

wherein the memory card write command includes a command index to the memory card write command in the data column, to identify the type of the hidden command; and when the hidden command is determined not to switch to the dual interface smart card controller, modify the power transfer to the dual interface smart card controller, the dual interface The smart card controller is placed on the memory card compatible RFID card together with the memory card controller.

9. The method of claim 8, wherein the step of modifying the power transfer to the dual interface smart card controller comprises removing power from the dual interface smart card controller.
10. The method of claim 8, wherein the step of modifying the power transfer to the dual interface smart card controller comprises applying power to the dual interface smart card controller.
11. The method of claim 8, further comprising receiving a second memory card write command at the memory card controller, wherein the second memory card write command includes a hidden command having an instruction to Reset the dual interface smart card controller.
12. A computer readable medium encoded with instructions that, when accessed by a memory card controller located on a memory card compatible radio frequency identification (RFID) card, causes the execution to be patented The steps described in item 8 of the scope.
13. The computer readable medium of claim 12, wherein the step of modifying power transfer to the dual interface smart card controller comprises cycling power to the dual interface smart card controller.

Description

Power negotiation for small RFID cards

The present invention is generally directed to contactless communication devices and, more particularly, to small radio frequency identification (RFID) cards.

RFID "tags" can be divided into two broad categories: active tags and passive tags. Active tags are characterized by a source of electrical power, such as a battery. Active tags typically transmit information by broadcasting over the selection of RF carrier frequencies, where the RF carrier frequency is selected using an RF carrier generated by a region. Active tags are typically used for long distance transmissions and are often referred to as "far field communications" (FFC). Antennas that use active RFID tags have a greater tendency to do so to allow communication over long distances.

Passive tags are not powered. The passive tag can obtain the energy required to supply the tag from an interrogating RF field, and use the energy source to transmit the response code by modulating the impedance (which is the impedance that the antenna presents to the challenge field). Thereby the reflection is modulated back to the signal reading the antenna. Passive tags are typically used for transmission over short distances and are 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 at distances of a few centimeters.

Passive tags are typically connected to "loop antennas". An example of a loop antenna is shown in U.S. Patent No. 6,568,600 to Carpiar and others, issued May 27, 2003. The device described in U.S. Patent No. 6,568,600 can be considered a "credit card size" passive RFID card (more specifically, a card that meets ISO 7816 size requirements). The loop antenna is necessarily large because the passive tag is powered by the energy received by the antenna from the signal transmitted by the RFID reader.

Figure 12 shows the power supply voltage developed over time by rectifying the voltage induced in the loop antenna by the presence of an interrogating RF field. Once the power supply voltage reaches a threshold, the tag is activated and operational. As the antenna size decreases and the power supply voltage takes a long time to reach the threshold, the labeling operation may not meet the specifications of the response time. Below this antenna size, the power supply voltage will never reach this threshold and the tag will never start.

The antenna design for RFID applications is described in the application note published by Dr. Youbok Lee of Microchip Technology, Inc. in 2003 (not documented in the month) under the heading "Antenna Circuit Design for RFID Applications". Dr. Lee's application note details how to determine the size requirements for a passive RFID tag antenna operating at 13.56 MHz. On page 5 of this application note, Dr. Lee showed that the optimal radius of the loop antenna coil is 1.414 times the required read distance. This analysis confirms that a credit card sized loop antenna can be nearly optimized for a reading distance of approximately several centimeters.

In many applications, it can be seen that passive tags are being widely used. For example, mobile device manufacturers embed passive RFID tags into actions for NFC applications in the device. Exemplary mobile applications include, but are not limited to, ticket sales and mobile payments. U.S. Patent No. 7,333,062 issued to Leizerovich et al. on February 19, 2008, shows a mobile telephone with an integrated loop antenna for an NFC device. As shown in U.S. Patent No. 7,333,062, the mobile phone provides the real estate necessary to implement a 13.56 MHz loop antenna.

The way to implement passive tags in smaller mobile devices has been tried many times. These attempts failed to achieve limited success, in part due to the size of the loop antenna. For example, Figure 13 shows the implementation of an RFID tag 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 therefore significantly too large. Also by way of example, U.S. Publication No. 2006/0124755 A1 shows a memory card with a passive tag, but the card must be inserted into a slot to access loop antennas on different devices. According to this implementation, the actual condition of the mobile device is still dependent on the implementation of the loop antenna. Therefore, it is foreseeable that the size of the antenna will be taken as an obstacle to further miniaturize the passive RFID tag.

There is a need for a small footprint RFID tag that can accommodate an antenna without relying on external devices. There is also a need for a memory card compatible RFID tag that is compatible with a standard memory card slot on a mobile device.

One aspect of the present invention discloses a method of maintaining undisturbed power for an additional slot compatible with a memory card, the method comprising periodically The memory card is compatible with the additional slot to send a memory card write command.

Another aspect of the present invention discloses a method of modifying power transfer to a dual interface smart card controller, the method comprising the steps of: embedding a hidden command into a memory card write command, the hidden command pair A dual interface smart card controller on a memory card compatible radio frequency identification (RFID) card that specifies modification of power transfer; and transmits the memory card write command to the memory card compatible RFID card.

Yet another aspect of the present invention discloses a method of modifying power transfer to a dual interface smart card controller, the method comprising the steps of: receiving a command at a memory card controller, wherein the command includes an instruction to For modifying power transmission to a dual interface smart card controller; the dual interface smart card controller is co-located on the memory card with the memory card controller; and modifying the power transmission of the dual interface smart card controller.

Yet another aspect of the present invention is directed to a computer readable medium encoded with instructions that, when accessed by a memory card controller, cause the memory card controller to perform the following actions: Receiving a command at the memory card controller, wherein the command includes an instruction to modify power transfer to a dual interface smart card controller, the dual interface smart card controller being co-located with the memory card controller on a memory card; and modifying the power transfer to the dual interface smart card controller.

In the following detailed description, reference may be made to the accompanying drawings, which are only specific embodiments of the invention are shown for purposes of illustration. The specific embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. It will be appreciated that the various embodiments of the invention are different, but are not mutually exclusive. For example, the specific features, structures, or characteristics of a particular embodiment can be implemented in other specific embodiments without departing from the spirit and scope of the invention. In addition, it should be understood that the location or configuration of the various elements in the disclosed embodiments may be modified without departing from the spirit and scope of the invention. Therefore, the following detailed description is not to be considered as limiting, and the scope of the invention is defined by the scope of the appended claims. In the drawings, like reference numerals will be used throughout the

Figure 1 shows a mobile computing device and a small RFID card compatible with the memory card slot. The mobile computing device 110 is shown in FIG. 1 as a mobile phone, but this is not a limitation of the invention. For example, the mobile computing device 110 can be a personal digital assistant (PDA), a smart phone, a mobile phone, a handheld computer, a desktop computer, or any other device capable of functioning as described herein.

The mobile computing device 110 includes a memory card slot 112. The memory card slot 112 is a slot that can accept the RFID card 120. For example, the memory card slot 112 can have a physical dimension that is compatible with the RFID card 120 and can have a communication interface that operates using a protocol that is compatible with the RFID card 120. As used herein, the term "memory card slot" can be any add-on slot that accepts a card with memory and can be like a Accessed by the mobile computing device shown in Figure 1. For example, a memory card slot can be compatible with an industry standard communication protocol, or can be compatible with widely accepted communication protocols, and this communication protocol does not have to be officially incorporated into an industry standard. Examples include slots that are compatible with the Multimedia Memory Card (MMC) protocol, the Memory Stick DUO protocol slot, the Secure Digital (SD) protocol slot, and the Smart Media protocol. The slot. The above list is for illustrative purposes only and is not intended to be exhaustive. In addition to the protocols explicitly set forth above, the memory card slot 112 can be compatible with many memory card slot agreements without departing from the scope of the present invention.

The RFID card 120 includes an electrical contact 122 that is part of a host interface that can communicate with the memory card slot 112. For example, electronic contacts 122 may provide connectivity for communication protocols for memory cards. The RFID card 120 includes RFID functionality and may also include memory that is accessible by the mobile computing device 110. For example, in some embodiments, the RFID card 120 includes a smart card controller and an inductive component that can interact with an NFC reader (eg, an ISO 14443 suitable interface). In other embodiments, the RFID card 120 does not include memory accessed by the mobile computing device 110. The RFID card 120 can include functions other than memory and RFID.

In various embodiments of the invention, the RFID functionality in the RFID card is accessed by the mobile computing device 110 using a memory card access command that has been defined for memory card insertion. Slot 112. Accordingly, embodiments of the present invention enable the RFID function to perform functions other than memory access without defining new commands. In some embodiments, new commands for RFID are embedded within the data bits, and the new commands are followed by a memory card read/write command. The RFID card 120 then determines whether the newly entered data bit is for a regular read/write memory card function or for an RFID function. In other words, functions other than the standard memory card function can be accessed through a "hidden" command in the data stream, which can be exchanged using existing memory card access commands and functions. In accordance with various embodiments of the present invention, both existing memory card functions and RFID functions can be implemented without requiring changes to the manner in which the host-side agreement is established.

The combination of mobile computing device 110 and RFID card 120 can be used for any purpose. For example, in some embodiments, the RFID card 120 can interact with a point-for-sale payment device to achieve the effect of a mobile payment. Also by way of example, in some embodiments, the RFID card 120 can be used in a wave-pay manner ticket sales in a mass transit environment, such as MIFARE.

Figure 2 shows a block diagram of a mobile computing device. The mobile computing device 110 includes an antenna 240, a radio frequency circuit 230, a processor 210, a memory 220, and a memory card slot 112. In some embodiments, the mobile computing device 110 is a mobile phone or includes a mobile phone function. For example, antenna 240 and RF circuitry 230 can be used to communicate with a cellular telephone network. Moreover, in some embodiments, the mobile computing device 110 is a wireless local area network (WLAN) or a wireless wide area network (WWAN) device. For example, antenna 240 and RF circuitry 230 can be utilized to communicate with a wireless access point. In some embodiments, the antenna 240 and the wireless circuit 230 is ignored, and the mobile computing device 110 is unable to utilize the wireless connection.

Processor 210 represents a processor that is capable of communicating with other blocks shown in mobile computing device 110. For example, processor 210 can be a microprocessor, a digital signal processor (DSP), a microcontroller, or the like. Further, processor 210 can be constructed in accordance with a state machine or other sequence logic. In operation, processor 210 can read instructions from memory 220 and perform actions in response to the instructions. For example, processor 210 can execute program instructions that can affect communication between mobile computing device 110 and devices coupled to memory card slot 112.

The memory card slot 112 is referenced in conjunction with Figure 1 and described above. Memory card slot 112 includes circuitry that is compatible with RFID card 120. The mobile computing device 110 can communicate with the RFID card 120 by using a standard set of memory card access commands. For example, the processor 210 can use a memory card write command to write to the memory within the RFID card 120 and can use the memory card read command to read data from the memory within the RFID card 120.

The mobile computing device 110 can access the RFID functionality within the RFID card 120 using a "hidden" command embedded within the memory card access command. For example, a memory card write command can include a unique data string to identify the memory card write command as a command that is transferred to a purpose other than memory write. In addition, the sector address supplied to the memory card write command can be set to a specific address value to further identify the memory card write command as a converted command. In addition to the specified address / data value can be recorded The memory card access command is recognized as a command that is converted for purposes other than memory access, and the memory access command can include a data bit to further specify the type and function of the hidden command. The sample format of the hidden command is further described below. In some embodiments, a read command is issued immediately after a write command to initiate a flow of data from a non-memory card function to a host side, wherein the data of the write command has a hidden command. The combination of the memory card write command and the memory card read command can be used in this manner to form a hidden read command.

In some embodiments, the memory card slot 112 is powered down after a period of inactivity to conserve power. For example, power may be activated to the memory card slot 112 when the processor 210 issues a memory card write or read command, but may be powered off later to conserve power. When the memory card slot 112 is powered off, any device coupled to the memory card slot is also powered off. For example, if the RFID card 120 (Fig. 1) is coupled to the memory card slot, the RFID card 120 will also be powered off when the memory card slot 112 is powered off.

In various embodiments of the invention, processor 210 executes software resident in memory 220 to maintain power to memory card slot 112 (and to RFID card 120). For example, the periodic hidden command may be sent to the RFID card 120 for the purpose of continuing power supply, while the RFID card 120 is expected to provide

the functionality of the RFID. Also as an example, a hidden command can be sent to the RFID card 120 for the purpose of circulating power to a smart card controller resident on the card. These hidden commands are described in detail below in conjunction with the following figures.

Figure 3A shows an RFID card with integrated sensing elements and compatible with a memory card. The RFID card 300 represents a possible embodiment of the RFID card 120 (Fig. 1). The RFID card 300 includes a host interface 310, a memory card controller 340, a memory 360, a smart card controller 330, a program memory 332, and a small inductive component 350. The RFID card is capable of communicating with a memory card slot within the mobile computing device. Further, the RFID card 300 does not require a memory card slot to implement an extended input/output function. For example, and not by way of limitation, in a particular embodiment of the SD, the RFID card 300 can operate in any SD memory card slot and does not require a secure digital input/output (SDIO) memory card slot.

The host interface 310 includes an electronic contact to interact with the memory card slot. For example, host side interface 310 includes contacts such as contacts 122 (Fig. 1). Also by way of example, in some embodiments, host side interface 310 includes concealed electronic contacts. The host interface 310 can also include circuitry such as drivers, receivers, terminals, and the like.

In the particular embodiment represented by Figure 3A, memory card controller 340 uses a memory card access command to communicate with the mobile device. The memory card controller can also communicate with the memory 360. The memory card controller determines whether each command should form a memory operation with the memory 360, whether a hidden command should be converted to the smart card controller 330, or whether the memory card controller 340 should act in response to the hidden command. In some embodiments, memory card controller 340 executes instructions stored in internal memory or stored in memory 360. In some embodiments, the memory card controller 340 includes a special purpose hardware that is in the process of determining a command. It should be useful if it should be converted. In other embodiments, the memory card controller 340 can be a microcontroller that is equivalent in all respects to the controller found in the memory card, except for the program it executes.

Memory 360 can be any type of volatile or non-volatile memory. For example, the memory 360 can be a volatile memory such as static random access memory (SRAM) or dynamic random access memory (DRAM). Also by way of example, memory 360 can be a non-volatile memory such as a NDR flash memory or a NAND flash memory. In various embodiments of the invention, memory 360 represents a memory that can be accessed by a mobile computing device using a memory card access command, the memory card access commands being defined for this purpose.

When the RFID card 300 is communicating with a memory card slot within a mobile computing device, the mobile computing device can transmit a memory card access command to access the memory 360. Also as an example, the mobile computing device can send a memory card access command with a hidden command. The memory card controller 340 detects the presence of the hidden command and uses the communication bus 342 to transfer all or part of the memory access commands to the smart card controller 330. Communication bus 342 can have any number of conductors and can take any form. For example, the communication bus 342 can be a serial port, a parallel port, or can include a plurality of data wires, a plurality of address wires, and/or a wire capable of carrying a control signal, such as a clock signal. In some embodiments, memory card controller 340 takes one or more actions in response to a hidden command. For example, the memory card controller 340 can modify the clock signal in response to a hidden command.

The memory card controller 340 can detect hidden commands in a number of ways. For example, in some embodiments, the memory card access command can include a particular address value or a particular data value. The memory card controller 340 detects a command including one or both of a specific address value or a specific material value and appropriately routes the command. The particular address value and specific data value used for this purpose can be considered here as a hidden command address value and a hidden command data value.

In some embodiments, the memory card controller 340 can detect the presence of a hidden command based solely on the hidden command address value. In these specific embodiments, the memory card controller 340 checks the address value included in a memory card access command, and if the command matches the hidden command address value, converts it (or takes some actions). In some embodiments, the memory card controller 340 detects the presence of a hidden command based only on the hidden command data value. In these particular embodiments, the memory card controller 340 checks a data value included in the memory card access command and converts the command if it matches the hidden command data value. In still further embodiments, the memory card controller 340 can detect the presence of a hidden command based on both the hidden command address value and the hidden command data value. In these embodiments, the memory card controller 340 will only switch commands if both the memory card access address and the data match the hidden command address value and the hidden command data value, respectively.

Hiding command address values and hiding command data values can be specified in a number of ways. For example, all RFID cards can be released with a fixed value. In these embodiments, the same hidden command is used each time the RFID function is accessed. The address and/or data value is included in the memory card access command. Also as an example, different RFID cards can be released with unique values. In these specific embodiments, each RFID card can provide these values to a mobile computing device when needed. Also as an example, the hidden command address and/or data value may be specified by the mobile computing device. In other further embodiments, the hidden command address and data value can be dynamic. The hidden command address and data value can be changed each time power is applied or on a periodic basis.

The smart card controller 330 receives the hidden commands converted by the memory card controller 340. The smart card controller 330 further translates the hidden commands and performs actions in response thereto. The smart card controller 330 executes the instructions stored in the program memory 332. In some embodiments, program memory 332 is embedded within smart card controller 330, while in other embodiments program memory 332 is part of memory 360.

The smart card controller 330 is a dual interface smart card controller having one of a plurality of interfaces including an RFID function. In some embodiments, the smart card is a passive RFID tag reader that is compatible with the NFC application. For example, smart card controller 330 can be a device that implements all or part of the ISO 14443 standard for contactless NFC devices. Also by way of example, smart card controller 330 can be a dual interface smart card controller capable of implementing both ISO 7816 and ISO 14443 for contact/contactless requirements. The "SmartMX" family of controllers available from NXP in Netherlands is an example of a suitable dual interface smart card controller. These controllers provide RFID functionality at 13.56 MHz, this Various embodiments of the invention can operate at 13.56 MHz, but are not limited to operating at this frequency. In some embodiments, the smart card controller interacts with the MIFARE system for ticketing applications.

The smart card controller 330 receives power from the host interface. By not receiving power from the interrogating RF field, the necessity of using one of the loop antennas for power generation can be negated. The smart card controller 330 includes an antenna port 334. The antenna 334 is coupled to the small inductive element 350.

The small inductive component 350 includes a coil wound around a magnetic core. The coil is too small for drawing power from the interrogating RF field, but since the smart card controller 330 is powered by the host device through the host interface 310, this approach is not necessary. The small inductive component 350 interacts with the antenna within the RFID reader in a manner that approximates the interaction of the primary and secondary coils within the transformer. The RFID reader has a coil that resonates at 13.56 MHz, which acts like a main line of a transformer. The small inductive component 350 functions as a secondary line to the transformer. Accordingly, the transmitter can "see" the impedance of the secondary coil (small sensing element 350). The smart card controller 334 can use circuitry to modulate the reflected signal to modify the impedance at the antenna 334.

The small sensing element 350 can be made very small. For example, in some embodiments, the RFID card 120 is a miniSD card and the small sensing element 350 is small enough to be completely contained within the apparent size of the miniSD. The specific embodiment of the small inductive element within the apparent size of the memory card is as described below with reference to FIG.

In various embodiments of the invention, the memory card controller 340 and The smart card controller 330 is implemented in many different ways. For example, in some embodiments, the various components are implemented as hardware. In these embodiments, the various components can be implemented as individual integrated circuits or as a combined integrated circuit. Also by way of example, in some embodiments, various components may be implemented as a software, or a combination of hardware and software. In some embodiments, RFID card 300 can include a microprocessor, and the components can be implemented as a software module running on the microprocessor. In other embodiments, RFID card 300 can include multiple processors, and the components can be implemented as software modules that are interspersed across the plurality of processors.

