PCT Patent Application No. PCT/US2006/013603, 7 pages (Docket No. 115.001US2.2).	
		Non-Final Office Action notified April 19, 2018 for U.S. Patent Application No. 15/658,208 (Docket No. 115.001US9.8).	
		Non-Final Office Action notified April 3, 2013 for U.S. Patent Application No. 13/426,500 (Docket No. 115.001US6.3).	
		Non-Final Office Action notified August 03, 2011 for U.S. Patent Application No. 13/114,473 (Docket No. 115.001US6.1).	
		Non-Final Office Action notified December 20, 2012 for U.S. Patent Application No. 13/593,492 (Docket No. 115.001US9.1).	
		Non-Final Office Action notified February 1, 2013 for U.S. Patent Application No. 13/184,227 (Docket No. 115.001US7).	
		Non-Final Office Action notified February 3, 2011 for U.S. Patent Application No. 12/962,953 (Docket No. 115.001US6).	

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		Non-Final Office Action notified January 18, 2013 for U.S. Patent Application No. 13/651,365 (Docket No. 115.001US4.4).	
		Non-Final Office Action notified July 3, 2012 for U.S. Patent Application No. 13/184,227 (Docket No. 115.001US7).	
		Non-Final Office Action notified July 5, 2013 for U.S. Patent Application No. 13/592,323 (Docket No. 115.001US9).	
		Non-Final Office Action notified June 22, 2012 for U.S. Patent Application No. 13/184,204 (Docket No. 115.001US5).	
		Non-Final Office Action notified March 15, 2013 for U.S. Patent Application No. 13/304,662 (Docket No. 115.001US6.2).	
		Non-Final Office Action notified May 22, 2015 for U.S. Patent Application No. 14/680,684 (Docket No. 115.001US9.2).	
		Non-Final Office Action notified November 25, 2011 for U.S. Patent Application No. 13/184,240 (Docket No. 115.001US8).	
		Non-Final Office Action notified November 29, 2019 for U.S. Patent Application No. 16/218,733 (Docket No. 115.001US9.9).	

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		Non-Final Office Action notified November 5, 2015 for U.S. Patent Application No. 14/866,998 (Docket No. 115.001US9.5).	
		Non-Final Office Action notified November 9, 2012 for U.S. Patent Application No. 13/552,633 (Docket No. 115.001US6.4).	
		Non-Final Office Action notified September 16, 2016 for U.S. Patent Application No. 14/929,297 (Docket No. 115.001US9.6).	
		Non-Final Office Action notified September 20, 2016 for U.S. Patent Application No. 14/948,325 (Docket No. 115.001US9.7).	
		Non-Final Office Action notified September 21, 2012 for U.S. Patent Application No. 13/311,247 (Attorney Docket No. 115.22US3).	
		Non-Final Office Action notified September 24, 2015 for U.S. Patent Application No. 14/833,113 (Docket No. 115.001US9.4).	
		Non-Final Office Action notified September 25, 2015 for U.S. Patent Application No. 14/747,770 (Docket No. 115.001US9.3).	
		Non-Final Office Action notified September 29, 2020 for U.S. Patent Application No. 16/791,609 (Attorney Docket No. 17.115.026US12).	

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	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		Non-Final Office Action notified September 30 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.P022US1).	
		Non-Final Office Action notified September 30, 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.022US1).	
		Notice of Allowance notified April 18, 2011 for U.S. Patent Application No. 12/962,953 (Docket No. 115.001US6).	
		Notice of Allowance notified April 25, 2011 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.P022US1).	
		Notice of Allowance notified April 25, 2011 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.P022US1).	
		Notice of Allowance notified December 21, 2015 for U.S. Patent Application No. 14/866,998 (Docket No. 115.001US9.5).	
		Notice of Allowance notified February 14, 2013 for U.S. Patent Application No. 13/311,247 (Attorney Docket No. 115.22US3).	
		Notice of Allowance notified February 18, 2015 for U.S. Patent Application No. 13/592,323 (Docket No. 115.001US9).	