Figure 3B shows a block diagram of a memory card compatible RFID card with integrated sensing elements. The RFID card 302 represents a possible embodiment of the RFID card 120 (Fig. 1). The RFID card 302 includes a host interface 310, a memory card controller 340, a memory 360, a smart card controller 340, a program memory 332, and a small inductive component 350, all of which are described above with reference to FIG. 3A. The RFID card 302 is capable of communicating with a memory card slot within the mobile computing device. Still further, the RFID card 302 does not require a memory card slot to implement extended input/output functions. For example, and not by way of limitation, in an SD embodiment, the RFID card 302 can operate in any SD memory card slot without the need for a secure digital input/output (SDIO) memory card slot.

In the particular embodiment represented by FIG. 3B, smart card controller 330 receives power from memory card controller 340. In these embodiments, the memory controller 340 can provide the smart card controller 330. The power is directly controlled. The memory controller 340 can apply and/or remove power from the smart card controller 330 in response to commands received through the host interface. For example, the memory controller 340 can receive a hidden command to reset the smart card controller 330 by re-starting through power cycling.

Figure 4 shows a photo of a memory card compatible RFID card with integrated sensing elements. The RFID card 120 is displayed in an apparent size of an SD card, which is not a limitation of the present invention. The RFID card 120 includes an electronic contact 122, a memory card controller 340, a smart card controller 330, a memory 360, a magnetic core 450, and a coil 452, all of which are fixed to the circuit board 402.

The magnetic core 450 and the coil 452 can be implemented as a small inductive element 350 (Fig. 3). As can be seen in the photo, the small sensing element can be assembled into the overall size of the memory card. The small inductive component does not provide power to the smart card controller 330, so it is not necessary to make the size larger for this purpose.

Figure 5 shows the data portion of a memory card write command. Included are hidden command material values 510, status bar 520, password field 530, device ID 532, command index 540, and hidden command related material 550. In the example of Fig. 5, the length of the data portion is 512 bytes, which is not a limitation of the present invention. Any number of numbers can be included in the write command, and the fields in Figure 5 can be of any length.

In the example of Figure 5, the hidden command data value is 256 bits in length, although any length can be used herein without departing from the scope of the invention. In some embodiments, the hidden command data value 510 is used to The memory write command is recognized as a hidden command. When a write command receives a material owned by the first 256 bits (which matches the hidden command data value), the command is recognized as a command to be converted to the smart card controller. As described above, a hidden command address value can be used to associate or otherwise unrelated to a hidden command data value to identify the memory write command as a hidden command.

When the memory is written as a hidden command, the remaining fields are more important. 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 in the data column The bit is treated as if it were in the general memory write command. Conversely, when the memory write is a hidden command, the remaining fields are used to further translate the hidden command.

Memory card controller 340 (Figs. 3 and 4) verifies the hidden command data value 510, status bar 520, and, if possible, the password field 530 and device ID 532. In some embodiments, if the command is recognized as a hidden command, the memory card controller 340 forwards the password 530, the command index 540, and the associated material 550 to the smart card controller 330. In other embodiments, memory card controller 340 can take action directly based on hidden commands.

Status bar 520 can include any information related to the status of the hidden command. For example, status bar 520 can include one or more bits to indicate to memory card controller 340 whether the host side (mobile computing device) desires the smart card to return data in response to the hidden command. For example, when the status bar 520 indicates a write meaning, the memory card controller 340 will forward the password, device ID, command index, and related data without expecting to return any data to the host. Also by way of example, when the status bar 520 indicates a read, the memory card controller 340 may, in the event that the smart card 330 is expected to provide data to transmit data to the host in response to a memory card read command, forward the password, device ID, command index, and related materials. A combination of a memory card write command followed by a memory card read command can be used to provide a "read" function to the smart card controller. The reading operation from the smart card controller is further described below with reference to Fig. 3.

The password field 530 includes a password to allow the smart card controller 330 to authenticate the token with the host. In some embodiments, each hidden command includes a password. Each time the password, device ID, command index, and related data are converted to the smart card controller, the password is checked to authenticate the token with the host.

Device ID 532 uniquely identifies the host (mobile computing device). The device ID can be checked by the smart card controller to ensure that the token is inserted into the host side to which it is authenticated. Some embodiments of the present invention use device IDs to enforce a unique host/card pair, while other embodiments allow the smart card controller functionality to be accessed by any host.

The command index 540 identifies the type of hidden command. The number of possible hidden commands is limited only by the number of bits configured on them. Any number of bits can be configured to the command index 540 without departing from the scope of the invention. Hidden command related material 550 can be used for various types of hidden commands And use it differently. Any number of bits can be used to hide the command related material 550.

The information shown in Figure 5 is provided as an example, and the data field of the memory card access command may include more or less data fields than the data fields shown in Figure 5. The invention is not limited by the content or number of fields within a memory card access command.

Figure 6 shows a flow chart in accordance with various embodiments of the present invention. In some embodiments, method 600 can be used by a mobile computing device to communicate with an RFID card within a memory card slot. In some embodiments, method 600, or portions thereof, is performed by a mobile computing device having a memory card slot, while in other embodiments, method 600, or portions thereof, is software Executed. The various actions within method 600 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 6 are ignored from method 600.

The method 600 begins at 610 where a data pattern and an address value are received from an RFID card within 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, while in other embodiments, the mobile device only receives the address value. In some embodiments, the action of 615 occurs once when the RFID card is first inserted into the memory card slot. The mobile computing device can use the address and data values whenever the mobile device establishes a hidden command. In other embodiments, each time the RFID card is inserted into the memory card slot, the action of 615 will occur. In still further embodiments, the action of 610 may occur periodically. Whenever action 610 occurs, the data patterns may be the same or different, and the address values may be the same or different.

At 620, the data field of the memory card access command is populated by the data pattern so that the command is converted to the smart card on the RFID card. For example, the data pattern can be written to the data field as a hidden command material value 510 (Fig. 5).

At 630, one of the address fields of the memory card access command is filled with the address value to further cause the command to be converted to the smart card controller. In some embodiments, only one of 620 or 630 is used. In these embodiments, the presence of the hidden command is represented by the data pattern alone or by the address value alone.

At 640, the data field of the memory card access command is filled with a command string to specify purposes other than memory card access. For example, a command string can be written to the data column as a command index 540 for the smart card controller. This command can be used for any purpose. For example, one or more hidden commands may have the sole purpose of maintaining power to the memory card slot such that the RFID card continues to receive power.

At 650, the data field of the memory card access command is filled 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 of each hidden command. In other embodiments, a password is only included at the beginning of an exchange.

At 660, a memory card access command is sent to the memory card plug the RFID card of the slot. For example, a mobile computing device (110, Figures 1, 2) can send a memory card access command to an RFID card in the memory card slot (112, Figures 1, 2) (120, first, third, 4 picture). The RFID card includes a memory card controller (340, Figure 3) to convert commands based on the data fields filled in method 600.

Figure 7 shows a flow chart in accordance with various embodiments of the present invention. In some embodiments, method 700 can be used by an RFID card within 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, it is executed by the software. The various actions in method 700 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 7 are ignored from method 700.

The method 700 begins at 710 with a memory card access command received from a mobile computing device via a host interface. The action of 710 corresponds to an RFID card within the memory card slot of the mobile computing device that receives a memory card access command.

At 720, the memory card controller checks the criteria in the memory card access command to determine if the memory card access command should be converted to a smart card controller resident on the RFID card. The criterion can be one or both of a hidden command data value or a hidden command address value. If there is a criterion match at 730, a hidden command is presented and at least a portion of the memory card access command is converted at 740. If there is no criterion is the phase. If there is no hidden command, it will be rendered and memory access will be performed at 750.

Figure 8 shows a flow chart showing various embodiments in accordance with the present invention. In some embodiments, method 800 can be used by an RFID card within a memory card slot. In some embodiments, the method 800, or portions thereof, is performed by a memory card controller within the RFID card, while in other embodiments, the method 800, or portions thereof, is performed by a software carried out. The various actions in method 800 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 8 are ignored from method 800.

The method 800 begins at 810 with a memory card access command received from a mobile computing device via a host interface. If the memory card write command is determined to be a hidden command, the process continues until 840; otherwise, the memory write is performed at 830.

At 840, the hidden command is converted to the smart card controller. If the hidden command is judged to be "read" at 850, the handler continues at 860; otherwise, the hidden command handler is considered complete. At 860, the memory card controller retrieves non-memory data from the smart card controller, and at 870, the memory card read command is received from the mobile computing device. At 880, non-memory data is passed back to the mobile computing device.

Method 800 illustrates how a mobile computing device can perform reading from a smart card controller within a memory card compatible RFID card. The mobile computing device issues a memory card write command with a hidden command. The hidden command has a status field indicating the read, and then the mobile computing device issues a memory card read command. The handler in the card receives the hidden command, recognizes it as a read, and then passes the data back to the mobile computing device in response to subsequent memory card read commands.

Figure 9 shows a flow chart showing various embodiments in accordance with the present invention. In some embodiments, method 900 can be used by an RFID card within a memory card slot. In some embodiments, the method 900, or portions thereof, is performed by a smart card controller within the RFID card, while in other embodiments, the method 900, or portions thereof, is performed by a software carried out. The various actions in method 900 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 9 are ignored from method 900.

The method 900 begins at 910 with a smart card access command receiving a command from the memory card controller. This command corresponds to a hidden command received by the memory card controller. At 950, the smart card controller determines if the command is a "dummy" command that is primarily used to maintain power to the memory card slot. If not, the smart card function specified in the command will be executed at 930. If so, the command is ignored at 960.

The method 900 can allow a memory card compatible RFID card within the memory card slot to remain powered while the memory card slot within the host device is being removed to save power. This is to construct a hidden command for the software within the memory card access command, which will hide the command. A cooperative effort between the memory card controller that switches to the smart card controller and the smart card controller that ignores the command. According to the embodiment represented by Figure 3A, the manner in which power is supplied to the RFID also provides power to the smart card controller, thereby allowing the use of a small inductive device, as shown in Figures 3 and 4.

Figure 10 shows a flow chart in accordance with various embodiments of the present invention. In some embodiments, method 1000 can be used by an RFID card within a memory card slot. In some embodiments, the method 1000, or portions thereof, is performed by a memory card controller within the RFID card, while in other embodiments, the method 1000, or portions thereof, is performed by a software carried out. The various actions in method 1000 can be performed in the order presented, in a different order, or concurrently. Still further, in some embodiments, some of the actions listed in FIG. 10 are ignored from method 1000.

The method 1000 begins at 1010 with a memory card controller receiving a hidden command from a mobile computing device. If at 1020, the memory card controller determines that the hidden command is about to be converted to the smart card controller, the command is converted at 1030. If the command is not ready to be converted, the memory card controller does not convert the command; however, at 1040 the memory card controller can take other actions based on the hidden command. For example, the memory card controller can modify a clock signal provided to the smart card controller. Also as an example, the memory card controller can assert a reset signal to the smart card controller. Still as an example, the memory card controller can modify the power transfer to the smart card controller. In Figure 3B

in a particular embodiment, the memory card controller can modify the power transfer to the smart card controller. Power transfer can be modified by means of removing power, applying power, circulating power, and the like

The step of modifying the power transfer to the smart card controller can be a collaborative effort between the host side computing device and the memory card controller within the RFID card. For example, the power supplied to the memory card slot can be maintained by supplying a virtual concealment command to the RFID card, as described above with reference to FIG. When power is continuously supplied to the memory card slot, a hidden command can be used to enable the memory card controller to modify, apply, or recycle power to the smart card controller.

Modifications to power delivery may allow for additional security features. For example, turning off the power to the smart card controller will show that the smart card is inactive, and thus the inferior reader can be prevented from unnecessary reading of the card. Since the antenna is too small to provide sufficient power to the smart card controller, in order to properly operate the card reading function, it is necessary to obtain power from the memory card controller or from the host interface.

Figure 11 shows a method of authenticating a mobile computing device to one or more functions within a memory card compatible RFID card. The method 1100 begins at block 1110, where an activation code is received at the RFID card from the mobile computing device. At 1120, the received activation code is compared to the code stored in the RFID card. If the activation code matches, then at 1140 the RFID card receives a password from the mobile computing device and stores the password in the RFID card at 1150 for later use. If the activation code does not match, then at 1160 the RFID card determines if the number of allowed trials has exceeded Over. If the number of allowable attempts has been exceeded, then the RFID card issuer is contacted at 1170, and if the number of allowable attempts has not been exceeded, then the method will repeat the attempt until the number of allowable attempts has been exceeded.

Method 1100 can be performed when an RFID card is issued to a user. For example, the RFID card can be a mobile payment card issued by a financial institution. A user-initiated code can be provided to "activate" the RFID card. When the user successfully enters the activation code, the user is provided with a set of passwords that will be stored for use in future hidden commands.

In some embodiments, multiple non-memory functions within the RFID card are identified using method 1100. For example, each of a plurality of non-memory functions may have a stored activation code, and each function has been activated separately. Each of the separately activated functions may have a different password, or the plurality of functions may share a password.

While the invention has been described with respect to the embodiments of the embodiments of the present invention, it is understood that the invention may be modified and changed as can be readily understood by those skilled in the art without departing from the spirit and scope of the invention. Such modifications and variations are considered to fall within the scope of the invention and the scope of the appended claims.

- 110-- Mobile computing device
- 112-- memory card slot
- 120--RFID card
- 122--Electronic contact
- 210-- processor
- 220-- memory
- 230--Wireless RF Circuit
- 240--Antenna
- 310--Host interface
- 330--Smart Card Controller
- 332-- Program memory
- 334--Antenna
- 340-- Memory Card Controller
- 342--Communication bus
- 350--Small sensing elements
- 360-- memory
- 402--Circuit board
- 450-- Magnetic core
- 452--core coil

Figure 1 shows a mobile computing device and a memory card slot compatible Small RFID card; Figure 2 shows a block diagram of a mobile computing device; Figure 3A-3B shows a block diagram of a memory card compatible RFID card with integrated sensing elements, Figure 4 shows a memory card with an integrated sensing element Photograph of compatible RFID card; Figure 5 shows the data portion of a memory write command; Figures 6-11 show a flow chart of a method in accordance with various embodiments of the present invention, and Figure 12 shows the presence of an interrogation In the case of an RF field, the power supply voltage developed over time by rectifying the voltage induced in the loop antenna; and Figure 13 shows one of the prior art RFIDs in a secure digital (SD) memory card The label is implemented.

Patent Citations (1)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				

DE10200403883484 *	2004-08-10	2006-11-02	Siemens Ag	A method of generating preamble and signaling structures in a MIMO-OFDM transmission system
--------------------	------------	------------	------------	---

* Cited by examiner, † Cited by third party

Cited By (7)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
US7581678B2	2005-02-22	2009-09-01	Tyfone, Inc.	Electronic transaction card
US9741027B2	2007-12-14	2017-08-22	Tyfone, Inc.	Memory card based contactless devices
US8451122B2	2008-08-08	2013-05-28	Tyfone, Inc.	Smartcard performance enhancement circuits and systems
US7961101B2	2008-08-08	2011-06-14	Tyfone, Inc.	Small RFID card with integrated inductive element
EP2401708A4	2009-02-24	2012-08-15	Tyfone Inc	Contactless device with miniaturized antenna
TW5015758 *	2011-03-14	2015-09-21	Nationz Technologies Inc	Mobile rf apparatus, rf ic card and rf storage card
CN104113501E *	2014-06-19	2017-04-26	北京科技大学	Modulator, demodulator, modulation method and demodulation method for low-frequency magnetic induction communication

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
TW421774B	2014-01-01	Small rfid card with integrated inductive element
US10949726B2	2021-03-16	Mobile phone with NFC apparatus that does not rely on power derived from an interrogating RF field
US20100033310A1	2010-02-11	Power negotiation for small rfid card
TW433560B	2014-04-01	Power negotiation for small rfid card

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
US1888820SP	2008-08-08	2008-08-08	US Provisional Application

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2007139909



Secure mobile information management system and method

Abstract

Mobile phones are used to advise users of information or changes that meet certain criteria. A website may provide storage, filter information, and send information to the phone for storage based on topic. In different embodiments, e-mails may be searched, information may be sent to different parties, and signals may be sent locally to exchange information. Information may include account or travel information. Different embodiments include methods for authorizing actions, authenticating access, authorizing transactions, and providing positional awareness using mobile phones. Actions and access include computer access, physical access, and financial transactions. Methods of providing positional awareness may involve location coordinates, monitoring the location of mobile phones, and providing alarms. Various embodiments include software on mobile phones and a website.

Classifications

H04W4/14 Short messaging services, e.g. short message services [SMS] or unstructured supplementary service data [USSD]

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WO2007139909A3

WBO (PCT)

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Other languages: French

Inventor: Sean Moshir, Kevin H Moshir, Houman Shafieezadeh

Worldwide applications

 2007 [WQ](#) AU EP US CA EP 2011 US 2015 US

Application PCT/US2007/012436 events ⓘ

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2007-05-25 Application filed by Celltrust Corp, Sean Moshir, Kevin H Moshir, Houman Shafieezadeh

2007-12-06 Publication of WO2007139909A2

2008-05-08 Publication of WO2007139909A3

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External links: Espacenet, Global Dossier, PatentScope, Discuss

Patent Citations (153)

Publication number	Priority date	Publication date	Assignee	Title
US20020088853A1 *	2000-09-30	2002-07-11	Yoshihiro Itoh	Service ticket issuing system and service ticket issuing service
US20020161476A1 *	2001-04-05	2002-10-31	David Panofsky	System for vending and dispensing digital files
US20050086261A1 *	2003-10-20	2005-04-21	Richard Mammone	Child locator apparatus and method
US20050160062A1 *	2004-01-16	2005-07-21	Howard W. B.	Method to report personal security information about a person
Family To Family Citations				
US3835885A	1973-05-24	1974-09-03	Docutel Corp	Automatic banking system
US5436960A	1991-05-20	1995-07-25	Campana, Jr., Thomas J.	Electronic mail system with RF communications to mobile processors and method of operation thereof
US5668860A	1991-07-08	1997-09-16	Alajajian; Philip Michael	Inter-vehicle personal data communications device
US6510925B1 *	1996-04-19	2003-01-21	Mack, II Gawins A.	Convertible portable telephone
US6041123A	1996-07-01	2000-03-21	Allsoft Distributing Incorporated	Centralized secure communications system
US5812671A	1996-07-17	1998-09-22	Xante Corporation	Cryptographic communication system
DE19722424D5	1997-05-28	2006-09-14	Telefonaktiebolaget Lm Ericsson (Publ)	Method of securing access to a remote system
US7127741B2	1998-11-03	2006-10-24	Turnbleweed Communications Corp.	Method and system for e-mail message transmission
US6016476A *	1997-08-11	2000-01-18	International Business Machines Corporation	Portable information and transaction processing system and method utilizing biometric authorization and digital certificate security
EP0917119A3 *	1997-11-12	2001-01-10	Oricorp Development	Distributed network based electronic wallet

Center, Inc.				
FI1066278	1998-01-08	2002-03-28	Nokia Corp	A method for implementing connection security in a wireless network
US6925568B1 *	1998-01-16	2005-08-02	Genera Oy	Method and system for the processing of messages in a telecommunication system
US6493758B1 *	1998-09-08	2002-12-10	Microsoft Corporation	Offline viewing of internet content with a mobile device
G82341523B *	1998-09-12	2003-10-29	Ibm	Apparatus and method for establishing communication in a computer network
US20050192038A1 *	1999-03-31	2005-09-01	Nimesh Desai	System and method for selective information exchange
US6970995B1	1999-05-17	2005-11-29	Caveo Technology, LLC	Theft detection system and method
US6705526B1	1999-11-15	2004-03-16	Satyan G. Pitroda	Point of sale adapter for electronic transaction device
EP1104213A3	1999-11-29	2003-05-21	Philips Intellectual Property & Standards GmbH	Wireless network with key change procedure
WO2001040605A1	1999-11-30	2001-06-07	Bording Data A/S	An electronic key device, a system and a method of managing electronic key information
DE69935339T2	1999-12-02	2007-11-15	Sony Deutschland GmbH	Protocol for instant messaging
US20070136592A1	2000-04-12	2007-06-14	Smith Richard A	Wireless internet gateway
EP1273125A2	2000-04-14	2003-01-08	PostX Corporation	Systems and methods for encrypting/decrypting data using a broker agent
US20040204041A1	2000-06-16	2004-10-14	Fillebrown Lisa A.	Wireless tablet for a personal wireless network
FR2819838B1	2000-06-22	2002-10-04	Cit Alcatel	METHOD FOR ACCESSING A SERVICE FROM A MOBILE RADIO COMMUNICATION TERMINAL USING A SHORT NUMBER
US6871063B1	2000-06-30	2005-03-22	Intel Corporation	Method and apparatus for controlling access to a computer system
US8727853B2	2000-09-27	2014-05-20	Milestone Entertainment, LLC	Methods and apparatus for enhanced play in lottery and gaming environments
SE518418C2	2000-12-28	2002-10-08	Ericsson Telefon Ab L M	Sound-based proximity detector
US7308477B1	2001-01-10	2007-12-11	Cisco Technology, Inc.	Unified messaging system configured for transport of encrypted messages
US7073200B2 *	2001-01-24	2006-07-04	Intel Corporation	Method of providing secure content-based user experience enhancement within a content protection architecture
EP1229467A1	2001-02-06	2002-08-07	Wincor Nixdorf GmbH & Co KG	Payment system comprising a mobile device
US20050015451A1 *	2001-02-15	2005-01-20	Sheldon Valentine D'arcy	Automatic e-mail address directory and sorting system
G80104136D0	2001-02-20	2001-04-11	Hewlett Packard Co	Apparatus for credential authorisation
US20020193557A1 *	2001-03-09	2002-09-19	Winarski Donna Ilene Robinson	Sorting e-mail
JP2002279326A	2001-03-15	2002-09-27	Kenwood Corp	Method and device for settling by credit by mobile phone
US7277927B2	2001-04-13	2007-10-02	Earthlink, Inc.	Systems and methods for saving internet content into a handheld internet appliance
US20020186845A1 *	2001-06-11	2002-12-12	Santanu Dutta	Method and apparatus for remotely disabling and enabling access to secure transaction functions of a mobile terminal
US20060240806A1 *	2001-07-18	2006-10-26	Saban Demirbasa	Data security device
US8032084B2 *	2001-07-18	2011-10-04	Data Transfer & Communications Limited	Data security device
US7184747B2	2001-07-25	2007-02-27	Nor Corporation	System and method for implementing financial transactions using cellular telephone data
US20030043036A1	2001-09-04	2003-03-06	Acco Brands, Inc.	Loss prevention system for portable electronic devices
JP4984364B2	2001-09-13	2012-07-25	ソニー株式会社	Information processing apparatus and method
US6811484B2	2001-09-26	2004-11-02	Milestone Entertainment LLC	Games, and methods and apparatus for game play in games of chance
US20030109271A1	2001-11-16	2003-06-12	Lewis John Ervin	Telecommunications system messaging infrastructure
US7454195B2	2001-11-16	2008-11-18	At&T Mobility II, LLC	System for the centralized storage of wireless customer information

US20030115288A1	2001-12-14	2003-06-19	Ljubich Philip A.	Technique for effective management of information and communications using a mobile device
CA3006804C	2001-12-26	2021-05-18	Blackberry Limited	Security interface for a mobile device
US7013006B1	2002-01-18	2006-03-14	Bellsouth Intellectual Property Corporation	Programmable audio alert system and method
US7308356B2	2002-01-30	2007-12-11	Converse, Inc.	Wireless personalized self-service network
US20050120230A1	2002-02-18	2005-06-02	Waterson David L.	System for preventing a computer virus accessing email addresses
US6768429B2	2002-02-28	2004-07-27	Teknovus, Inc.	Multiplexing an additional bit stream with a primary bit stream with conversion between qB/rB and xB/yB encoded bit streams
US7250846B2	2002-03-05	2007-07-31	International Business Machines Corporation	Method and apparatus for providing dynamic user alert
DE60329584D1 *	2002-03-20	2009-11-19	Research In Motion Ltd	SYSTEM AND METHOD FOR SENDING AND USING THE MESSAGES
US20030182559A1	2002-03-22	2003-09-25	Ian Curry	Secure communication apparatus and method for facilitating recipient and sender activity delegation
EP1353298A1	2002-04-10	2003-10-15	SkiData AG	Method and system for paid or authorised parking
US7321969B2	2002-04-26	2008-01-22	Entrust Limited	Secure instant messaging system using instant messaging group policy certificates
AUP3217002A0	2002-05-07	2002-06-06	Wireless Applications Pty Ltd	Clarence tan
US7096254B2	2002-05-30	2006-08-22	International Business Machines Corporation	Electronic mail distribution network implementation for safeguarding sender's address book covering addressee aliases with minimum interference with normal electronic mail transmission
US20040127256A1	2002-07-30	2004-07-01	Scott Goldthwaite	Mobile device equipped with a contactless smart card reader/writer
US7822688B2	2002-08-08	2010-10-26	Fujitsu Limited	Wireless wallet
US7239861B2	2002-08-26	2007-07-03	Cisco Technology, Inc.	System and method for communication service portability
WO2004043037A1	2002-11-06	2004-05-21	International Business Machines Corporation	Providing a user device with a set of access codes
US20040117262A1	2002-12-17	2004-06-17	Berger Jeffrey Keith	System and method for conducting a monetary transaction
G82396472A	2002-12-18	2004-06-23	Ncr Int Inc	System for cash withdrawal
US7326800B2	2003-02-28	2009-04-28	Novell, Inc.	Administration of protection of data accessible by a mobile device
US7155405B2	2002-12-31	2006-12-26	Symbol Technologies, Inc.	System for communicating product and service related information to a user based on direction of movement
US7088237B2 *	2003-02-14	2006-08-08	Qualcomm Incorporated	Enhanced user privacy for mobile station location services
US6946715B2	2003-02-19	2005-09-20	Micron Technology, Inc.	CMOS image sensor and method of fabrication
US6978118B2	2003-02-20	2005-12-20	Nokia Corporation	Apparatus, system, method and computer program product for implementing an automatic identification system with a personal communication device to improve functionality
G82399670A	2003-03-15	2004-09-22	Gary Wallis	Child's distance monitor alarm
US7082260B2	2003-03-27	2006-06-13	Nokia Corporation	Fetching application and driver for extension device from network
US7394761B2	2003-04-29	2008-07-01	Avocent Huntsville Corporation	System and method for delivering messages using alternate modes of communication
EP1475765A1	2003-05-05	2004-11-10	Openlot Systems B.V.	Lottery system with mobile access
WO2004105959A2 *	2003-05-19	2004-12-02	Einar Rosenberg	An apparatus and method for increased security of wireless transactions
US7248895B2 *	2003-06-12	2007-07-24	Nokia Corporation	Controlling settings for mobile telecommunications apparatus
US8117273B1	2003-07-11	2012-02-14	Mcafee, Inc.	System, device and method for dynamically securing instant messages
JP2005045557A	2003-07-22	2005-02-17	Sony Corp	Communication device
WO2005048819A2	2003-09-04	2005-05-26	Eric Corporation	Data message mirroring and redirection
EP1676409B1	2003-10-20	2011-12-07	TELEFONAKTIEBOLAGET LM ERICSSON (publ)	Network and node for providing a secure transmission of mobile application part messages
US20050090239A1	2003-10-22	2005-04-28	Chang-Hung Lee	Text message based mobile phone configuration system

FR2863811B1	2003-12-16	2006-03-03	Melissima Start	COMMUNICATION SYSTEM BETWEEN A MOBILE TERMINAL AND A COMMUNICATION SERVER AND ASSOCIATED COMMUNICATION METHODS.
EP1569482A1	2004-01-29	2005-08-31	Nagracard S A	Method for securing the transmission of short messages
US7194438B2	2004-02-25	2007-03-20	Nokia Corporation	Electronic payment schemes in a mobile environment for short-range transactions
G80405245D0	2004-03-09	2004-04-21	Ibm	Key-based encryption
US20050221800A1	2004-03-31	2005-10-06	Jackson Riley W	Method for remote lockdown of a mobile computer
US20050222961A1	2004-04-05	2005-10-06	Philippe Staib	System and method of facilitating contactless payment transactions across different payment systems using a common mobile device acting as a stored value device
US7748617B2	2004-04-12	2010-07-06	Gray R O'neal	Electronic identification system
US7255264B2	2004-04-24	2007-08-14	De Leon Hilary Laing	Cellular phone-based automatic payment system
US20050250538A1	2004-05-07	2005-11-10	July Systems, Inc.	Method and system for making card-based payments using mobile devices
US7996673B2	2004-05-12	2011-08-09	Echowerx Corporation	System, method and computer product for sending encrypted messages to recipients where the sender does not possess the credentials of the recipient
US7259671B2	2004-06-21	2007-08-21	Christine Garley	Proximity aware personal alert system
G80415447D0 *	2004-07-09	2004-08-11	Tiger Telematics Inc	Portable electronic device
US7996471B2 *	2004-07-13	2011-08-09	At&T Intellectual Property I, L.P.	Electronic message distribution system
US7814107B2	2004-07-20	2006-03-21	Irek Singer	Wireless payment processing system
US7565577B2	2004-07-22	2009-07-21	Research In Motion Limited	Method and apparatus for providing intelligent error messaging
DE602004023546D1	2004-07-22	2009-11-19	Telecom Italia Spa	METHOD AND SYSTEM FOR IMPROVING THE ROBUSTNESS OF SAFE MESSAGE TRANSMISSION IN A MOBILE COMMUNICATION NETWORK
US7375616B2	2004-09-08	2008-05-20	Nokia Corporation	Electronic near field communication enabled multifunctional device and method of its operation
DE102004045147A1	2004-09-17	2006-03-23	Fujitsu Ltd., Kawasaki	A setting information distribution apparatus, method, program and medium, authentication setting transfer apparatus, method, program and medium, and setting information receiving program
US20060080232A1	2004-10-08	2006-04-13	Randy Epps	Cellular telephone based payment apparatus and method for use in purchase of good and services
US7489781B2 *	2004-10-29	2009-02-10	Research In Motion Limited	Secure peer-to-peer messaging invitation architecture
US7583958B2	2004-11-05	2009-09-01	Research In Motion Limited	Integrated message delivery over a plurality of transport mediums
JP4631401B2	2004-11-10	2011-02-23	日本電気株式会社	Presence update system and method, and mobile communication terminal used therefor
US20060120348A1	2004-12-03	2006-06-08	Marian Croak	Method and apparatus for enabling the downloading of network based information to IP phones
US20060163140A1	2005-01-25	2009-06-25	Packham Donald L	Biochip electroporator and its use in multi-site, single-cell electroporation
JP4907880B2	2005-02-23	2012-04-04	株式会社エヌ・ティ・エ ィ・ドコモ	Portable information terminal and data protection method
US20060194572A1	2005-02-28	2006-09-31	Clearsky Mobile Media, Inc.	Wireless interactive property advertising system and methods
US7537152B2	2005-03-23	2009-05-26	E2Interactive, Inc.	Delivery of value identifiers using short message service (SMS)
MX2007011926A	2005-03-29	2007-11-20	Research In Motion Ltd	System and method for personal identification number messaging.
KR100640449B1	2005-04-20	2006-10-30	삼성전자주식회사	Method and system for restricting an additional function in mobile communication terminal
JP4363361B2	2005-04-28	2009-11-11	沖電気工業株式会社	PORTABLE ELECTRONIC DEVICE, SECURITY SYSTEM AND METHOD FOR DETERMINING OPERATION PERMITTED RANGE
US8244179B2	2005-05-12	2012-08-14	Robin Dua	Wireless inter device data processing configured through inter-device transmitted data

US6880047B2 *	2005-08-03	2014-11-04	Jeffrey C. Konicek	Realtime, location-based cell phone enhancements, uses, and applications
US20070046477A1	2005-08-24	2007-03-01	Kolo Brian A	Known sex offender access control system
US20070129113A1 *	2005-12-01	2007-06-07	Klicpera Michael E	Cell phone alerting system
US7796982B2	2005-12-07	2010-09-14	Tor Anumana, Inc.	Wireless controller device
US7643821B2	2005-12-17	2010-01-05	Access U2 Mobile Solutions, LLC	Text brochure and media system and method
CA2633784A1	2005-12-19	2007-06-28	Karim Yaghmour	System and method for end-to-end electronic mail encryption
KR100735382B1	2006-02-08	2007-07-04	삼성전자주식회사	Security communication method and apparatus in bluetooth terminal
DE602006001357D1	2006-02-13	2008-07-10	Research In Motion Ltd	Secure procedure to notify a service termination
US7715831B2 *	2006-03-24	2010-05-11	Sony Ericsson Mobile Communications, Ab	Methods, systems, and devices for detecting and indicating loss of proximity between mobile devices
US20070255653A1 *	2006-03-30	2007-11-01	Obopay Inc.	Mobile Person-to-Person Payment System
WO2007120462A2	2006-03-31	2007-10-25	Onteia Inc	Method and system for phone-number discovery and phone-number authentication for mobile communications devices
EP2005721A4	2006-03-31	2011-10-12	Sybase 365 Inc	System and method for providing feedback to wireless device users
US20070262862A1	2006-05-12	2007-11-15	Ichaperone, Llc	Monitoring and tracking system
US20080019530A1	2006-05-30	2008-01-24	International Business Machines Corporation	Message archival assurance for encrypted communications
CN101110953B	2006-07-21	2012-01-11	宏基股份有限公司	Portable communication equipment with loss protection function and loss protection method thereof
US20080058057A1	2006-09-06	2008-03-06	Lau Tony S L	Methods and systems for secure mobile integrated lottery gaming
US6478310B2	2006-10-05	2013-07-02	Verizon Patent And Licensing Inc.	Short message service (SMS) data transfer
US7447510B2	2006-10-22	2008-11-04	Onepin, Inc.	Short message service network plug-in
WO2008046161A1	2006-10-19	2008-04-24	Fruitful Technologies Pty Ltd	An interactive system and process
US20080094230A1	2006-10-23	2008-04-24	Motorola, Inc.	Using location capabilities of a mobile device to permit users to avoid potentially harmful interactions
US6856511B2	2006-12-14	2014-10-07	BlackBerry Limited	System and method for wiping and disabling a removed device
US20080171536A1	2007-01-17	2008-07-17	Darius Katz	System and method for broadcasting an alert
EP2570961B1	2007-01-19	2019-03-13	BlackBerry Limited	Selectively wiping a remote device
US7945292B2	2007-05-30	2011-05-17	Embarq Holdings Company, Llc	System and method for a remote wireless ringer
US8274968B2	2007-07-20	2012-09-25	Cisco Technology, Inc.	Restriction of communication in VoIP address discovery system
US664599B2	2007-08-29	2011-11-22	Red Hat, Inc.	Secure message transport using message segmentation
US8554176B2	2007-09-18	2013-10-08	Qualcomm Incorporated	Method and apparatus for creating a remotely activated secure backup service for mobile handsets
US8631227B2	2007-10-15	2014-01-14	Cisco Technology, Inc.	Processing encrypted electronic documents
EP2053531B1	2007-10-25	2014-07-30	BlackBerry Limited	Authentication certificate management for access to a wireless communication device
US20100128857A1	2007-12-26	2010-05-27	Logan James D	Call forwarding system and method employing virtual phone numbers associated with landline and other discrete telephone units
US8233901B2	2008-02-28	2012-07-31	Saomon Co., Ltd.	Method and system of providing personal information control service for mobile communication terminal
KR20100126850A	2008-03-28	2010-12-02	셀트리스트 코퍼레이션	Systems and methods for secure short messaging service and multimedia messaging service
US20090257593A1	2008-04-10	2009-10-15	Camverse Ltd.	Method and apparatus for secure messaging
US8094551B2	2008-05-13	2012-01-10	AT&T Mobility II Llc	Exchange of access control lists to manage femto cell coverage
US20090323926A1	2008-06-30	2009-12-31	Shaham Eliezer	Methods and systems for voice communication

US8131266B2	2008-12-18	2012-03-06	Alcatel Lucent	Short message service communication security
US8509212B2	2009-09-22	2013-08-13	Verizon Patent And Licensing Inc.	Method and system of recovering lost mobile devices
US8320944B1	2010-01-04	2012-11-27	Intuit Inc.	Method and system for creating/updating customer lists and profiles
WO2011112767A2	2010-03-10	2011-09-15	Sra International, Inc.	One vault voice encryption

* Cited by examiner, † Cited by third party

Non-Patent Citations (1)

Title
See also references of EP2021960A4 *

* Cited by examiner, † Cited by third party

Cited By (88)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
US8127984B2 *	2003-06-13	2012-03-06	Varia Holdings Lic	Emulated radio frequency identification
US7581678B2	2005-02-22	2009-09-01	Tyfone, Inc.	Electronic transaction card
US7706778B2	2005-04-05	2010-04-27	Assa Abloy Ab	System and method for remotely assigning and revoking access credentials using a near field communication equipped mobile phone
US9985955B2	2006-08-09	2018-05-29	Assa Abloy Ab	Method and apparatus for making a decision on a card
US8674271B2	2006-08-09	2011-12-06	Assa Abloy Ab	Method and apparatus for making a decision on a card
US8909553B2 *	2006-09-06	2014-12-09	Transaction Wireless, Inc.	Payment card terminal for mobile phones
JPS39600182 *	2006-12-13	2014-01-22	楽天 E d y 株式会社	Information processing apparatus, information processing apparatus control method, and information processing apparatus control program
US7991158B2 *	2006-12-13	2011-08-02	Tyfone, Inc.	Secure messaging
US20080238614A1 *	2007-03-30	2008-10-02	International Business Machines Corporation	Method and system for securing and recovering a wireless communication device
US7739169B2 *	2007-06-25	2010-06-15	Visa U.S.A. Inc.	Restricting access to compromised account information
US8504450B2 *	2007-08-31	2013-08-06	Ebay Inc	Mobile remittances/payments
SE532268C2 *	2007-12-04	2009-11-24	Accumulate Ab	Procedure for secure transactions
JPS16779182 *	2007-12-05	2013-03-21	日本電気株式会社	Monitoring device, monitoring method, and monitoring program
US9741027B2	2007-12-14	2017-08-22	Tyfone, Inc.	Memory card based contactless devices
WO2009089208A1	2008-01-07	2009-07-16	Xceedid Corporation	Systems and methods for utilizing wireless programmable credentials
US20090204539A1 *	2008-02-13	2009-08-13	Andre Parker	Portable Electronic Financial Management
US20090287599A1 *	2008-05-15	2009-11-19	Bank Of America Corporation	Monetary Transfer Approval Via Mobile Device
US20090307140A1 *	2008-06-06	2009-12-10	Upendra Mardikar	Mobile device over-the-air (ota) registration and point-of-sale (pos) payment
US7961101B2	2008-08-08	2011-06-14	Tyfone, Inc.	Small RFID card with integrated inductive element
US8451122B2	2008-08-08	2013-05-28	Tyfone, Inc.	Smartcard performance enhancement circuits and systems
US9659188B2	2008-08-14	2017-05-23	Invention Science Fund I, Llc	Obfuscating identity of a source entity affiliated with a communiqué directed to a receiving user and in accordance with conditional directive provided by the receiving user
US8550944B2	2008-08-14	2014-09-30	The Invention Science Fund I, Llc	Obfuscating identity of a source entity affiliated with a communicate in accordance with conditional directive provided by a receiving entity
US9641537B2 *	2008-08-14	2017-05-02	Invention Science Fund I, Llc	Conditionally releasing a communiqué determined to be affiliated with a particular source entity in response to detecting occurrence of one or more environmental