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	Art Unit	2684
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	Attorney Docket Number	18.115.026US13

		Notice of Allowance notified January 10, 2012 for U.S. Patent Application No. 13/184,240 (Docket No. 115.001US8).	
		Notice of Allowance notified June 18, 2020 for U.S. Patent Application No. 16/218,733 (Docket No. 115.001US9.9).	
		Notice of Allowance notified June 19, 2015 for U.S. Patent Application No. 14/680,684 (Docket No. 115.001US9.2).	
		Notice of Allowance notified March 24, 2017 for U.S. Patent Application No. 14/948,325 (Docket No. 115.001US9.7).	
		Notice of Allowance notified March 3, 2017 for U.S. Patent Application No. 14/929,297 (Docket No. 115.001US9.6).	
		Notice of Allowance notified May 13, 2013 for U.S. Patent Application No. 13/426,500 (Docket No. 115.001US6.3).	
		Notice of Allowance notified November 16, 2011 for U.S. Patent Application No. 13/114,473 (Docket No. 115.001US6.1).	
		Notice of Allowance notified October 26, 2015 for U.S. Patent Application No. 14/747,770 (Docket No. 115.001US9.3).	

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	Attorney Docket Number	18.115.026US13

		Notice of Allowance notified October 28, 2011 for U.S. Patent Application No. 13/081,775 (Attorney Docket No. 115.022US2).	
		Notice of Allowance notified October 28, 2015 for U.S. Patent Application No. 14/833,113 (Docket No. 115.001US9.4).	
		Notice of Allowance notified September 19, 2018 for U.S. Patent Application No. 15/658,208 (Docket No. 115.001US9.8).	
		Official Letter from Taiwan Patent Office notified January 26, 2010 for Patent Application No. 95105997 (Docket No. 115.001TW1).	
		Restriction Requirement notified August 16, 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.022US1).	
		Restriction Requirement notified August 16, 2010 for U.S. Patent Application No. 12/188,346 (Attorney Docket No. 115.P022US1).	
		International Search Report & Written Opinion notified January 11, 2006 for PCT Patent Application No. PCT/US2005/019988, 8 pages (Docket No. 115.001US3).	
		LEE, Y., "Anntenna Circuit Design For RFID Applications", Microchip, AN710, 2003, Microchip Technology Inc., 50 pages.	

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	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		LEE, Y., "Antenna Circuit Design for RFID Applications", Microchip, AN710, 2003 Microchip Technology, Inc., 50 pages (2003).	

EXAMINER SIGNATURE

Examiner Signature	/TOAN N PHAM/	Date Considered	08/03/2022

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document.
[4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e) (2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Usman Mughal/	Date (YYYY-MM-DD)	2021-07-28
Name/Print	Usman A. Mughal	Registration Number	62887

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: **Siva G. Narendra**	Examiner: **PHAM, TOAN NGOC**
Application No.: 17/179,237	Art Group: 2684
Filed: February 18, 2021	Confirmation No.: 3258
For: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING	Docket No.: iC18P115.026US13

Mail Stop **Issue Fee**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT UNDER 37 C.F.R. § 1.312

Dear Examiner:

This Amendment is in response to the Notice of Allowance mailed February 15, 2023. Applicants respectfully request the Examiner to enter this Amendment.

SPECIFICATION AMENDMENT

Please replace paragraph [0001] with the amended paragraph below.

CLAIM FOR PRIORITY

[0001] This application is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 16/791,609, filed February 14, 2020, and now issued as U.S. Patent No. 10,949,726 on March 16, 2021, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 16/393,275, filed April 24, 2019, now issued on March 31, 2020 as U.S. Patent No. 10,607,129, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/904,328, filed on February 24, 2018, now issued on June 11, 2019 as U.S. Patent No. 10,318,855, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 15/338,436, filed October 30, 2016, now issued on February 27, 2019, as U.S. Patent No. 9,904,887, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 14/517,585, filed October 17, 2014, now issued on November 08, 2016, as U.S. Patent No. 9,489,608, which is a continuation of, and claims priority to U.S. Patent Application No. 14/460,647, filed August 15, 2014, now issued on January 20, 2015, as U.S. Patent No. 8,937,549, which is a continuation of, and claims the benefit of priority to U.S. Patent Application No. 13/871,849, on April 26, 2013, now issued on October 21, 2014, as U.S. Patent No. 8,866,614, which is a continuation of, and claims the benefit of priority to, U.S. Patent Application No. 13/038,341, filed March 01, 2011, now issued on May 28, 2013, as U.S. Patent No. 8,451,122, which is a continuation-in-part of, and claims the benefit of priority to U.S. Patent Application No. 12/188,346, filed August 08, 2008, now issued on June 14, 2011, as U.S. Patent No. 7,961,101 and which are incorporated by reference in their entirety.