				aspects
US8929268B2	2008-08-14	2015-01-06	The invention Science Fund I, Llc	Conditionally releasing a communiqué determined to be affiliated with a particular source entity in response to detecting occurrence of one or more environmental aspects
US8730836B2	2008-08-14	2014-05-20	The invention Science Fund I, Llc	Conditionally intercepting data indicating one or more aspects of a communiqué to obfuscate the one or more aspects of the communiqué
US8583553B2	2008-08-14	2013-11-12	The invention Science Fund I, Llc	Conditionally obfuscating one or more secret entities with respect to one or more billing statements related to one or more communiqués addressed to the one or more secret entities
US8626848B2	2008-08-14	2014-01-07	The invention Science Fund I, Llc	Obfuscating identity of a source entity affiliated with a communiqué in accordance with conditional directive provided by a receiving entity
US10467642B2 *	2008-10-15	2019-11-05	Micro Focus Llc	Virtual redeemable offers
CN101807998A *	2009-02-13	2010-08-18	英飞凌科技股份有限公司	Authentication
EP2401708A4	2009-02-24	2012-08-15	Tyfone Inc	Contactless device with miniaturized antenna
EP2237234A1 *	2009-04-03	2010-10-06	Inventio AG	Method and device for access control
US8604929B1 *	2009-04-27	2013-12-10	Navigator Technology, inc.	Personal alert system and method
US8374916B2 *	2009-10-27	2013-02-12	At&T Mobility II Llc	Secure mobile-based financial transactions
US8510188B2 *	2010-07-28	2013-08-13	The Western Union Company	Receiver driven money transfer alert system
US8667560B2	2010-08-31	2014-03-04	At&T Intellectual Property I, L.P.	Authenticating a user with picture messaging
US8438063B2	2010-08-31	2013-05-07	At&T Intellectual Property I, L.P.	Mobile payment using picture messaging
US8817984B2	2011-02-03	2014-08-26	mSignia, Inc.	Cryptographic security functions based on anticipated changes in dynamic minutiae
US11063920B2	2011-02-03	2021-07-13	mSignia, Inc.	Cryptographic security functions based on anticipated changes in dynamic minutiae
JP6153947B2 *	2012-01-05	2017-06-28	ヴィザ インターナショナル サービス アソシエーション	Transaction video capture device, method and system
US10009305B2	2011-03-31	2018-06-26	Loment, Inc.	Ubiquitous user control for information communicated among end user communication devices
CN102760259B *	2011-04-27	2016-05-11	阿里巴巴集团控股有限公司	A kind of on-line payment method and apparatus
US20120310408A1 *	2011-06-02	2012-12-06	Nokia Siemens Networks Oy	Vending machine ordering
US8548380B2	2011-06-10	2013-10-01	Broadcom Corporation	Communications device for intelligently routing information among multiple user interfaces
US8905763B1 *	2011-06-22	2014-12-09	Amazon Technologies, Inc.	Managing demonstration sessions by a network connected demonstration device and system
US8845337B1	2011-06-22	2014-09-30	Amazon Technologies, Inc.	Sharing demonstration information by a network connected demonstration device and system
TW450125B *	2011-12-30	2014-08-21	Gamania Digital Entertainment Co Ltd	A password generating method for indicating whether a service system has been logged in via the password by a third party, and a method for locking and unlocking service system, and an apparatus using the methods
KR101345943B1 *	2012-02-29	2013-12-27	주식회사 팬택	Mobile device for access point verification and method for operating mobile device
US9165293B2	2012-03-30	2015-10-20	Mastercard International Incorporated	Systems and methods for waveform transmission of transaction card data
US8988146B1 *	2012-05-30	2015-02-10	CBANC Network, Inc.	System and method for regulated collaboration marketplace
US9059972B2	2012-07-03	2015-06-16	International Business Machines Corporation	Issuing, presenting and challenging mobile device identification documents
US8707454B1	2012-07-16	2014-04-22	Wickr Inc.	Multi party messaging

CN103812760A *	2012-11-05	2014-05-21	王正伟	Implementation method of notification mechanism of common base accounts
US10223710B2	2013-01-04	2019-03-05	Visa International Service Association	Wearable intelligent vision device apparatuses, methods and systems
US9215075B1	2013-03-15	2015-12-15	Poltorak Technologies LLC	System and method for secure relayed communications from an implantable medical device
US9230660B2	2013-03-15	2016-03-08	Cognizant Business Services Limited	Mobile information management methods and systems
US9059852B2	2013-03-27	2015-06-16	International Business Machines Corporation	Validating a user's identity utilizing information embedded in a image file
US10129260B1	2013-06-25	2018-11-13	Wickr Inc.	Mutual privacy management
US9866591B1	2013-06-25	2018-01-09	Wickr Inc.	Enterprise messaging platform
US9830089B1	2013-06-25	2017-11-28	Wickr Inc.	Digital data sanitization
US10567349B2	2013-06-25	2020-02-18	Wickr Inc.	Secure time-to-live
EP2821972B1	2013-07-05	2020-04-08	Assa Abloy Ab	Key device and associated method, computer program and computer program product
ES2577882T5	2013-07-05	2020-03-12	Assa Abloy Ab	Access control communication device, method, software and software product
US9443362B2	2013-10-18	2016-09-13	Assa Abloy Ab	Communication and processing of credential data
US9223965B2 *	2013-12-10	2015-12-29	International Business Machines Corporation	Secure generation and management of a virtual card on a mobile device
US9235692B2	2013-12-13	2016-01-12	International Business Machines Corporation	Secure application debugging
US9577946B1 *	2014-01-03	2017-02-21	hopTo, Inc.	Account-specific login throttling
US9698976B1	2014-02-24	2017-07-04	Wickr Inc.	Key management and dynamic perfect forward secrecy
US9251330B2	2014-04-09	2016-02-02	International Business Machines Corporation	Secure management of a smart card
US10796302B2	2014-04-23	2020-10-06	Minkasu, Inc.	Securely storing and using sensitive information for making payments using a wallet application
US10661009B2	2014-04-23	2020-12-08	Minkasu, Inc.	Secure payments using a mobile wallet application
US10475026B2	2014-05-16	2019-11-12	International Business Machines Corporation	Secure management of transactions using a smart/virtual card
US9584530B1	2014-06-27	2017-02-28	Wickr Inc.	In-band identity verification and man-in-the-middle defense
US10192383B2	2014-09-10	2019-01-29	Assa Abloy Ab	First entry notification
US9654288B1	2014-12-11	2017-05-16	Wickr Inc.	Securing group communications
CN106570699A *	2015-10-08	2017-04-19	平安科技 (深圳) 有限公司	Client contact information excavation method and server
US10846665B2 *	2015-11-23	2020-11-24	Switch, Inc.	Management of remotely stored data
CN105553962B *	2015-12-10	2018-08-28	黄信开	A kind of information storage and method for down loading of smart mobile phone
US9590956B1	2015-12-18	2017-03-07	Wickr Inc.	Decentralized authoritative messaging
US20170178117A1 *	2015-12-22	2017-06-22	Intel Corporation	Facilitating smart geo-fencing-based payment transactions
US20170186003A1 *	2015-12-28	2017-06-29	Ner Corporation	Secondary authentication of network transactions
US10291607B1	2016-02-02	2019-05-14	Wickr Inc.	Providing real-time events to applications
US9596079B1	2016-04-14	2017-03-14	Wickr Inc.	Secure telecommunications
US9590958B1	2016-04-14	2017-03-07	Wickr Inc.	Secure file transfer
CN107820240A *	2016-09-12	2018-03-20	山东量子科学技术研究院有限公司	Short message Encrypt and Decrypt method and Android operation system based on Android operation system
CN106303967B *	2016-09-19	2019-07-02		A kind of express delivery monitoring method, equipment and system

上海商信信息科技有限公司

US11144620B2 *	2018-06-26	2021-10-12	Counseling and Development, Inc.	Systems and methods for establishing connections in a network following secure verification of interested parties
CN109981598A *	2019-03-04	2019-07-05	成都小步创想智能科技有限公司	Convenient processing method, device and the electronic equipment of personal information
WO2021048351A2	2019-09-11	2021-03-18	Michiel Cramwinckel	Process to convert a waste polymer product to a gaseous product

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
WO2007139909A3	2008-05-08	Secure mobile information management system and method
WO2008061002A3	2008-07-24	Method and system for automatically identifying users to participate in an electronic conversation
WO2005027387A3	2005-12-08	Wireless communications services pay plan customizer and notifier
WO2006062915A3	2009-04-09	System and method for vital communications connectivity
EP2248371A4	2013-12-11	System and method for authenticating a user of multiple computer applications, networks or devices using a wireless device
WO2008074008A3	2009-03-19	Fleet management system
GB0508058D0	2005-06-01	Method and system to enable mobile transactions
WO2007182233A3	2008-01-17	Method and system for user equipment configuration
WO2011116296A3	2012-01-19	Systems and methods to enhance search data with transaction based data
WO2007070676A3	2009-04-09	Systems and methods for social mapping
WO2006093839A3	2008-01-10	A media management system and method
WO2005048046A3	2005-12-22	Systems and methods for assessing the potential for fraud in business transactions
WO2007019169A3	2007-11-29	Method and system for workflow management of electronic documents
WO2010192797A3	2011-03-17	Systems and method for determining a relationship rank
EP2266089A4	2012-05-30	System and method for specified pool trading
MY142384A	2010-11-30	Object-based service oriented architecture method, apparatus and media
WO2007144265A3	2008-10-09	Tracking discrete elements of distributed transactions
WO2008097780A3	2009-04-09	System and method for adding context to prevent data leakage over a computer network
WO2007123821A3	2008-11-06	Techniques for tracking communication frequency across communication modalities
CN102984388A	2013-03-20	Smart phone with fingerprint identification function
WO2008008321A3	2008-03-06	Smart card terminal side data and management framework
CN106934607A	2017-07-07	A kind of method of payment, payment system service end and payment devices
WO2006007427A3	2007-08-02	System for processing a data request and related methods
WO2006020200A3	2009-04-16	Asset visibility management system with rule engine
CN103516870A	2014-01-15	Information processing method and electronic equipment

Priority And Related Applications

Child Applications (1)

Application	Priority date	Filing date	Relation	Title
US11/807,024	2006-05-25	2007-05-25	Continuation-in-Part	Secure mobile information management system and method

Priority Applications (4)

Application	Priority date	Filing date	Title
US80905206P	2006-05-25	2006-05-25	US Provisional Application
US60/809,052		2006-05-25	
US92060337P	2007-03-29	2007-03-29	US Provisional Application
US60/920,603		2007-03-29	

Applications Claiming Priority (12)

Application	Filing date	Title
AU2007267898A	2007-05-25	Secure mobile information management system and method
CA2658862A	2007-05-25	Secure mobile information management system and method
EP07795316.4A	2007-05-25	Secure mobile information management system and method
US11/864,329	2007-09-28	Dissemination of real estate information through text messaging
US11/931,822	2007-10-31	Methods of authorizing actions
US11/932,134	2007-10-31	Methods to authenticate access and alarm as to proximity to location
US11/931,343	2007-10-31	Extraction of information from e-mails and delivery to mobile phones, system and method
US12/038,496	2008-02-27	Lost phone alarm system and method
US13/531,177	2012-06-22	Methods to authenticate access and alarm as to proximity to location
US13/775,008	2013-02-22	Systems and methods for encrypted mobile voice communications
US14/514,063	2014-10-14	Systems and methods for encrypted mobile voice communications
US15/846,559	2017-12-19	Dissemination of real estate information through text messaging

Legal Events

Date	Code	Title	Description
2008-03-26	121	Ep. the epo has been informed by wipo that ep was designated in this application	Ref document number: 07795316 Country of ref document: EP Kind code of ref document: A2
2008-07-24	DPE1	Request for preliminary examination filed after expiration of 19th month from priority date (pct application filed from 20040101)	
2008-10-30	WWE	Wipo information: entry into national phase	Ref document number: 2650852 Country of ref document: CA
2008-10-31	WWE	Wipo information: entry into national phase	Ref document number: 2007795316 Country of ref document: EP
2008-11-11	WWE	Wipo information: entry into national phase	Ref document number: 2007267898 Country of ref document: AU
2008-11-26	NENP	Non-entry into the national phase in:	Ref country code: DE
2008-12-04	ENP	Entry into the national phase in:	Ref document number: 2007267898

Country of ref
document: AU

Date of ref
document:
20070525

Kind code of ref
document: A

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Patents

I323424



Memory card control apparatus and protection method thereof

Classifications

G06F1/28 Supervision thereof, e.g. detecting power-supply failure by out of limits supervision

TWI323424B

Taiwan

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Other languages: Chinese

Inventor: An Ming Lee, Zhen-Guo Sun, Ying-Hui Zhu, Chih Ching Chien

Worldwide applications

 2006 [TW](#) 2007 [US](#)

Application TW095147686A events

2006-12-19 Application filed by Realtek Semiconductor Corp

2006-12-19 Priority to TW095147686A

2008-07-01 Publication of TW200828126A

2010-04-11 Application granted

2010-04-11 Publication of TWI323424B

Info: Patent citations (7), Cited by (9), Similar documents, Priority and Related Applications

External links: Espacenet, Global Dossier, Discuss

Claims (1)

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1. 1. L/W24. X. Patent application scope: L. A control device for accessing a memory card, the control device comprising: - a bus bar used as a signal transmission line between the control device and the memory card, And the bus bar has a power signal line for providing a power signal to the memory card; a detecting circuit for detecting an operating state of the control device, and generating a notification when the operating state exceeds a predetermined operating range And a stupid adjustment circuit coupled to the bus bar and the detecting circuit for adjusting a current on the power signal line according to the notification signal and not turning off the power signal, so that the operation of the control device The state falls within the predetermined operating range. 2. The control device of claim 2, wherein the operational state is a current state on the power signal line. 3. as claimed in claim 1, wherein the detection circuit comprises: a current path, a current flowing through the predetermined current and generating a predetermined voltage; and a comparator coupled Connected to the current path and the power signal line for comparing the predetermined voltage with the power signal to generate the notification signal. 4. The control device of claim 1, wherein the adjustment circuit is a voltage supply circuit. The voltage supply circuit adjusts the amount of current on the power signal line according to the notification signal. 5. If the application of the research patent tamping item I is controlled, the life ladder will think about your ambient temperature state. 6. The control device of claim 1, wherein the detecting circuit comprises: a voltage generating circuit for generating a positive temperature coefficient voltage and a negative temperature coefficient voltage; and a Luyi comparator coupled The voltage generating circuit is configured to compare the positive temperature coefficient voltage with the negative temperature coefficient voltage to generate the notification signal. 7. The control device of claim 1, wherein the control device has a storage unit for storing the notification signal. 8. If the control device of the above-mentioned item 1 is applied, it is coupled to a warning device. The warning device is used to generate a signal according to the notification signal. 9. The control device of claim 1, further coupled to a computer system, wherein when the detecting circuit generates the notification signal, the control device sends an interrupt signal to notify The computer system. 10. A method for protecting a memory card control device, the memory card control device having a bus bar, and the bus bar having a power supply line to output a power signal, the protection method comprising: a beta measurement Controlling one of the operating states> and generating a notification when the operating state exceeds the pre-23424 operating range; and adjusting the current on the power signal line based on the notification signal and not under the power signal, The operational state of the control device is caused to fall within the predetermined operational range. * * *. * f.u. The protection method described in claim 10 wherein the operational state is the current state on the power signal line. 12. The protection method of claim 1, wherein the step of detecting the operational state of the memory card control device comprises: providing a predetermined current to generate a predetermined voltage; and comparing the predetermined voltage with the The power signal is used to generate the notification signal. 13. The method of protecting according to claim 10, further comprising: storing the sin notification signal in a storage unit; and controlling the operation of the memory card control device according to the notification signal in the storage unit. H. The protection method according to claim 10, further comprising: providing a warning device </ RT> the warning device is issued according to the notification signal - an alert signal. . 15. The protection method according to item H) of the patent application, wherein the memory card control 1323424 - the device is further coupled to a computer system, the protection method further comprises: "issuing one when the notification status number is generated" The ten-break signal (interrupt signal) is used to inform the computer system. 16. A method for protecting a memory card control device. The memory card control device has a bus bar, and the bus bar has a power signal line for outputting a power signal. The protection method includes: #Detecting an ambient temperature state 'and generate a notification signal when the ambient temperature state exceeds a predetermined temperature range; and, according to the 6-hai notification signal, it does not turn off. Close the power signal to 'adjust the current on the power transmission line' to make the ambient temperature The state falls within the predetermined temperature range. 17. The method of claim 16, wherein the step of detecting the ambient temperature state comprises. p a positive temperature coefficient voltage and a negative temperature coefficient

voltage; and comparing the positive temperature coefficient voltage to the negative. The temperature coefficient voltage is used to generate the notification signal.

18. The method of claim 16, wherein the method further comprises: storing the sin notification signal in a storage unit; and controlling the operation of the memory card control device according to the notification signal in the storage unit. For example, in the protection method described in claim 16, the method further includes: 1323424 provides a warning device, and the warning device sends a warning signal according to the notification signal. 20. The protection method of claim 16, wherein the memory card control device is further coupled to a computer system, the protection method further comprising: when the notification signal is generated, an interrupt signal is sent to notify The computer system.

XI. Schema: Reference 20

Description

IX. Description of the Invention: [Technical Field] The present invention relates to a memory card control device and related protection method, and more particularly to a memory card control device having over temperature protection or over current protection. [Prior Art] In modern life, in order to record diverse data, a variety of memory cards (such as Secure Digital (SD) Card, Memory Stick (MS) Card, or Compact Flash (CF) Card, etc.) has been generally developed. In order to facilitate the user to read the above memory card, a memory card control system (or card reader) that can read the data content of different memory cards will be required. The memory card control system generally has a single-slot structure or a multi-slot structure, wherein the single-slot structure is accessed for a memory card having a single or similar structure, and the multi-slot structure can be adapted to different characteristics. The memory card is used for access. With the improvement of the access mechanism, the memory card control system with multi-slot structure has gradually become the mainstream specification. However, due to the variety of memory cards, the use of the memory card in the wrong slot may occur in the use of 'memory card and memory card control (four) system internal circuit short circuit or JE error caused by the internal memory card. The content of the data is damaged, and even the ... it card and the memory card control (4) are also likely to be damaged. In addition, improper use or improper environment (such as wet or high temperature environment) may cause unexpected damage. Therefore, when designing the memory card control system, it is necessary to design the relevant security mechanism. The data content of the security card control (4) system, memory card or needle (4) is protected from damage. In general, the conventional overcurrent protection machine directly cuts off the lion's position in the memory card slot to avoid the error or damage of the memory card, and the corresponding power supply of the memory card slot. It is possible to provide other parts of the memory card control system, and the actual power supply corresponding to the memory card slot may cause the memory card control system to lose the local operation function. The related technology may refer to the Republic of China Patent Publication No. I155090 patent specification. SUMMARY OF THE INVENTION Therefore, it is an object of the present invention to provide a memory card replenishing device for adjusting the amount of current flowing through a slot without closing the slot and a method for lifting the same to solve the above problem. . According to an embodiment of the invention, there is disclosed a control device for accessing a memory card, the control device comprising a bus bar, a detecting circuit and an adjusting circuit. The busbar side serves as a signal transmission line between the memory card and the memory card, and the bus bar has a power signal line to provide a power signal to the memory card, and the circuit is used for detecting the control device. The operation state, and when the operation state exceeds the predetermined operation range, a notification signal is generated, and the adjustment circuit is connected to the bus bar and the ... circuit, and is based on the notification signal and does not close the power supply nickname The current of the 5 $\geq$ power supply line is adjusted downward, so that the operation state of the control device falls within the predetermined operation range. 1323424 According to an embodiment of the present invention, a method for protecting a memory card control device is disclosed, wherein the memory card control device has a bus bar, and the bus bar has a power signal line for outputting a power signal. The protection method includes: detecting an operation state of the memory card control device, and generating an notification signal when the operation state exceeds a predetermined operation range; and adjusting the notification signal according to the notification signal without turning off the power signal The current on the power signal line causes the operational state of the control device to fall within the predetermined operational range. According to an embodiment of the present invention, a method for protecting a memory card control device is disclosed. The beta memory card control device has a bus bar, and the bus bar has a power source line to output a power signal. The protection method includes: detecting an ambient temperature state, generating an notification signal when the ambient temperature state exceeds a predetermined temperature range, and adjusting the power supply nickname according to the notification signal without turning off the power signal. The current on the line causes the environmental thirst state to fall within the predetermined temperature range. [Embodiment] Referring to Fig. 1, Fig. 1 is a schematic view showing an embodiment of a memory card control system 1 of the present invention. As shown in FIG. 1, the memory card control system 1 is coupled to a computer system 102 and includes a memory card control device 105, at least one slot 110 and an external circuit 115, wherein The card control device 105 is connected to the slot 110 through a bus bar BUS2, and the bus bar BUS2 includes at least one power signal line to provide a power signal to the slot 110, so that the memory is inserted when the memory card is inserted into the slot 11. The card can be operated by the power signal, and the memory card control device 105 1323424 includes a voltage conversion circuit 120, at least one detection circuit 125, at least one adjustment circuit 130, and a spur circuit 135. For the sake of explanation, only one slot, one detecting circuit, and one adjusting circuit are shown in FIG. 1 without affecting the technical content disclosed in the present invention. However, in other embodiments, the memory card control system A plurality of slots, a plurality of detection circuits, and a plurality of adjustment circuits may also be included, which is not a limitation of the present invention. In an embodiment of the present invention, it is assumed that the internal circuit of the memory card control device 105 and the memory card in the slot no operate at the same operating voltage. The voltage conversion circuit 120 is used to switch the memory card control device. The external power supply of 5 is converted into the internal power of the memory card control device 1 and the power supply required for the memory card in the slot no (for example, converting an external power supply having 5 volts into a power supply having 3.3 ... * volts) The converted power supply is transmitted to the internal circuit of the memory card control device 105 and the memory card in the slot no by the internal power bus BUS, and the detection circuit 125 is used to detect the operation of the memory card control device 105. State (for example, if the current on the power signal line of the bus BUS2 is too large, or when the external ambient temperature is too high... Lu, etc.) 'When the operating state exceeds a predetermined operating range, a notification signal will be generated and communicated via the internal signal. The row Bus 儲存 stores the notification signal in the register of the control circuit 135, and the control circuit 135 transmits the notification signal to the adjustment circuit 130 to control the adjustment circuit 130 to adjust the power. Control means to adjust the memory card] bo is the case according to the informing signal does not turn off the power source to an operating state signal to fall Q5 of the predetermined operating range. Please refer to FIG. 2, which is a schematic diagram of an embodiment of the detecting circuit 125 and the adjusting circuit 130 shown in FIG. 1 of the present invention. As shown in FIG. 2, the detecting circuit 125 includes a comparator COM, a transistor Q1, and a reference current source, and the adjusting circuit 130 includes transistors a and Q3, wherein the reference current source u is a pre-current. The source and the gate voltage of the transistor Q are also a fixed voltage. Therefore, referring to the *mref#t&ss body q, it is decorated as a current and the non-inverting input (+) of the health cOMP will have a predetermined The reference voltage Vref, and the output signal S&t;n will be used as the power supply number and output to the slot 11 in the first figure. In addition, the power supply VDD shown in Fig. 2 is the conversion shown in Fig. 1. The converted power supply provided by circuit 120, under normal operating conditions, the voltage level of the output signal Scut (that is, the voltage level v of the inverting input terminal (1) of the comparator COMP) will be higher than the reference voltage Vref. At this time, the output level of the comparator COMP will be maintained at a low logic level; conversely, since the gate voltage of the transistor Q2 (1/4 is connected to the solid voltage, Yes, the conduction of the transistors Q2, Q3) The resistance value can be regarded as fixed. If the voltage level V is less than the reference voltage vref, it indicates the output signal. The Scut has a large current value, that is, the amount of current flowing through the slot 110 becomes large at this time. Therefore, when the voltage level v is smaller than the reference voltage Vref, the comparator COMP outputs the notification signal Sc having a high logic level. And the notification signal Sc will be transmitted to the gate voltage of the transistors a, Q2 to raise the original voltage level 'so 'the transistor, Q2 will be turned off' and since the transistor Q2 is assumed in this embodiment The aspect ratio (aSpect rati) is larger than the aspect ratio of the transistor Q3, so 'although the transistor Q3 remains conductive at this time, however, since the resistance value of the transistor Q3 is higher than the resistance value of the transistor Q2, the adjustment is made. The circuit 130 only

allows a small current to pass and thus effectively limits the amount of current flowing through the slot 11. In other words, when an overcurrent condition occurs (i.e., when the transistors Q1, Q2 are turned off). And (when turned on) At this time there is still a current on the transistor Q3 or a predetermined current to provide 1323424. the memory card in the slot 110 so that the memory card can still be accessed. In another embodiment Assuming that the internal circuit of the memory card control device 105 and the memory card in the slot 110 operate at different operating voltages, the voltage conversion circuit 120 is only used to convert the external power supply of the memory card control device 105 into a memory card control. The power supply required by the internal circuit of the device 105 (for example, converting an external power supply having 5 volts to a power supply having 3.3 volts), and the adjustment circuit 13 is implemented by a power supply circuit for converting the voltage conversion circuit. The converted power supply provided by 120 is further converted into the power required by the memory card in the slot 110 (for example, converting the converted power supply having 3.3 volts into a power supply having 1.5 to 1.8 volts), at this time, since the adjustment circuit 130 is For the power supply circuit, a maximum supply current amount can be adjusted according to the notification signal to achieve the purpose of limiting the maximum current flowing through the slot 11(). this variation is also within the scope of the present invention. Furthermore, in addition to detecting the current flowing through the power signal line, the memory card of the slot 11 can be protected from damage by detecting the ambient temperature state and not turning off the power signal, please refer to 3, FIG. 3 is a schematic diagram of an embodiment of the detecting circuit 3 for detecting an ambient temperature state of the present invention. Please note that in the present embodiment, the detecting circuit 300 And the adjustment circuit 130 shown in FIG. 2 (which is composed of a plurality of transistors) is used for the purpose of adjusting the amount of current flowing into the slot; however, in another embodiment, the adjustment circuit is also This can be achieved by a power supply circuit, i.e., by limiting the maximum amount of current supplied to limit the amount of current flowing through the socket 110, which is also within the scope of the present invention. As shown in FIG. 3, the detection circuit 300 includes a voltage generating circuit having a temperature negative phase, a shutdown voltage, a voltage generating unit 305 and a temperature positive correlation electric generating unit 31, and a comparator COMP in which a temperature is negatively correlated. The voltage generating unit 305 generates a voltage V1 according to the transistor itself and the negative phase of the dish, and the temperature positive paste voltage generating unit 31 generates a voltage V2 according to the characteristic that the transistor itself is positively correlated with the temperature. For example, in the case of a bipolar junction transistor (Bipolar junction), a difference in emitter junction voltage (i.e., emitter and base) corresponding to a negative correlation with temperature can be used. The voltage difference between the poles) (4) The voltage is taken as the voltage V1, and a voltage value corresponding to a thermal voltage positively related to the temperature is used as the voltage V2; when operating at a lower ambient temperature state, The voltage V1 will be less than the voltage V2, therefore, the output of the comparator COMP will remain at a low logic level, inversely, when operating at a higher ambient temperature state (i.e., the ambient temperature state exceeds - the predetermined temperature range) Time) due to electricity The pressure V1 is positively correlated with the temperature and the electroacoustic V1 is negatively correlated with the temperature (that is, the higher the temperature, the higher the voltage value of the voltage V2 and the smaller the voltage value of the voltage V1), so that the electric voltage V2 will be greater than the voltage V1. At this time, the comparator COMP generates the notification signal Sc having a high logic level and stores the notification signal Sc to the control circuit via the internal signal bus, and then the control circuit transmits the notification signal Sc to the adjustment circuit 13 in order to control the adjustment circuit 130, the adjustment circuit 130 adjusts the amount of current flowing through the slot 11 to fall within a predetermined operating range without turning off the power signal according to the notification signal Sc; The detecting circuit 3 can also use a reference voltage (a voltage that does not substantially change with temperature) to be compared with a temperature coefficient, and when the temperature coefficient related voltage is greater than or less than the reference voltage, a notification is issued. The signal has been temperature-protected, and such similar changes are also within the scope of the present invention. 1323424 In addition, the horse has solved the problem between the memory card control system and the electric job. The error or interruption of the connection mechanism causes the conventional overcurrent protection mechanism to not notify the user of the problem by the computer system. In the above embodiment, the memory card control system 100 can set a warning in the external circuit 115. The device, wherein the alert device sends a specific alert signal according to the notification signal stored in the control circuit 135. For example, the alert device can be implemented by using a light emitting diode (LED) display or a speaker. In addition, in another embodiment, if the connection mechanism between the memory card control device 105 and the computer system 102 is not erroneous or interrupted, the computer system 102 can still be used to inform the user whether the current memory card is It is placed in the wrong slot 'At this time' because the connection between the memory card swept device 105 and the computer system 102 can also be connected by other types of bus bars, and is not limited to the use of the universal serial bus (Universal Serial Bus) is used to make the connection. Therefore, when the debt measurement circuit 125 in the memory card control device 105 generates the notification signal, the control circuit 135 can set a The software variable (for example, writes the specific software variable into a predetermined register) and sends an interrupt signal to inform the computer system 102, and the application in the computer system 102 only needs to check the current setting. The data content of a specific software variable can inform the user whether a memory card has been placed in the wrong slot. Please refer to FIG. 4, which is a flow chart of an embodiment of the protection method of the present invention. The protection method of the present invention is applied to a memory card control device (for example, a memory card control device 105 having the circuit structure shown in Fig.), and it is noted that the steps of the protection method of the present invention are substantially obtained under the same result. It is not necessary to follow the execution order of Figure 4. The protection method of the present invention comprises the following steps: 1. Step 400: Start. Step 402: Current state on the power signal line. Step 404: Tear off whether the current state on the power supply letter is over the operating range. If yes, go to step 410; otherwise, go to step 406. Step 406: Investigate an ambient temperature state. Step 408: Determine whether the ambient temperature state exceeds a silent temperature range. If yes, go to step 410; otherwise, go back to step 402 to continue monitoring. Step 410: Adjust the current on the power signal line under the power signal. Next, return to step 402 to continue monitoring. Since the detailed operation of the memory card control device has been clearly disclosed, those skilled in the art should be able to easily understand the operation of each step in Fig. 4, and therefore, it is not separately mentioned. The above description is only the preferred embodiment of the present invention, and all scale changes and modifications made in accordance with the scope of the present invention should be within the scope of the present invention. [Simplified description of the drawings] Fig. 1 is a schematic diagram of a memory card control (four) system of the present invention. Fig. 2 is a schematic view showing an embodiment of the measurement circuit and the adjustment circuit shown in Fig. 1 of the present invention. 1323424 FIG. 3 is a schematic diagram of an embodiment of a detection circuit for detecting an ambient temperature state of the present invention. Figure 4 is a flow chart of an embodiment of the protection method of the present invention. [Main component symbol description] 100 Memory card control system 102 Computer system 105 Memory card control device 110 Slot 115 External circuit 120 Voltage conversion circuit 125 Detection circuit 130 Adjustment circuit 135 Control circuit 300 Detection circuit 305 Temperature negative correlation voltage generation unit 310 temperature positive correlation voltage generation - early 315 voltage generation circuit

Patent Citations (7)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
JPH08185248A *	1994-12-15	1996-07-16	Internatl Business Mach Corp <IBM>	Mechanism and method for control of power supply as well as controller for input/output device
JP3384522B2 *	1996-07-30	2003-03-10	矢崎総業株式会社	Switching device
TW561414B	2001-12-24	2003-11-11	Winbond Electronics Corp	Universal memory card reader
US7724390B2 *	2003-02-14	2010-05-25	Canon Kabushiki Kaisha	Selective access to memory cards

US7443144B2 *	2003-04-16	2008-10-28	Nxp B.V.	Voltage regulation system comprising operating condition detection means
TW255090B	2004-03-11	2006-05-11	Alcor Micro Corp	Over-current protection method for card reader with multi-slot flash card
JP2006294694A *	2005-04-06	2006-10-26	Denso Corp	Load driving device and load driving method

* Cited by examiner, † Cited by third party

Cited By (9)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
US7581678B2	2005-02-22	2009-09-01	Tyfone, Inc.	Electronic transaction card
KR100648224B1 *	2007-02-01	2008-07-31	삼성전자주식회사	Method and memory card system for supplying power with a memory card of the memory card system
US9741027B2	2007-12-14	2017-08-22	Tyfone, Inc.	Memory card based contactless devices
US8451122B2	2008-03-08	2013-05-28	Tyfone, Inc.	Smartcard performance enhancement circuits and systems
US2010033310A1 *	2008-08-08	2010-02-11	Narendra Silva G	Power negotiation for small rfid card
US7951101B2	2008-09-08	2011-06-14	Tyfone, Inc.	Small RFID card with integrated inductive element
US20100125689A1 *	2008-11-20	2010-05-20	Mediatek Inc.	Electronic apparatus capable of receiving different types of memory cards
EP2401708A4	2009-02-24	2012-03-15	Tyfone Inc	Contactless device with miniaturized antenna
CN109871692B *	2019-01-02	2021-05-07	新华三技术有限公司	Over-temperature power failure protection method, logic device, service board and network system

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
TWI323424B	2010-04-11	Memory card control apparatus and protection method thereof
US6985343B2	2006-01-10	Programmable power management switch
US7777554B2	2010-03-17	Method and apparatus for detecting temperatures of a plurality of circuits and controlling operations based on the detected temperatures
US8590414B2	2017-03-07	Current controller and protection circuit
CN107276571B	2020-11-03	System and method for high side power switch
CN102457384A	2012-05-16	Power device
TW201028673A	2010-08-01	Temperature detection circuit
US6072681A	2000-06-06	Power line protection devices and methods
US9927779B2	2018-03-27	Power sourcing equipment and method of detecting inrush fault errors
KR20110006518A	2011-01-20	Overvoltage protection circuit
TW640162B	2018-11-01	Reset circuit and related electronic device
TW405380B	2013-08-11	Over voltage and over temperature detection circuit
WO2018040777A1	2018-03-08	Device, cabinet, and method for preventing power outage of entire cabinet
TW505838B	2002-10-11	Power source detector of digital integrated circuit
TW200533844A	2005-10-16	Fan regulator with excess temperature signaling, particularly for a voltage supply device
US20180212418A1	2018-07-26	Usb cable with thermal protection
JP2008046719A	2008-02-28	Integrated circuit incorporating power source
TW201603427A	2016-01-16	Over-temperature detection circuit
CN101206519B	2010-06-16	Storing card control device and related protection method thereof

US8577638B2	2013-11-05	Automatic discharge of a failed battery
TW678539B	2019-12-01	Input voltage detection module and method
JPW02019021492A1	2020-06-18	DC voltage supply circuit
CN212112263U	2020-12-08	Linear voltage stabilizing circuit with overvoltage protection
TW202015305A	2020-04-16	Electronic apparatus and power supply module thereof
TW678854B	2019-12-01	Power circuit and method for releasing protection status thereof

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
TW095147686A	2006-12-19	2006-12-19	Memory card control apparatus and protection method thereof

Applications Claiming Priority (2)

Application	Filing date	Title
TW095147686A	2006-12-19	Memory card control apparatus and protection method thereof
US11/956,324	2007-12-13	Memory card control apparatus and protection method thereof

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Patents

2006172121

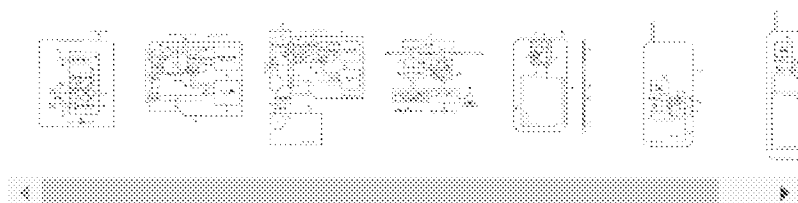


Card type storage device, adapter for the same, and host device

Abstract

<P>PROBLEM TO BE SOLVED: To provide a card type storage device that can be appropriately powered from any type of host device, and an adapter and a host device that can be loaded with the storage device. <P>SOLUTION: Power terminals PW1 and PW2 are powered by the host device. Antenna terminals ANT1 and ANT2 are connected to an antenna for contactless communication disposed in the host device to receive a signal from the antenna. A control circuit 14 has a wireless communication function and an IC card function. A power generation circuit 14c is included in the control circuit 14 to generate power in response to the signal from the antenna. A switch circuit 14d is included in the control circuit 14 to switch the power supplied to the power terminals and the power from the power generation circuit. <P>COPYRIGHT: (C)2006, JPO&NCIPI

Images (7)



Classifications

⌘ G06K19/077 Constructional details, e.g. mounting of circuits in the carrier

[View 2 more classifications](#)

Claims (6)

[Hide Dependent](#) ^

1. A power supply terminal for receiving power supply from the host device;
An antenna terminal connected to a non-contact communication antenna provided in the host device and receiving a signal from the antenna;
A control circuit having a wireless communication function and an IC card function;
A power supply generation circuit included in the control circuit for generating a power supply in response to a signal from the antenna;
A card-shaped storage device comprising: a power supply included in the control circuit and supplied to the power supply terminal; and a switching circuit for switching a power supply from the power supply generation circuit.
2. The card-like memory according to claim 1, wherein the switching circuit switches between a power source supplied from the power source terminal and a power source supplied from the power source generating circuit in accordance with a voltage supplied to the power source terminal, apparatus.
3. The card storage device according to claim 1, wherein the switching circuit switches between power supplied from the power supply terminal and power supplied from the power generation circuit in response to a command from the host device.
4. A non-contact communication antenna;
A power supply circuit for generating power;
A card-like shape having a power generation circuit that has a wireless communication function and an IC card function and generates a power according to a signal from the antenna, and a switching circuit that switches between the power from the power generation circuit and the power from the power circuit A mounting unit that can be mounted with a storage device and to which the antenna and the card-shaped storage device are connected when mounted,
A host device comprising: a host control unit that generates a command for controlling the switching circuit.
5. A non-contact communication antenna;
A power supply circuit for generating power;
A card-like shape having a power generation circuit that has a wireless communication function and an IC card function and generates a power according to a signal from the antenna, and a switching circuit that switches between the power from the power generation circuit and the power from the power circuit A mounting unit that can be mounted with a storage device and to which the antenna and the card-shaped storage device are connected when mounted,
A host device comprising: power control means for shutting off power generated by the power supply circuit when the card-like storage device is operated by power from the power generation circuit.
6. A card-shaped body,
A non-contact communication antenna provided in the main body;
An adapter for a card-like storage device, comprising: a connector connected to the card-like storage device connected to the antenna and capable of non-contact communication.

Description

The present invention relates to an improvement in the function of a memory card with a built-in IC card function, and more particularly to an improvement in a power supply method for a memory card with a built-in IC card function.

In recent years, a memory card incorporating an IC card function that is significantly smaller than a business card size has been developed. It is considered that this memory card is used by being attached to a card type adapter as an external memory of a host device such as a mobile phone.