LISTING OF CLAIMS

1. (**Currently Amended**) A mobile device comprising:

a power source;

a smartcard controller coupled to the power source to receive power;

an antenna tuned to operate at substantially 13.56 MHz, wherein the antenna interacts with a Near Field Communication (NFC) reader external to the mobile device; and

an active transmit driver circuit coupled to the power source to receive the power, wherein the active transmit driver circuit affects transmission of data between the antenna and the NFC reader.

2. (Original) The mobile device of claim 1, wherein the transmitted data includes ticketing information for a mass transit system.

3. (Original) The mobile device of claim 1, wherein the transmitted data includes transaction information for a mobile payment.

4. (Original) The mobile device of claim 1, wherein the NFC reader is a point-of-sale NFC reader.

5. (Original) The mobile device of claim 1, wherein the antenna includes an inductive element.

6. (Original) The mobile device of claim 1, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.

7. (**Currently Amended**) The mobile device of claim 1 comprising an amplifier coupled to the power source to receive the power, wherein the amplifier is further coupled to the antenna.

8. (Previously Presented) The mobile device of claim 7, wherein the amplifier amplifies a signal received at the antenna and generates an amplified signal, and provides the amplified signal to the smartcard controller.

9. (Original) The mobile device of claim 1, wherein the smartcard controller includes a bridge rectifier.

10. (**Currently Amended**) A method of activation, the method comprising:

receiving a first communication via a network including a request for the activation; and

sending a second communication to a mobile device via a network, wherein the second communication comprises an activation code provided in response to the request for activation[[;]], wherein verification of the activation code results in activation of a built-in RFID functionality in the mobile device[[;]], wherein the mobile device comprises:

a smartcard controller to provide the built-in RFID functionality and coupled to receive power from the mobile device;

an antenna tuned to operate at substantially 13.56 MHz; and

an active transmit driver circuit coupled to receive power from the mobile device[[;]], and wherein the activated built-in RFID functionality comprises transmission of data between the antenna and an external RFID reader, the transmission effected by the active transmit driver circuit.

11. (**Currently Amended**) The method of claim 10, wherein the RFID functionality is a Near Field Communication (NFC) functionality and the external RFID reader is an NFC reader.

12. (Original) The method of claim 10, wherein the transmitted data includes ticketing information for a mass transit system.

13. (Original) The method of claim 10, wherein the transmitted data includes transaction information for a mobile payment.

14. (Original) The method of claim 10, wherein the antenna includes an inductive element.

15. (Original) The method of claim 10, wherein the active transmit driver circuit includes one or more of an amplifier filter, oscillator, and/or modulator.

16. (Previously Presented) The method of claim 10, wherein the mobile device further comprises an amplifier coupled to the antenna and further coupled to receive power from the mobile device, and wherein the amplifier operates to amplify a signal received by the antenna.

17. (Previously Presented) A method of near field communication between a mobile device and an NFC reader, the method comprising:

coupling a smartcard controller and an active transmit driver circuit to a power source of the mobile device;

providing power to the smartcard controller and the active transmit driver circuit from the power source of the mobile device;

coupling the active transmit driver circuit to an antenna of the mobile device, wherein the antenna is tuned to operate at substantially 13.56 MHz; and

driving transmission of data by the active transmit driver circuit from the antenna to the NFC reader.

18. (**Currently Amended**) The method of claim 17 further comprising:

amplifying a signal received from the antenna[[,]] to generate an amplified signal; and

providing the amplified signal to the smartcard controller.

19. (Original) The method of claims 10 or 17, wherein the transmitted data includes ticketing information for a mass transit system.

20. (Original) The method of claims 10 or 17, wherein the transmitted data includes transaction information for a mobile payment.

REMARKS

This listing of claims will replace all prior versions and listings of claims in the application. Claims 1, 7, 10, 11, and 18 are amended. No claims are added or cancelled in this response. Hence, claims 1-20 are pending.

CLAIM AMENDMENTS

Applicants amend claims to fix typographical and/or antecedent basis errors. Applicants respectfully request Examiner to enter the amendments. No new matter has been introduced.

SPECIFICATION AMENDMENTS

Applicants amend the specification to update the claim of priority. No new matter has been introduced.