However, since the memory card itself does not have a power source, a means for supplying power to the memory card by some method is required. On the other hand, power is supplied from the host side of an electronic device or the like to which the memory card is mounted, or when the supply is cut off, it is detected from an antenna for contactless communication provided on the memory card. A method using electric power obtained by electromagnetic induction has already been proposed (see, for example, Patent Document 1).

By the way, the power supply method from the electronic device as the host device to which the memory card is mounted to the memory card has been diversified in recent years. For this reason, it is desired that any type of host device can appropriately supply power to the memory card.

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The present invention provides a card-like storage device that can supply power appropriately from any type of host device, an adapter to which the storage device is mounted, and a host device.

An aspect of the card-like storage device of the present invention includes a power supply terminal for receiving power supply from a host device, an antenna terminal connected to a non-contact communication antenna provided in the host device, and receiving a signal from the antenna. A control circuit having a wireless communication function and an IC card function; a power generation circuit that is included in the control circuit and generates power according to a signal from the antenna; and is included in the control circuit and is supplied to the power supply terminal. And a switching circuit for switching the power supply from the power generation circuit.

An aspect of the host device of the present invention includes a contactless communication antenna, a power supply circuit that generates power; a power generation circuit that has a wireless communication function and an IC card function and generates power according to a signal from the antenna. A card-like storage device comprising a switching circuit for switching between a power supply from the power supply generation circuit and a power supply from the power supply circuit, and a mounting portion to which the antenna and the card-like storage device are connected when mounted; A host control unit for generating a command for controlling the switching circuit.

An aspect of the host device of the present invention includes a contactless communication antenna, a power supply circuit that generates power, a power generation circuit that has a wireless communication function and an IC card function and generates power according to a signal from the antenna. A card-like storage device comprising a switching circuit for switching between a power supply from the power supply generation circuit and a power supply from the power supply circuit, and a mounting portion to which the antenna and the card-like storage device are connected when mounted; In the case where the card-like storage device is operated by the power supply from the power supply generation circuit, power supply control means for cutting off the power supply generated by the power supply circuit is provided.

An aspect of the adapter of the present invention includes a card-shaped main body, a non-contact communication antenna provided in the main body, a connector connected to the antenna and connected to a card-shaped storage device capable of non-contact communication. It has.

According to the present invention, it is possible to provide a card-like storage device that can supply power appropriately from any type of host device, an adapter to which the storage device is mounted, and a host device.

Hereinafter, embodiments of the present invention will be described with reference to the drawings.

FIG. 2 shows an embodiment of a card-like storage device, for example a memory card 11. The memory card 11 contains, for example, a card controller chip 12, a nonvolatile semiconductor memory chip 13, and an IC card function chip 14 in a card case 11-1. For example, a connector 15 is provided on one side of the memory card 11. The connector 15 has, for example, a plurality of terminals to which one end of the bus 16 is connected, two terminals to which the power supply voltage VDD and the ground potential VSS are connected, and two terminals to which an antenna is connected.

The card controller chip 12 includes a bus interface (I / F) circuit 12a, a memory control unit 12b, and an IC card control unit 12c. The bus I / F circuit 12a is connected to the other end of the bus 16, and is also connected to the memory control unit 12b and the IC card control unit 12c. The bus I / F circuit 12a supplies a clock signal CLK, a command CMD, data DAT0-3, and the like supplied from a host device (not shown) via the bus 16 to the memory control unit 12b and the IC card control unit 12c. For example, data supplied from the control unit 12b and the IC card control unit 12c is output to the bus 16. The memory control unit 12b is connected to the nonvolatile semiconductor memory chip 13 via the bus 17, and the IC card control unit 12c is connected to the IC card function chip 14 via the wiring 18. Note that the card controller chip 12 protects the copyright of the content data stored in the nonvolatile semiconductor memory chip 13, for example, CPRM (Content Protection for Recordable Media) based authentication and encryption / encryption based on a common key system. It also has a decoding function.

The non-volatile semiconductor memory chip 13 is a flash memory composed of, for example, NAND type EEPROM cells. The nonvolatile semiconductor memory 13 performs data writing, reading, and erasing in accordance with an instruction from the memory control unit 12b by using, for example, 8-bit data and a command interface.

In addition, an area (data storage area) in which data of the nonvolatile semiconductor memory chip 13 is written is divided into a plurality of areas in accordance with stored data. For example, the nonvolatile semiconductor memory chip 13 includes a general area for storing user data and a secure area for storing important data as data storage areas. The general area is an area that a user who uses the memory card 11 can freely access and use. The secure area is an area that can be accessed only when the validity of the host device 21 is proved by mutual authentication with the host device 21 connected to the memory card 11.

In addition, the IC card function chip 14 is connected to the IC card control unit 12c by the wiring 18 and is connected to the antenna terminal of the connector 15 through the wiring 19. The IC card function chip 14 has a non-contact wireless communication function, and can transmit and receive electromagnetic signals via the antenna of the host device when the memory card 11 is connected to the host device.

The IC card function chip 14 is a semiconductor chip having a so-called IC card function such as a credit card, a cash card, prepaid money, an employee ID, various licenses as a public ID, and a passport. The IC card function chip 14 realizes an IC card function. For example, public key encryption (PKI), stronger common key encryption (AES: Advanced Encryption Standard, etc.), tamper resistance, etc. Has advanced security functions. In order to realize this advanced security function, the IC card function chip 14 incorporates a nonvolatile semiconductor memory (not shown) for storing the above data.

The power supply voltage VDD and the ground potential VSS supplied from the host device to the power supply terminals PW1 and PW2 of the connector 15 are supplied to the card controller chip 12, the nonvolatile semiconductor memory chip 13, and the IC card function chip 14, respectively.

FIG. 3 shows a state where the memory card 11 is connected to the host device 21. As the host device 21, for example, a mobile phone or a card-like adapter can be applied. The host device 21 includes, for example, a host control unit 22, a power supply circuit 23, a battery 25, for example, a loop-shaped non-contact communication antenna 24. The host control unit 22 is connected to a plurality of terminals of the connector 15 via the bus 23. The host control unit 22 generates a clock signal, various commands, and data for controlling the memory card 11.

The power supply voltage VDD and the ground potential VSS output from the power supply circuit 23 are supplied to the power supply terminals PW1 and PW2 of the connector 15, respectively. Furthermore, one end and the other end of the antenna 24 are connected to the antenna terminal of the connector 15.

FIG. 4 shows a logical interface having the configuration shown in FIG. A schematic operation will be described with reference to FIGS. 4, 2, and 3.

When accessing the nonvolatile semiconductor memory 13 of the memory card 11 from the host device 21, writing or reading of data to or from the nonvolatile semiconductor memory chip 13 is controlled in accordance with a memory access command sent from the host device 21. That is, the memory control unit 12b writes the write data received from the host device 21 via the bus 16 and the bus I / F circuit 12a to the general area or the secure area of the nonvolatile semiconductor memory chip 13, and the nonvolatile semiconductor memory data read from the chip 13 is transferred to the host device 21 via the bus I / F circuit 12a and the bus 16.

On the other hand, when data is transmitted / received to / from the IC card function chip, the IC card function chip is controlled in accordance with an McEX (Mobile Communication Extension Standard) extension command transmitted from the host device 21. That is, the McEX extension command sent from the host device 21 is supplied to the IC card control unit 12c via the bus 16 and the bus I / F circuit 12a. The IC card control unit 12c transmits the received command data (C-APDU: Command-Application Protocol Data Unit) to the IC card function chip 14 in accordance with a communication protocol compliant with ISO7816. Further, the IC card control unit 12c receives data (R-APDU: Response-Application Protocol Data Unit) received from the IC card function chip 14 by a communication protocol compliant with ISO7816 via the bus I / F circuit 12a and the bus 16. Transfer to the host device 21.

When using the IC card function, the antenna 24 of the host device 21 is brought close to an external device having a non-contact communication function, for example, an antenna 32 of a reader / writer 31 as shown in FIG. In this state, communication is performed between the reader / writer 31 and the IC card function chip 14 via the antenna 32 and the antenna 24.

FIG. 1 shows a power supply switching function provided in the IC card function chip 14 according to the embodiment. The IC card function chip 14 includes a contact interface (I / F) circuit (wired interface) 14a, a non-contact interface (I / F) circuit (antenna interface) 14b, a power generation circuit 14c, and a power switching circuit 14d. It is out. The contact I / F circuit 14a is connected to the IC card control unit 12c by the wiring 18. The contact I / F circuit 14a is an interface circuit conforming to ISO7816, and performs 1-bit serial communication with the IC card control unit 12c. The non-contact I / F circuit 14b is an ISO 14443-compliant interface circuit for performing wireless communication via a host device described later, and is connected to the antenna terminal of the connector 15 via the wiring 19. When the antenna of the host device is connected to the connector 15, the power generation circuit 14c generates a power necessary for the operation of the IC card function chip 14 from a signal supplied via the antenna. The power supply switching circuit 14d is supplied with the power output from the power generation circuit 14c and the power supplied from the host device via the connector 15. The power supply switching circuit 14d is configured to contact one of a power supply output from the power supply generation circuit 14c and a power supply supplied from the host device via the connector 15 in accordance with a control signal supplied from the contact I / F circuit 14a. This is supplied to the I / F circuit 14b.

Next, the operation of the IC card function built-in memory card will be described with reference to FIGS.

As shown in FIG. 3, in a state where the memory card 11 is mounted on the host device 21, the power switching circuit 14d determines whether power is supplied from the power terminals PW 1 and PW 2 of the connector 15. When it is detected that power is supplied from the power supply terminals PW1 and PW2, the power supply switching circuit 14d supplies power from the power supply terminals PW1 and PW2 to the non-contact I / F circuit 14b. For this reason, the memory card 11 performs wireless communication with the reader / writer 31 by non-contact operation with the power from the power supply circuit 23 of the host device 21.

Further, when the power switching circuit 14d detects that no power is supplied from the power terminals PW1 and PW2 due to a decrease in the voltage of the battery 25 of the host device 21, or the host device does not have a power source. When the power switching circuit 14d detects that no power is supplied, the power switching circuit 14d supplies the power from the power generation circuit 14c to the non-contact I / F circuit 14b. For this reason, the memory card 11 performs wireless communication with the reader / writer 31 by non-contact operation with electric power from the electromagnetic induction from the non-contact communication antenna 24 of the host device 21. Thus, the memory card 11 can change the power supply form from the host device according to the power supply status of the host device.

5 to 7 show usage patterns of the memory card.

FIG. 5 shows a state in which the memory card 11 is mounted on the card-like adapter 51. The adapter 51 does not have a power source such as a battery in the main body, and has an antenna 52, a connector 53, and a storage portion 54 for the memory card 11. The connector 53 is connected to the antenna 52. By inserting the memory card 11 into the housing 54 and connecting the memory card 11 to the connector 53, the memory card 11 and the antenna 52 are connected. Since this adapter 51 does not have a power supply, when the memory card 11 is attached to the card-like adapter 51, the power supply switching circuit 14d selects the power supply generation circuit 14c. The power generation circuit 14c generates power from a signal received by electromagnetic induction by the antenna 52, and supplies it to the non-contact I / F circuit 14b. In this state, a non-contact operation by wireless communication is possible.

Further, the power supply switching circuit 14d can be controlled by a command output from the host control unit 22 of the host device 21. That is, it is possible for the host device 21 to switch the power supply switching circuit 14d using a command according to the power supply capability of the host device 21.

For example, as shown in FIG. 6, the size of the loop antenna 61 provided in the mobile phone as the host device 21 may be small, and sufficient power may not be supplied to the IC card function chip 14. In such a case, the host control unit 22 supplies power to the IC card function chip 14 from the power supply circuit 23 shown in FIG. 3 of the host device 21, so that the power supply switching circuit 14d uses the power supply terminals PW1 and PW2 of the connector 15. Output the command to be selected. Specifically, the host control unit 22 sends command data (C-APDU) that instructs the non-contact I / F circuit 14b in the IC card function chip 14 to be supplied with power from the power terminals PW1 and PW2. And sent to the card controller chip 12 via the bus 16. The card controller chip 12 transmits command data (C-APDU) to the IC card function chip 14 via the wiring 18 by the ISO7816 communication protocol. The IC card function chip 14 can communicate with the card controller chip 12 through the contact I / F circuit 14a, and the power supply switching circuit 14d is contactless based on command data (C-APDU) received from the card controller chip 12. Switching is performed so that power is supplied from the power supply terminals PW1 and PW2 to the I / F circuit 14b. As described above, the IC card function chip 14 is supplied with power from the power terminals PW1 and PW2 according to the command, and can perform a non-contact operation by wireless communication.

Alternatively, as shown in FIG. 7, when the size of the loop antenna 71 provided in the mobile phone is large and sufficient power can be supplied to the IC card function chip 14, the host control unit 22 uses the power generation circuit. In order to supply power to the IC card function chip 14 from 14c, the power supply switching circuit 14d outputs a command for selecting the antenna terminals ANT1 and ANT2 of the connector 15. This command is supplied to the IC card function chip 14 in the same

manner as described above, and the IC card function chip 14 is supplied with power from the power supply generation circuit 14c according to this command, and can perform a non-contact operation by wireless communication. .

According to the above embodiment, the IC card function chip 14 is provided with the power supply generation circuit 14c and the power supply switching circuit 14d. The power supply switching circuit 14d is provided with the presence / absence of the voltages at the power supply terminals PW1 and PW2 and the command supplied from the host device 21. Can be switched. Therefore, regardless of whether or not a host device equipped with a contactless communication antenna can directly supply power to the memory card, the memory card 11 incorporating the IC card function can perform wireless communication by contactless operation. It becomes. That is, since the power supply to the IC card function chip 14 can be switched according to the power supply capability of the host device to which the memory card 11 is mounted or the power supply form of the host device, the memory card 11 can be connected to various host devices. Can be installed.

In addition, a host device that can supply power from the power supply circuit 23 to the IC card function chip 14 and from the antenna 24 can reduce power consumption of the host device by selecting power supply from the antenna 24. The consumption of the battery 26 can be suppressed.

In the above example, the power source of the memory card is switched by issuing a command to the card. However, the memory card may operate with the power supplied from the antenna by cutting off the power supply to the memory card without using a command. That is, as indicated by a broken arrow in FIG. 3, for example, when a memory card having an IC card function is attached to the host device, the host control unit 22 may stop the operation of the power supply circuit 23. .

Note that the adapter 51 shown in FIG. 5 further includes a conversion control circuit between a memory card interface and a PCMCIA (Personal Computer Memory Card International Association) card interface, so that the memory card can be used in a PCMCIA slot of a personal computer. May be provided.

The present invention is not limited to the above embodiment, and can be applied to various host devices and memory cards incorporating IC card functions.

The block diagram which shows the principal part of the memory card which concerns an embodiment of this invention. The block diagram which shows the memory card which incorporated the IC card function chip; tip shown in FIG. FIG. 3 is a configuration diagram showing a state in which the memory card shown in FIG. The figure which shows the logical interface of the memory card shown in FIG. The block diagram which shows an example of the card-shaped adapter which can mount; wear with the memory card shown in FIG. The block diagram which shows an example of the mobile telephone as a host apparatus which can mount; wear with the memory card shown in FIG. The block diagram which shows the other example of the mobile telephone as a host apparatus which can mount; wear with the memory card shown in FIG.

Explanation of symbols

DESCRIPTION OF SYMBOLS 11 ... Memory card, 21 ... Host apparatus, 14 ... IC card functional chip, 14c ... Power supply generation circuit, 14d ... Power supply switching circuit, 15 ... Connector, PW1, PW2 ... Power supply terminal, ANT1, ANT2 ... Antenna terminal, 24, 52, 61, 71 antennas.

Patent Citations (9)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
JP2000090221A	1998-09-09	2000-03-31	Hitachi Maxell Ltd	Non-contact ic card
JP4053704B2 *	2000-01-05	2008-02-27	株式会社東芝	IC card with built-in wireless interface function, antenna module, information processing device
JP3657178B2 *	2000-07-10	2005-06-08	沖電気工業株式会社	IC card
JP2002279378A	2001-03-16	2002-09-27	Jr East Mechatronics Co Ltd	Multiple power supply combination type ic card
JP2003189488A	2001-12-20	2003-07-04	Toshiba Corp	Terminal, electronic medium, and method for supplying power in terminal
JP2003271915A	2002-03-13	2003-09-26	Jr East Mechatronics Co Ltd	Plug-in type ic card with non-contact type antenna built therein
US20030239631A1 *	2002-06-17	2003-12-18	Hitachi, Ltd.	IC card
JP2004348235A	2003-05-20	2004-12-09	Toshiba Corp	Portable electronic device and portable terminal device
US7472834B2 *	2003-07-09	2009-01-06	Stmicroelectronics S.A.	Dual-mode smart card

* Cited by examiner, † Cited by third party

Cited By (29)

Publication number	Priority date	Publication date	Assignee	Title
JP2008181110A *	2006-12-27	2008-08-07	Semiconductor Energy Lab Co Ltd	Display device
JP2008197499A *	2007-02-14	2008-08-28	Nobuyuki Kasuga	Image display card and power supply device for image display card
JP2009140465A *	2007-12-06	2009-06-25	Avermedia Technologies Inc	Tv card with power-switching function
JP2015133095A *	2014-01-14	2015-07-23	株式会社東芝	Memory device including radio antenna
Family To Family Citations				

US7581578B2	2005-02-22	2009-09-01	Tyfone, Inc.	Electronic transaction card
JP4534962B2 *	2005-11-16	2010-09-01	ソニー株式会社	Information recording apparatus, non-contact recording medium and recording method therefor
GB0325635D0	2005-12-16	2006-01-25	Innovision Res & Tech Plc	Chip card and method of data communication
GB2444798B *	2006-12-15	2010-06-30	Innovision Res & Tech Plc	Communications devices comprising near field RF communicators
GB0709671D0	2006-12-15	2007-02-21	Innovision Res & Tech Plc	Nfc communicator and method of data communication
WO2007138021A1 *	2006-05-29	2007-12-06	Paschalis Papagrigoriou	Method for communication with a multi-function memory card
WO2008013230A1 *	2006-07-26	2008-01-31	Panasonic Corporation	Nonvolatile storage device, nonvolatile storage system, and host device
US7991155B2 *	2006-12-13	2011-08-02	Tyfone, Inc.	Secure messaging
KR100849224B1 *	2007-02-01	2008-07-31	삼성전자주식회사	Method and memory card system for supplying power with a memory card of the memory card system
US20080244208A1 *	2007-03-30	2008-10-02	Narendra Siva G	Memory card hidden command protocol
WO2009063386A1 *	2007-11-12	2009-05-22	Nxp B.V.	Chip card comprising a display
US8290433B2 *	2007-11-14	2012-10-16	Blaze Mobile, Inc.	Method and system for securing transactions made through a mobile communication device
US9741027B2 *	2007-12-14	2017-08-22	Tyfone, Inc.	Memory card based contactless devices
CN101393744A *	2008-04-18	2008-11-12	上海瑞纳电子科技有限公司	Chip for signal amplifier of radio frequency recognition system and signal amplifier thereof
US7961101B2	2008-08-08	2011-06-14	Tyfone, Inc.	Small RFID card with integrated inductive element
US8451122B2	2008-08-08	2013-05-28	Tyfone, Inc.	Smartcard performance enhancement circuits and systems
EP2401708A4 *	2009-02-24	2012-08-15	Tyfone Inc	Contactless device with miniaturized antenna
JP2011134174A *	2009-12-25	2011-07-07	Sony Corp	Card-type peripheral device and card system
CN101916950B *	2010-04-06	2013-09-12	上海复旦微电子集团股份有限公司	Safety chip concentrator
JP2012163865A *	2011-02-16	2012-09-06	Toshiba Corp	Memory system
CN102880958B *	2011-07-13	2016-08-10	中国银联股份有限公司	Data process and storage device
TW459188B	2012-03-09	2014-11-01	Phison Electronics Corp	Memory card with smart card function and power control method and power control circuit thereof
CN103325409B *	2012-03-22	2016-03-23	群联电子股份有限公司	The storage card of tool intelligent card function and power control method thereof and power control circuit
JPS70345281 *	2014-03-06	2015-04-22	パナソニックIPマネジメント株式会社	Information processing apparatus and information processing method
US10146476B2	2015-04-28	2018-12-04	Toshiba Memory Corporation	Wireless communication device, method for controlling wireless communication device, game system, and memory system