EXAMINER INTERVIEW SUMMARY

Applicant's representative, Usman Mughal, and Examiner Pham met by phone on March 02, 2023 to discuss a cited reference. The correct reference number was supplied. Applicants thank Examiner Pham for the interview.

COMMENTS ON THE STATEMENT OF REASONS FOR ALLOWANCE

The guidance provided at M.P.E.P. § 1302.14 under the heading, "Reasons for Allowance," sets forth:

> In most cases, the examiner's actions and the applicant's replies make evident the reasons for allowance, satisfying the "record as a whole" proviso of [37 CFR 1.104(e)]. This is particularly true when applicants fully complies with 37 CFR 1.111(b) and (c) and 37 CFR 1.133(b). Thus, where the examiner's actions clearly point out the reasons for rejection and the applicant's reply explicitly presents reasons why claims are patentable over the reference, the reasons for allowance are in all probability evident from the record and no statement should be necessary.

Applicants respectfully submit that Applicants' previously filed responses are "repl[ies that] explicitly present[] reasons why claims are patentable over the [cited references]." Thus, Applicants respectfully submit that the Statement of Reasons for Allowance should be

understood only to refer to the arguments made of record, and should not be understood as requiring or implying that other reasons for allowance have been relied on in allowing the claims. Therefore, all reasons for allowance should be understood from the arguments clearly set forth in the prosecution history, and the Statement of Reasons for Allowance should not be construed as narrowing the claims.

CONCLUSION

Pursuant to 37 C.F.R. § 1.136(a)(3), Applicants request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. § 1.16 and § 1.17, to Deposit Account No. 60-4139.

Respectfully submitted,
MUGHAL GAUDRY FRANKLIN PC

05/15/23
Date

/Usman Mughal/
Usman Mughal
Reg. No. 62,887
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971-634-0286
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UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/179,237	**05/15/2023 11:25:58 PM ET**	**iC18P115026US13**

Title of Invention

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3258	FILED BY	Katherine Campbell
PATENT CENTER #	62077788	FILING DATE	02/18/2021
CUSTOMER #	175023	FIRST NAMED INVENTOR	Siva G. Narendra
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Usman Mughal

Documents

TOTAL DOCUMENTS: 5

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
iC18P115026US13_Issue_Fee_Pay.pdf		1	Issue Fee Payment (PTO-85B)	129 KB
iC115026US13_312_Amend_resp.pdf		8	-	52 KB
iC115026US13_312_Amend_resp-A.NA.pdf	(1-1)	1	Amendment after Notice of Allowance (Rule 312)	25 KB
iC115026US13_312_Amend_resp-SPEC.pdf	(2-2)	1	Specification	26 KB
iC115026US13_312_Amend_resp-CLM.pdf	(3-6)	4	Claims	34 KB

iC115026US13_312_Amend_resp-REM.pdf	(7-8)	2	Applicant Arguments/Remarks Made in an Amendment	31 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
iC18P115026US13_Issue_Fee_Pay.pdf	C88822A8ECAD5566DB281ED2A643F56B10243419B417910F3D6B73C84ED088881129BC93ABEFB7A83C9A4516CDFE35713726D4795B8B2EBE4E0A1389F7D6429F
iC115026US13_312_Amend_resp.pdf	7F4AE4F898FF2874CF3A6A28A5F32A0326F758E9AD4D1579E6A4F45E7CEEE726DE7B1763E3D072C5C91EDAC5FCD1E131603AD4ABA003C0EFE51CDAE7D8092603
iC115026US13_312_Amend_resp-A.NA.pdf	577789A3D0C8417DEA763285CBD5B9552CFCFC72A20BA4338D289398B6D0FEEBF5C42E7AD6F4E4B71CDE7C483DC5A27129913C3C728AEAB8489F147A0BB2E03D
iC115026US13_312_Amend_resp-SPEC.pdf	C173393A61B9D3259D462B0DA0B2D52471ECA0995D5B8BABD78E142F6904A63204B5EDD43623F253C16AEF6BB2BA249E8BC825CE2255E30BA8A8E13155017A72
iC115026US13_312_Amend_resp-CLM.pdf	819CE465B932537682C9B2413856C50526E12A2465104CFDF89BCBB5550200226678EC258F7D451D383E6FF664A8DDC6F2A730AE7041B2C1BA558B581C8E5BB3
iC115026US13_312_Amend_resp-REM.pdf	62C33E87195E5132A3A2B8251D38A4E4B8C2A1395AA4894C411172DD9E57D6EB651F4DC2361704E87639E976A08171B5658C03E7837CF1277B58ED08815651B3

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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ELECTRONIC PAYMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
17/179,237	05/15/2023 11:25:58 PM ET	iC18P115026US13

Title of Invention

METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	-
CONFIRMATION #	3258	FILED BY	Katherine Campbell
PATENT CENTER #	62077788	AUTHORIZED BY	Usman Mughal
CUSTOMER #	175023	FILING DATE	02/18/2021
CORRESPONDENCE ADDRESS	-	FIRST NAMED INVENTOR	Siva G. Narendra

Payment Information

PAYMENT METHOD	PAYMENT TRANSACTION ID	PAYMENT AUTHORIZED BY
CARD / 2971	E20235EN26447306	Katherine Campbell

FEE CODE	DESCRIPTION	ITEM PRICE($)	QUANTITY	ITEM TOTAL($)
2501	UTILITY ISSUE FEE	480.00	1	480.00
			TOTAL AMOUNT:	$480.00

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C.

371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

175023 7590 02/15/2023

Mughal IP P.C.
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/179,237	02/18/2021	Siva G. Narendra	iC18P115026US13	3258

TITLE OF INVENTION: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$480	$0.00	$0.00	$480	05/15/2023

EXAMINER	ART UNIT	CLASS-SUBCLASS
PHAM, TOAN NGOC	2684	340-572100

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/AIA/122 or PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/AIA/47 or PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Mughal Gaudry & Franklin PC
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE	(B) RESIDENCE: (CITY and STATE OR COUNTRY)
iCashe, Inc.	Portland, OR

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 6041396

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Usman Mughal/ Date May 11, 2023

Typed or printed name Usman A. Mughal Registration No. 62887

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United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/179,237	02/18/2021	Siva G. Narendra	iC18P115026US13	3258

175023 7590 05/25/2023

MUGHAL GAUDRY & FRANKLIN PC
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

EXAMINER	
PHAM, TOAN NGOC	

ART UNIT	PAPER NUMBER
2684	

NOTIFICATION DATE	DELIVERY MODE
05/25/2023	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@mgf.law
eofficeaction@appcoll.com

Response to Rule 312 Communication	Application No.	Applicant(s)	
	17/179,237	Narendra et al.	
	Examiner	Art Unit	AIA (FITF) Status
	TOAN N PHAM	2684	No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☑ The amendment filed on 15 May 2023 under 37 CFR 1.312 has been considered, and has been:
   a) ☑ entered.
   b) ☐ entered as directed to matters of form not affecting the scope of the invention.
   c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
      Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.
   d) ☐ disapproved. See explanation below.
   e) ☐ entered in part. See explanation below.
   f) ☐ not entered because the supplemental or corrected Application Data sheet (ADS)
      ☐ was not accompanied by a petition to accept an unintentionally delayed claim under 37 CFR 1.55 or 27 CFR 1.78;
      ☐ did not identify the information being changed in accordance with 37 CFR 1.76(c)(2);
      ☐ was not properly signed in accordance with 37 CFR 1.76(e) (or 37 CFR 1.33(b) for applications filed prior to September 16, 2012).

/TOAN N PHAM/
Primary Examiner, Art Unit 2684

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor: **Siva G. Narendra**	Examiner: **PHAM, TOAN NGOC**
Application No.: 17/179,237	Art Group: 2684
Filed: February 18, 2021	Confirmation No.: 3258
For: METHOD AND APPARATUS FOR TRANSMITTING DATA VIA NFC FOR MOBILE APPLICATIONS INCLUDING MOBILE PAYMENTS AND TICKETING	Docket No.: iC18P115.026US13

Mail Stop **Issue Fee**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

OK TO ENTER: /T.N.P/

AMENDMENT UNDER 37 C.F.R. § 1.312

Dear Examiner:

This Amendment is in response to the Notice of Allowance mailed February 15, 2023. Applicants respectfully request the Examiner to enter this Amendment.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	17/179,237
Filing Date	Feb 18, 2021
First Named Inventor	Siva Narendra
Art Unit	2684
Examiner Name	
Attorney Docket Number	18.115.026US13

		20010002035		2001- 05-31	Kayanakis	
		20010006902		2001-07-05	Ito	
		20010013551		2001-08-16	Ramachandran	
		20010034246		2001-10-25	Hutchison, IV et al.	
		20020007434		2002-01-17	Campardo	
		1178450		2002-02-06	Vazvan	
		20020025796		2002-02-28	Taylor et al.	
		20020043566		2002-04-18	Goodman et al.	
		20020044043		2002-04-18	Chaco et al.	
		20030115126		06/2003 ~~2002-06-29~~	Pitroda	
		20020095588		2002-07-18	Shigematsu et al.	
		20020096570		2002-07-25	Wong et al.	
		20020099665		2002-07-25	Burger et al.	