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
JP2006172121A	2006-06-29	Card type storage device, adapter for the same, and host device
US10496918B2	2019-12-03	Cards and devices with multifunction magnetic emulators and methods for using the same
JP2006172122A	2006-06-29	Card type storage device
US20100181377A1	2010-07-22	Card reader with near field communication function and near field communication device thereof
JP2007317179A	2007-12-06	Ic module and cellular phone
ES2380750T3	2012-05-18	Microprocessor card
KR101825326B1	2018-02-02	Portable electronic device

JP2006236200A	2006-09-07	Card type storage device and host device thereof
KR200329847Y1	2003-10-10	Usb driving device use smartcard reader
US8708232B2	2014-04-29	Bank card with display screen
JP2009151435A	2009-07-09	Non-contact communication device
JP2006101542A	2006-04-13	Cellular phone terminal
JP2007087168A	2007-04-05	Composite portable electronic device and composite ic card
JP2006107380A	2006-04-20	Information processor, information processing method, memory device and computer program
CN100962528C	2008-01-16	Contactless CPU card compatible to logic encryption card
JP3983885B2	2007-09-26	Compound IC card and IC module for compound IC card
KR100734168B1	2007-07-02	Secure data storage apparatus with memory card interface
JP5693824B2	2015-04-01	IC card processing device, IC card, and IC card processing system
JP2005173744A	2005-06-30	Noncontact ic tag
JP2004310583A	2004-11-04	Communication system
JP2007257543A	2007-10-04	Composite portable electronic equipment and composite ic card
JP2002245425A	2002-08-30	Card type storage device
KR200342949Y1	2004-02-21	Dummy Terminal for Reading Smart Card
KR20090035781A	2009-04-13	Card module with plural card ics
JP2008065388A	2008-12-18	Mobile telephone terminal provided with ic card function

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
JP2004363399A	2004-12-15	2004-12-15	Card type storage device, adapter for the same, and host device

Applications Claiming Priority (4)

Application	Filing date	Title
JP2004363399A	2004-12-15	Card type storage device, adapter for the same, and host device
US11/250,406	2005-10-28	Card-shaped memory device incorporating IC card function, adapter for the same and host device
CNA200810186385XA	2005-12-15	Card-shaped memory device incorporating IC card function
CN2005101295783A	2005-12-15	Host device

Legal Events

Date	Code	Title	Description
2007-09-05	A621	Written request for application examination	Free format text: JAPANESE INTERMEDIATE CODE: A621 Effective date: 20070904
2009-10-07	A977	Report on retrieval	Free format text: JAPANESE INTERMEDIATE CODE: A971007 Effective date: 20091007
2009-10-14	A131	Notification of reasons for refusal	Free format text: JAPANESE INTERMEDIATE CODE: A131 Effective date: 20091013
2009-12-15	A521	Written amendment	Free format text: JAPANESE INTERMEDIATE CODE: A523

Effective date: 20091214

2010-03-10 A02 Decision of refusal

Free format text: JAPANESE INTERMEDIATE CODE: A02

Effective date: 20100309

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Patents

4403431



Communication system and communication apparatus

Classifications

H01Q9/28 Conical, cylindrical, cage, strip, gauze, or like elements having an extended radiating surface; Elements comprising two conical surfaces having collinear axes and adjacent apices and fed by two-conductor transmission lines

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JP4403431B2

Japan

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Other languages: Japanese

Inventor: 藤田 和城

Worldwide applications

 2007 [JP](#) 2008 [US](#) [CN](#)
Application JP2007157906A events ⓘ

2007-06-14 Application filed by ノーリック株式会社

2007-06-14 Priority to JP2007157906A

2008-12-25 Publication of JP2008311960A

2010-01-27 Application granted

2010-01-27 Publication of JP4403431B2

Status Expired - Fee Related

2027-06-14 Anticipated expiration

Info: Patent citations (17), Cited by (45), Legal events, Similar documents, Priority and Related Applications

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Claims (19)

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1. A transmitter circuit unit that generates a high-frequency signal for transmitting data, a transmitter including a high-frequency coupler that transmits the high-frequency signal as an electrostatic field or an induction electric field,
A high-frequency coupler and a receiver including a receiving circuit unit that receives and processes a high-frequency signal received by the high-frequency coupler;
The high frequency coupler of the transmitter and the receiver includes a coupling electrode, a resonance unit for strengthening electrical coupling between the coupling electrodes, and a magnetic loss disposed in the vicinity of the coupling electrode. It has a radio wave absorber made of materials.
Transmitting the high-frequency signal by electric field coupling between high-frequency couplers facing the transmitter and the receiver;
A communication system characterized by the above
2. The high-frequency signal is a UWB signal that uses an ultra-wideband.
The communication system according to claim 1.
3. The resonance unit constitutes a bandpass filter that passes a desired high frequency band between the high frequency couplers of the transmitter and the receiver.
The communication system according to claim 1.
4. The resonating part is composed of a distributed constant circuit.
The communication system according to claim 1.
5. The radio wave absorber is composed of a magnetic loss material in which the spin responsible for magnetization gives a magnetic loss due to a delay caused by a change in a high frequency magnetic field, and generates a magnetic field in a radio wave that travels while alternately repeating a magnetic wave and an electric wave. By suppressing the propagation of radio waves generated from the high-frequency coupler, or preventing the arrival of radio waves from the outside to the high-frequency coupler;
The communication system according to claim 1.
6. The coupling electrode is formed inside or on the surface of the radio wave absorber.
The communication system according to claim 1.
7. A communication circuit unit for processing a high-frequency signal for transmitting data,
A high-frequency coupler for electric field coupling with an opposing communication partner;
The high frequency coupler includes a coupling electrode, a resonating unit for strengthening electrical coupling between the coupling electrodes, and a radio wave absorption device including a magnetic loss material disposed in the vicinity of the coupling electrode. With a body,
Transmitting the high-frequency signal by electric field coupling of an electrostatic field or an induction electric field with a high-frequency coupler on the communication

partner side,
A communication device.

8. The high-frequency signal is a UWB signal that uses an ultra-wideband.
The communication apparatus according to claim 7.
9. The resonating unit constitutes a band-pass filter that passes a desired high-frequency band with a communication partner high-frequency coupler,
The communication apparatus according to claim 7.
10. The resonating part is composed of a distributed constant circuit,
The communication apparatus according to claim 7.
11. The radio wave absorber is composed of a magnetic loss material in which the spin responsible for magnetization gives a magnetic loss due to a delay caused by a change in a high frequency magnetic field, and generates a magnetic field in a radio wave that travels while alternately repeating a magnetic wave and an electric wave. By suppressing the propagation of radio waves generated from the high-frequency coupler, or preventing the arrival of radio waves from the outside to the high-frequency coupler,
The communication apparatus according to claim 7.
12. The coupling electrode is formed inside or on the surface of the radio wave absorber.
The communication apparatus according to claim 7.
13. A transmitter circuit unit that generates a high-frequency signal for transmitting data, a transmitter including a high-frequency coupler that transmits the high-frequency signal as an induction magnetic field,
A high-frequency coupler and a receiver including a receiving circuit unit that receives and processes a high-frequency signal received by the high-frequency coupler;
The high-frequency coupler of the transmitter and the receiver includes a coupling coil and a radio wave absorber made of a dielectric loss material disposed in the vicinity of the coupling coil,
Transmitting the high-frequency signal by coupling an induction magnetic field between high-frequency couplers facing the transmitter and the receiver;
A communication system characterized by the above
14. The high-frequency signal is a UWB signal that uses an ultra-wideband.
The communication system according to claim 13.
15. The radio wave absorber is composed of a dielectric loss material that gives a dielectric loss by a delay caused by a change in a high frequency electric field by a dipole that provides dielectric properties, or a current in phase with the electric field flows and converts electromagnetic wave energy into heat. By suppressing the generation of the electric field in the radio wave traveling while alternately repeating the magnetic field wave and the electric field wave, the propagation of the radio wave generated from the high frequency coupler is suppressed, or the radio wave from the outside to the high frequency coupler is suppressed. Prevent arrival,
The communication system according to claim 13.
16. A communication circuit unit for processing a high-frequency signal for transmitting data;
A high-frequency coupler for magnetically coupling with an opposing communication partner;
The high-frequency coupler includes a coupling coil and a radio wave absorber made of a dielectric loss material disposed in the vicinity of the coupling coil.
Transmitting the high-frequency signal by magnetic field coupling of an induction magnetic field with a high-frequency coupler on the communication partner side,
A communication device.
17. The high-frequency signal is a UWB signal that uses an ultra-wideband.
The communication apparatus according to claim 16.
18. The radio wave absorber is composed of a dielectric loss material that gives a dielectric loss by a delay caused by a change in a high frequency electric field by a dipole that provides dielectric properties, or a current in phase with the electric field flows and converts electromagnetic wave energy into heat. By suppressing the generation of the electric field in the radio wave traveling while alternately repeating the magnetic field wave and the electric field wave, the propagation of the radio wave generated from the high frequency coupler is suppressed, or the radio wave from the outside to the high frequency coupler is suppressed. Prevent arrival,
The communication apparatus according to claim 16.
19. Rectifying the high-frequency signal transmitted between the high-frequency couplers, further comprising power generation means for generating power,
The communication device according to claim 7, wherein the communication device is a device.

Description

The present invention relates to a communication system and a communication apparatus that perform large-capacity data communication between information devices, and more particularly, to perform data communication without interference with other communication systems using an electrostatic field or an induction electric field between information devices. BACKGROUND OF THE INVENTION 1. Field of the Invention The present invention relates to a communication system and communication apparatus for performing communication, and a communication system and communication apparatus for performing data communication without interference with other communication systems using an induction magnetic field between information devices.

More specifically, the present invention relates to a communication system and a communication apparatus that transmit a high-frequency signal using an electrostatic field or an induced electric field between information devices arranged at a short distance, and between information devices arranged at a short distance. BACKGROUND OF THE INVENTION 1. Field of the Invention The present invention relates to communication systems and communication devices that transmit high-frequency signals using an induced magnetic field, and in particular, efficiently transmit high-frequency signals between couplers mounted on each information device, and use electric field coupling or magnetic field coupling at a short distance. The present invention relates to a communication system and a communication apparatus that can perform large-capacity transmission.

Recently, when moving data between small information devices such as exchanging data such as images and music with a personal computer, it is possible to use a general-purpose cable such as an AV (Audio Visual) cable or a USB (Universal Serial Bus) cable. The use of a wireless interface is increasing instead of a method using a

medium such as a connected data communication or a memory card. According to the latter, it is not necessary to change the connector and route the cable every time data is transmitted, which is convenient for the user. Many information devices equipped with various cableless communication functions have also appeared. As a method of transmitting data between small devices without a cable, radio waves that transmit and receive wireless signals using an antenna, such as wireless LAN (Local Area Network) and Bluetooth (registered trademark) communication represented by IEEE 802.11, are used. Communication methods have been developed.

In addition, a communication method called "ultra-wide band (UWB)", which has been attracting attention in recent years, uses a very wide frequency band of 3.1 GHz to 10.6 GHz, and transmits large-capacity wireless data of about 100 Mbps in a short distance. Therefore, a large amount of data such as a moving image or music data for one CD can be transferred at high speed in a short time.

The UWB communication has a communication distance of about 10 m from the relationship of transmission power, and a short-range wireless communication system such as PAN (Personal Area Network) is assumed. For example, in IEEE 802.15.3, a data transmission system having a packet structure including a preamble has been devised as an access control system for UWB communication. In addition, Intel Corporation is considering a wireless version of USB (Universal Serial Bus), which is widely used as a general-purpose interface for personal computers, as a UWB application.

In addition, UWB communication allows data transmission exceeding 100 Mbps without occupying a transmission band of 3.1 GHz to 10.6 GHz, and considering the ease of making an RF circuit, 3.1-4. A transmission system using a 9 GHz UWB low band is also actively developed.

Here, under the Radio Law in Japan, the electric field strength (the strength of radio waves) at a distance of 3 meters from the radio equipment is below a predetermined level, that is, about the noise level for other radio systems in the vicinity. With weak radio, there is no need to obtain a radio station license, and the development and manufacturing costs of the radio system can be reduced. The above-described UWB communication can configure a short-range wireless communication system with a relatively low electric field level from the relationship of transmission power. However, when a UWB communication system is configured by a radio wave communication system that transmits and receives radio signals using an antenna, it is difficult to suppress the generated electric field to such a weak level.

Many of the conventional wireless communication systems adopt a radio communication system, and propagate signals using a radiation electric field generated when a current is passed through an antenna (antenna). In this case, since a radio wave is emitted from the transmitter side regardless of whether there is a communication partner, there is a problem that it becomes a generation source of an interference radio wave for a nearby communication system. Further, since the antenna on the receiver side receives not only the desired wave from the transmitter but also a radio wave arriving from a distance, it is easily affected by the surrounding interfering radio waves and causes a decrease in reception sensitivity. Further, when there are a plurality of communication partners, it is necessary to perform complicated settings in order to select a desired communication partner. For example, when a plurality of sets of wireless devices perform wireless communication in a narrow range, it is necessary to perform communication by performing division multiplexing such as frequency selection in order to avoid mutual interference. In addition, since radio waves cannot communicate when their polarization directions are orthogonal, it is necessary for the antennas to have the same polarization direction between the transceivers.

For example, when considering a contactless data communication system at a close distance of several millimeters to several centimeters, the transmitter / receiver is strongly coupled at a short distance, while a signal is transmitted to a long distance to avoid interference with other systems. It is preferable not to arrive. In addition, it is desirable that the devices that perform data communication do not depend on each other's posture (orientation) when they are brought close to each other, and that they are coupled, that is, have no directivity. In addition, in order to perform large-capacity data communication, it is desirable that broadband communication is possible.

The wireless communication includes a communication method using an electrostatic field or an induction field in addition to the radio wave communication using the radiated electric field. For example, in an existing non-contact communication system mainly used for RFID (Radio Frequency Identification), an electric field coupling method or an electromagnetic induction method is applied. The static electric field and the induction electric field are inversely proportional to the cube of the distance and the square of the distance with respect to the distance from the source, respectively, so that the electric field strength (radio wave strength) at a distance of 3 meters from the radio equipment is below a predetermined level. Weak wireless is possible, and there is no need to obtain a radio station license. Also, in this type of contactless communication system, the transmission signal attenuates steeply according to the distance. Therefore, when there is no communication partner in the vicinity, a coupling relationship does not occur, so that other communication systems are not disturbed. Further, even when radio waves arrive from a distance, the coupler (coupler) does not receive radio waves, so that it is not necessary to receive interference from other communication systems. In other words, it can be said that contactless / ultra-short-range communication by electric field coupling using an induced electric field or an electrostatic field is suitable for realizing weak wireless.

A contactless ultra-short-range communication system has several advantages over a normal wireless communication system. For example, when wireless signals are exchanged between devices that are relatively distant from each other, the quality of signals in the wireless section will decrease depending on the presence of surrounding reflectors and the expansion of the communication distance. Therefore, there is no dependence on the surrounding environment, and high quality

transmission with a low error rate is possible using a high transmission rate. Also, in the ultra short-range communication system, there is no room for unauthorized devices to intercept transmission data, and it is not necessary to consider prevention of hacking and ensuring confidentiality on the transmission path.

Further, in radio wave communication, since the antenna needs to have a size that is about one-half or one-fourth of the wavelength λ used, the apparatus inevitably increases in size. On the other hand, there is no such restriction in the ultra short-range communication system using an induced electric field or an electrostatic field.

For example, by forming a communication auxiliary body set in which RFID tags are positioned between a plurality of communication auxiliary bodies, and arranging RFID tags attached to a plurality of products so as to be sandwiched between the communication auxiliary bodies, RFID There has been proposed an RFID tag system that enables stable reading / writing of information even when tags are overlapped (see, for example, Patent Document 1).

In addition to the apparatus main body and a mounting means for mounting the apparatus main body on the body, the antenna coil and the data communication means for performing data communication with an external communication device through the antenna coil in a non-contact manner. A data communication device using an induction magnetic field in which an antenna coil and data communication means are arranged in an outer case provided in the upper part of the device body has been proposed (see, for example, Patent Document 2).

In addition, an antenna coil for data communication with an external device is mounted on a memory card inserted into the portable information device, and an RFID antenna coil is disposed outside the memory card insertion slot of the portable information device. A proposal has been made on a mobile phone having an RFID that secures a communication distance without impairing portability (see, for example, Patent Document 3).

A conventional RFID system using an electrostatic field or an induction electric field uses a low frequency signal, and therefore has a low communication speed and is not suitable for a large amount of data transmission. In the case of a communication method using an induction magnetic field by an antenna / coil, if there is a metal plate on the back of the coil, communication cannot be performed, and a large area is required on the plane on which the coil is arranged. There are also implementation issues. Further, the loss in the transmission path is large, and the signal transmission efficiency is not good.

On the other hand, the present inventors transmit a high-frequency signal by electric field coupling, that is, super transmission that transmits the above UWB communication signal using electric field coupling by an electrostatic field or an induction electric field, or magnetic field coupling by an induction magnetic field. We believe that high-speed data transmission considering confidentiality can be realized by a short-range communication system using a weak electric field that does not

enables high-speed data transmission considering confidentiality and is realized by a short-range communication system using a weak electric field that does not require a license as a radio station. In the UWB communication system using an electrostatic field or an induction field, the present inventors consider that a large amount of data such as a moving image or music data for one CD can be transferred in a short time.

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In radio communication systems using radio fields that radiate electric fields, radio signals can be propagated far away, but in radio frequency radio communication systems, unintended radio waves can interfere with other radio systems, and peripheral information devices. Communication may be hindered by external interference radio waves. If a radio wave absorber is placed in the vicinity of the antenna of the wireless device, unnecessary radio waves can be blocked, but the desired radio wave that propagates the desired signal is also absorbed and communication cannot be performed.

On the other hand, in the case of an electric field coupling type non-contact communication system in which a communication distance is limited to a short distance and coupled by an electrostatic field or an induction electric field, or a magnetic field coupling type non-contact communication system coupled by an induction magnetic field, a coupling electrode. Alternatively, if the coil is ideally designed, generation of unnecessary radio waves can be suppressed and reception of external radio waves can be prevented. As described above, high-speed data transmission considering confidentiality can be realized by a very short-range communication system that transmits an UWB communication signal using an electrostatic field, by a weak electric field that does not require a license as a radio station. .

However, in practice, it is difficult to design a high-frequency circuit so as to completely suppress the radiated electric field, and even a communication device originally designed to be an electric field coupling type may not be able to detect minor mismatches in the circuit or the ground. There is a problem that unnecessary radio waves are oscillated or received by a flowing current or the like. For example, assuming that the input power to the coupler is 100, a situation in which a ratio of 10 is radiated as a radio wave is also conceivable. As described above, the radio wave generated by the radiated electric field propagates farther than the static electric field and the induced electric field, so that the influence on the external electronic device and the influence on the external electronic device are large.