Change(s) applied to document, /B.P./ 2/24/2023

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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	Application Number	17/179,237
	Filing Date	Feb 18, 2021
	First Named Inventor	Siva Narendra
	Art Unit	2684
	Examiner Name	
	Attorney Docket Number	18.115.026US13

		7954716		2011-06-07	Narendra et al.	
		7954717		2011-06-07	Narendra et al.	
		7961101		2011-06-14	Narendra et al.	
		7991158		2011-08-02	Narendra et al.	
		8072331		2011-12-06	Narendra et al.	
		8082575		2011-12-20	Doughty et al.	
		8083145		2011-12-24	Narendra et al.	
		8091786		2012-01-10	Narendra et al.	
		8103881		2012-01-24	Doughty et al.	
		6705520		03/2004 ~~2016-03-04~~	Pitroda et al.	

Change(s) applied to document,
/B.P./
2/24/2023

U.S. PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		20010001035		2001- 05-31	Kayanakis	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Field

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Art Unit	2684
Examiner Name	
Attorney Docket Number	18.115.026US13

		20010002035		2001- 05-31	Kayanakis	
		20010006902		2001-07-05	Ito	
		20010013551		2001-08-16	Ramachandran	
		20010034246		2001-10-25	Hutchison, IV et al.	
		20020007434		2002-01-17	Campardo	
		1178450		~~2002-02-06~~ 04/1916	~~Vazvan~~ La Chapelle	
		20020025796		2002-02-28	Taylor et al.	
		20020043566		2002-04-18	Goodman et al.	
		20020044043		2002-04-18	Chaco et al.	
		20030115126		06/2003 ~~2002-06-29~~	Pitroda	
		20020095588		2002-07-18	Shigematsu et al.	
		20020096570		2002-07-25	Wong et al.	
		20020099665		2002-07-25	Burger et al.	

Change(s) applied to document, /T.W./ 6/5/2023

Change(s) applied to document, /B.P./ 2/24/2023

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.N.P/

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/179,237	07/04/2023	11694053	iC18P115026US13	3258

175023 7590 06/14/2023

MUGHAL GAUDRY & FRANKLIN PC
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

ISSUE NOTIFICATION

The projected patent number and issue date are specified above. The patent will issue electronically. The electronically issued patent is the official patent grant pursuant to 35 U.S.C. § 153. The patent may be accessed on or after the issue date through Patent Center at https://patentcenter.uspto.gov/. The patent will be available in both the public and the private sides of Patent Center. Further assistance in electronically accessing the patent, or about Patent Center, is available by calling the Patent Electronic Business Center at 1-888-217-9197.

The USPTO is implementing electronic patent issuance with a transition period, during which period the USPTO will mail a ceremonial paper copy of the electronic patent grant to the correspondence address of record. Additional copies of the patent (i.e., certified and presentation copies) may be ordered for a fee from the USPTO's Certified Copy Center at https://certifiedcopycenter.uspto.gov/index.html. The Certified Copy Center may be reached at (800)972-6382.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 27 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site http://pair.uspto.gov for additional inventors):

Siva G. Narendra, Portland, OR;
Saurav Chakraborty, West Bengal, INDIA;
Prabhakar Tadepalli, Bangalore, INDIA;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

iCashe, Inc., Portland, OR;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

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United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/179,237	02/18/2021	Siva G. Narendra	iC18P115026US13	3258

175023 7590 07/04/2023

MUGHAL GAUDRY & FRANKLIN PC
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

EXAMINER
PHAM, TOAN NGOC

ART UNIT	PAPER NUMBER
2684	

NOTIFICATION DATE	DELIVERY MODE
07/04/2023	ELECTRONIC

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The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@mgf.law
eofficeaction@appcoll.com

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.
17/179,237	04-Jul-2023	11694053

MUGHAL GAUDRY & FRANKLIN PC
iCashe, Inc.
1500 NW Bethany Blvd.
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