The present invention has been made in view of such a technical problem, and its main purpose is to suitably transmit a high-frequency signal between information devices arranged at a short distance by using an electrostatic field or an induced electric field. An excellent communication system and communication apparatus capable of suitably transmitting a high-frequency signal using an induced magnetic field between information devices arranged at a short distance are provided. It is in.

A further object of the present invention is to provide an excellent communication system capable of efficiently transmitting a high-frequency signal between couplers mounted on each information device and enabling large-capacity transmission using electric field coupling or magnetic field coupling at a short distance, and it is to provide a communication device.

A further object of the present invention is to prevent the generation of an electrostatic field and an induction field, and to prevent external interference while suitably transmitting a high-frequency signal using electric field coupling or magnetic field coupling between information devices arranged at a short distance. It is an object of the present invention to provide an excellent communication system and communication apparatus that can suppress generation of a radiation electric field.

The present invention has been made in consideration of the above-described problems. The first aspect of the present invention is a transmission circuit unit that generates a high-frequency signal for transmitting data, and a high-frequency signal that transmits the high-frequency signal as an electrostatic field or an induction field. A transmitter with a coupler;

A high-frequency coupler and a receiver including a receiving circuit unit that receives and processes a high-frequency signal received by the high-frequency coupler; The high frequency coupler of the transmitter and the receiver includes a coupling electrode, a resonance unit for strengthening electrical coupling between the coupling electrodes, and a radio wave absorber disposed in the vicinity of the coupling electrode. With Transmitting the high-frequency signal by electric field coupling between high-frequency couplers facing the transmitter and the receiver; This is a communication system characterized by the above.

However, "system" here refers to a logical collection of a plurality of devices (or functional modules that realize specific functions), and each device or functional module is in a single housing. It does not matter whether or not (hereinafter the same).

Many wireless communication systems typified by wireless LANs use a radiated electric field that is generated when a current is passed through an antenna, so that radio waves are emitted regardless of whether there is a communication partner. In addition, the radiated electric field attenuates gently in inverse proportion to the distance from the antenna, so that the signal reaches a relatively far distance and becomes a source of disturbing radio waves to nearby communication systems, and the antenna on the receiver side also surrounds it. The reception sensitivity decreases due to the effects of interference. In short, in the radio wave communication system, it is difficult to realize wireless communication limited to a communication partner at a short distance.

On the other hand, the communication system according to the present invention includes a transmitter that generates a high-frequency signal such as UWB for transmitting data and a receiver that receives and processes the high-frequency signal. Are opposed by a static electric field or an induced electric field when they are opposed to each other at a close distance, and a high frequency signal is transmitted in a non-contact manner.

In a communication system using this type of electrostatic field or induction field, a coupling relationship does not occur when there is no communication partner nearby. In addition, the electric field strengths of the induction electric field and the electrostatic field are steeply attenuated in inverse proportion to the square and the cube of the distance, respectively. That is, an unnecessary electric field is not generated and the electric field does not reach far, so that it does not disturb other communication systems. Further, even when radio waves arrive from a distance, the coupling electrode does not receive radio waves, so that it is not necessary to receive interference from other communication systems. Therefore, weak radio that does not require a radio station license is possible, and it is not necessary to consider prevention of hacking and ensuring confidentiality on the transmission path. In addition, since it is a broadband communication using high-frequency signals such as UWB, it is possible to perform a large-capacity communication over a very short distance. For example, a large amount of data such as a moving image or music data for one CD can be transmitted at high speed in a short time. Can be transferred.

Here, in the high frequency circuit, a propagation loss occurs according to the propagation distance with respect to the wavelength. Therefore, when transmitting a high frequency signal such as UWB, it is necessary to suppress the propagation loss sufficiently low.

Therefore, in the communication system according to the present invention, the high-frequency coupler of the transmitter and the receiver includes a resonance unit and an impedance matching unit. The electric field coupling is strengthened by the mutual resonance parts, and the impedance matching part is configured to match the impedance between the electrodes of the transmitter and the receiver, that is, the coupling part, and suppress the reflected wave. In other words, the pair of high frequency couplers of the transmitter and the receiver are configured to operate as a band pass filter that passes a desired high frequency band.

The impedance matching unit and the resonance unit can be configured by a lumped constant circuit in which a series inductor and a parallel inductor are connected to a high-frequency signal transmission path, for example. However, since the lumped constant circuit determines constants such as inductance L and capacitance C based on the center frequency, impedance matching is not achieved in a band outside the assumed center frequency, and the operation as designed is do not do. In other words, it works effectively only in a narrow band. Particularly in the high frequency band, the resonance frequency is influenced by the fine structure of the lumped constant circuit portion and the variation of inductors and capacitors having a small value, so that it is difficult to adjust the frequency. In addition, when the impedance

matching part and the resonance part are configured with lumped constants, if a small chip inductor is used as the inductor, there is a loss inside the chip inductor, and the propagation loss between the high frequency couplers becomes large. is there.

Further, when the coupler is accommodated in the casing of the device, it is assumed that the center frequency is shifted due to the influence of the surrounding metal parts. For this reason, it is necessary to design the coupler in advance so as to effectively operate at a wide frequency. When a plurality of devices having a narrow band are arranged, the band of the entire system is further narrowed, so that it is difficult to simultaneously use a plurality of high-frequency couplers in a broadband communication system.

Therefore, in the communication system according to the present invention, the high-frequency coupler changes the coupling electrode and the impedance matching unit and the resonance unit for impedance matching between the coupling electrodes from a lumped constant circuit to a distributed constant circuit. By configuring instead, a broader band is realized.

The high-frequency coupler is mounted on a printed circuit board as one of the mounting components, similarly to a circuit module constituting a communication circuit unit that processes a high-frequency signal that transmits data. In such a case, the distributed constant circuit can be configured as a stub composed of a microstrip line or a coplanar waveguide formed on a printed circuit board. Then, a ground is formed on the other surface of the printed circuit board, and the tip portion of the stub may be connected to the ground through a through hole in the printed circuit board. The stub has a length approximately half of the wavelength of the used frequency. Then, the coupling electrode may be disposed at a position substantially at the center of the stub that is the maximum amplitude position of the standing wave.

The coupling electrode can be configured as a conductor pattern deposited on the surface of a spacer made of an insulator. The spacer is a circuit component that is surface-mounted on the printed circuit board. When the spacer is mounted on the printed circuit board, the conductor pattern of the coupling electrode is located approximately at the center of the stub through the through hole in the spacer. Connected to position. Further, by using an insulator having a high dielectric constant as a spacer, the length of the stub can be made shorter than a half wavelength due to the wavelength shortening effect.

However, it is difficult to completely suppress the radiated electric field in the design of an actual high-frequency circuit, and even a communication device originally designed as an electric field coupling type as described above may have a slight mismatch in the circuit or in the ground. There is a problem that unnecessary radio waves are oscillated or received by the current flowing through the.

Therefore, in the communication system according to the present invention, when the high frequency couplers of the transceiver are coupled by an electrostatic field or an induction field, a magnetic loss material is disposed in the vicinity of the coupling electrode.

It is effective to use a radio wave absorber to suppress a radiation electric field that propagates far away and has a large influence between electronic devices. When the radio wave absorber is considered as a distributed constant circuit at a high frequency, the distributed series resistance R (Ω / m) and the distributed parallel conductance G (S / m) play a role of absorbing energy. Here, the distributed series resistance R corresponds to μ'' representing the imaginary part of the complex permeability, and the distributed parallel conductance G is the sum of ϵ'' representing the imaginary part of the complex permittivity and the conductivity σ divided by the angular frequency ω . That is, it corresponds to $\epsilon'' + \sigma / \omega$. The electromagnetic wave absorber is composed of a magnetic loss material having a complex dielectric constant μ'' , a dielectric loss material having a complex dielectric constant ϵ'' , and a conductivity having a conductivity σ depending on the material constant responsible for the loss. The loss material can be classified into three types: the magnetic loss μ'' is caused by the spin responsible for the magnetization in the magnetic material being delayed by the change in the high frequency magnetic field, and the dielectric loss ϵ'' is the dielectric pole that causes the dielectric property of the high frequency electric field. The conductor loss σ is caused by the fact that a current in phase with the electric field flows and the energy of the electromagnetic wave is converted into heat.

Here, the radio wave is a wave in which an "electric field wave" and a "magnetic field wave" are sequentially transmitted through the air, and is a kind of electromagnetic wave. Usually, when a current is passed through a conductor such as an antenna, a magnetic field is generated around the conductor, and an electric field is generated in conjunction with the magnetic field, and a magnetic field is generated by this electric field. A magnetic field and an electric field are alternately repeated, and radio waves arrive up to a relatively long distance (see FIG. 27). The wave of the electric field and the wave of the magnetic field interact like a chain and proceed in the traveling direction of the wave while maintaining an orthogonal relationship (see FIG. 28).

As described above, since the radio wave is accompanied by both the electric field wave and the magnetic field wave, only one of the waves is suppressed, and the other wave is significantly attenuated, so that the propagation can be suppressed. That is, the radio wave can be similarly suppressed by a magnetic loss material that mainly absorbs and attenuates a magnetic field and a dielectric loss material that mainly absorbs and attenuates an electric field.

In a communication system that performs non-contact communication by electric field coupling between opposing electrodes as in the present invention, even if the magnetic loss material is around the coupling electrode, the radio wave is absorbed by the magnetic loss material, and the induced electric field are not easily affected. Therefore, the magnetic loss material placed near the coupling electrode suppresses the effects of unnecessary radio waves and external interference radio waves, and at the same time, stable data communication can be performed by electric field coupling between the transmitter and the receiver at a short distance. it can.

A second aspect of the present invention provides a transmitter circuit unit that generates a high-frequency signal for transmitting data, a transmitter including a high-frequency coupler that transmits the high-frequency signal as an induction magnetic field,

A high-frequency coupler and a receiver including a receiving circuit unit that receives and processes a high-frequency signal received by the high-frequency coupler; The high-frequency coupler of the transmitter and receiver includes a coupling coil and a radio wave absorber disposed in the vicinity of the coupling coil, Transmitting the high-frequency signal by coupling an induction magnetic field between high-frequency couplers facing the transmitter and the receiver, This is a communication system characterized by the above.

According to a second aspect of the present invention, in a magnetic field coupling type communication system in which a transceiver includes a coil coupled to an induction magnetic field and performs non-contact communication at a short distance by magnetic coupling, the coupling coil is a dielectric loss material. It is arranged in a position in the inside or surface. In this case, similar to the case of a non-contact communication system using electric field coupling, if the dielectric loss material is around the coil, the radio wave is absorbed by the dielectric loss material, but the induced magnetic field is hardly affected. For this reason, radio waves are absorbed by dielectric loss material placed near the coupling coil, but at the same time it is stable due to magnetic coupling between the transmitter and receiver at a short distance, while suppressing the effects of unnecessary radio emissions and external interference radio waves. Data communication can be performed.

According to the present invention, electric field coupling is generated in the high frequency band between the couplers of the transceiver and operates effectively in a wide band, and a large-capacity transmission is achieved by forming an electric field coupling transmission line or a magnetic field coupling transmission line that is resistant to noise. An excellent communication system and communication apparatus that can be provided can be provided. The impedance matching part and the resonance part of the high-frequency coupler can be configured as a pattern on the printed circuit board that is a distributed constant circuit, that is, a stub, and can operate suitably in a wide band.

In addition, according to the present invention, an excellent communication system capable of efficiently transmitting a high-frequency signal between couplers

mounted on each information device and enabling large-capacity transmission using electric field coupling or magnetic field coupling at a short distance. In addition, a communication device can be provided.

According to the present invention, it is possible to prevent electromagnetic waves emitted from the transmitter from adversely affecting other electronic devices by suppressing the exchange of unnecessary radio waves, and to prevent malfunction due to external interference radio waves.

Other objects, features, and advantages of the present invention will become apparent from more detailed description based on embodiments of the present invention described later and the accompanying drawings.

Hereinafter, embodiments of the present invention will be described in detail with reference to the drawings.

The present invention relates to a communication system that performs data transmission between information devices using electric field coupling of an electrostatic field or an induction electric field. According to a communication method based on an electrostatic field or an induced electric field, when there is no communication partner nearby, there is no coupling relationship and no radio waves are emitted, so that other communication systems are not disturbed. Further, even when radio waves arrive from a distance, the coupler does not receive radio waves, so that it is not necessary to receive interference from other communication systems.

In the conventional radio communication using an antenna, the electric field strength of the radiated electric field is inversely proportional to the distance, whereas in the induced electric field, the electric field strength is inversely proportional to the distance squared, and in the static electric field, the electric field strength is inversely proportional to the cube of the distance. Therefore, according to the communication method based on electric field coupling, it is possible to configure a weak radio having a noise level for other radio systems in the vicinity, and it is not necessary to obtain a license from the radio station.

An electrostatic field that varies with time may be referred to as a "quasi-electrostatic field". In this specification, however, the electrostatic field is collectively referred to as an "electrostatic field".

Conventional communication using an electrostatic field or an induction field uses a low-frequency signal and is not suitable for transmitting a large amount of data. On the other hand, in the communication system according to the present invention, high-capacity transmission is possible by transmitting a high-frequency signal by

electric field coupling. Specifically, by applying a communication method using a high frequency and a wide band, such as UWB communication, to electric field coupling, it is possible to realize weak data and large capacity data communication.

UWB communication uses a very wide frequency band of 3.1 GHz to 10.6 GHz, and can realize high-capacity wireless data transmission of about 100 Mbps despite a short distance. In addition, UWB communication allows data transmission exceeding 100 Mbps without occupying a transmission band of 3.1 GHz to 10.6 GHz, and considering the ease of making an RF circuit, 3.1-4. A transmission system using a 9 GHz UWB low band is also actively developed.

The present inventors consider that a data transmission system using UWB low band is one of effective wireless communication technologies installed in mobile devices. For example, it is possible to realize high-speed data transmission in a short-distance area such as an ultra-high-speed short-range DAN (Device Area Network) including a storage device. According to a UWB communication system using electric field coupling such as an electrostatic field and an induction field, data communication by a weak electric field is possible and, for example, a large amount of data such as a moving image or music data for one CD can be quickly and quickly. : think it can be transferred with.

FIG. 1 shows a configuration example of a non-contact communication system using electric field coupling by an electrostatic field or an induction electric field. The illustrated communication system includes a transmitter 10 that transmits data and a receiver 20 that receives data. As shown in the figure, when the high-frequency couplers of the transceivers are arranged face to face, the two electrodes operate as one capacitor, and as a whole operate like a band-pass filter; the two high-frequency couplers High-frequency signals can be efficiently transmitted between the two. In the communication system shown in the figure, in order to suitably form a transmission path by electric field coupling, sufficient impedance matching is achieved between the high-frequency couplers of the transmitter and receiver, and it operates effectively in a high frequency band and in a wide band. It is necessary to.

The transmitter / receiver electrodes 14 and 24 of the transmitter 10 and the receiver 20 are disposed to face each other with a spacing of, for example, about 3 cm, and can be coupled to each other. The transmission circuit unit 11 on the transmitter side generates a high-frequency transmission signal such as a UWB signal based on transmission data when a transmission request is generated from a higher-level application, and the signal propagates from the transmission electrode 14 to the reception electrode 24. Then, the receiving circuit unit 21 on the receiver 20 side demodulates and decodes the received high-frequency signal and passes the reproduced data to the upper application.

According to a communication method using a high frequency and a wide band like UWB communication, it is possible to realize ultrahigh-speed data transmission of about 100 Mbps at a short distance. In addition, when UWB communication is performed by electric field coupling instead of radio wave communication, the electric field strength is inversely proportional to the cube of the distance or the square of the distance, so the electric field strength (radio wave strength) at a distance of 3 meters from the radio equipment is By suppressing the frequency to a predetermined level or less, it is possible to obtain a weak radio that does not require a radio station license, and a communication system can be configured at low cost. In addition, when data communication is performed at an extremely short distance by the electric field coupling method, the signal quality is not deteriorated by the reflecting objects present in the vicinity, and it is not necessary to consider the prevention of hacking and ensuring the confidentiality on the transmission line. There are advantages such as.

On the other hand, since the propagation loss increases according to the propagation distance with respect to the wavelength, it is necessary to sufficiently suppress the propagation loss when a high-frequency signal is propagated by electric field coupling. In a communication system that transmits high-frequency broadband signals such as UWB signals by electric field coupling, even ultra-short-distance communication of about 3 cm is equivalent to about one-half wavelength for the used frequency band of 4 GHz, so it is ignored. It is a length that cannot be done. In particular, the problem of characteristic impedance is more serious in a high-frequency circuit than in a low-frequency circuit, and the influence of impedance mismatch becomes apparent at the coupling point between the electrodes of the transceiver.

In communication using frequencies in the kHz or MHz band, the propagation loss in space is small, so that the transmitter and receiver have a coupler consisting only of electrodes as shown in FIG. 2, and the coupling part is simply a parallel plate capacitor. Even in the case of operating as, it is possible to perform desired data transmission. However, in communication using high frequency in the GHz band, since propagation loss in space is large, it is necessary to suppress signal reflection and improve transmission efficiency. As shown in FIG. 3, even if the high-frequency signal transmission path is adjusted to a predetermined characteristic impedance Z_0 in each of the transmitter and the receiver, impedance matching is performed at the coupling portion only by coupling with a parallel plate capacitor, I can't take it. For this reason, in the impedance mismatching part in a coupling part, a signal is reflected, a propagation loss arises, and efficiency falls. For example, even if the high-frequency signal transmission line connecting the transmission circuit unit 11 and the transmission electrode 14 is a coaxial line with 50Ω impedance matching, the impedance at the coupling portion between the transmission electrode 14 and the reception electrode 24 is low. If they are mismatched, the signal is reflected to cause a propagation loss.

Therefore, as shown in FIG. 4, the high-frequency couplers disposed in the transmitter 10 and the receiver 20 are connected to the plate-like electrodes 14 and 24, the series inductors 12 and 22, and the parallel inductors 13 and 23, respectively. Connected to the transmission line. When such a high-frequency coupler is disposed facing each other as shown in FIG. 5, the two electrodes operate as one capacitor and operate like a band-pass filter as a whole. High-frequency signals can be efficiently transmitted between the two. Here, the high-frequency signal transmission line indicates a coaxial cable, a microstrip line, a coplanar line, or the like.

Here, if the purpose is simply to perform impedance matching between the electrodes of the transmitter 10 and the receiver 20, that is, the coupling portion, to suppress the reflected wave, each coupler is connected as shown in FIG. 6A. It is not necessary to configure the flat electrodes 14 and 24, the series inductors 12 and 22 and the parallel inductors 13 and 23 to be connected to the high-frequency signal transmission path, and each coupler is formed as a flat electrode 14 as shown in FIG. 6B. , 24 and a series inductor may be connected to a high-frequency signal transmission line. That is, even when a series inductor is inserted on the high-frequency signal transmission line, when there is a coupler on the receiver side at a very short distance facing the coupler on the transmitter side, the impedance at the coupling portion becomes continuous. It is possible to design as such.

However, in the configuration example shown in FIG. 6B, there is no change in the characteristic impedance before and after the coupling portion, so the magnitude of the current does not change. On the other hand, as shown in FIG. 6A, when connected to the ground via the parallel inductance before the electrode at the end of the high-frequency signal transmission path, the coupler alone has the characteristic impedance Z_0 on the near side of the coupler. On the other hand, the characteristic impedance Z_{1st} at the end of the coupler is reduced (that is, $Z_0 > Z_{1st}$), so that it has a function as an impedance conversion circuit, and the output current of the coupler with respect to the input current I_0 to the coupler, I_1 can be amplified (ie, $I_0 < I_1$).

7A and 7B show a state in which an electric field is induced by electric field coupling between electrodes in each of the couplers with and without the parallel inductance. From this figure, it can be understood that the coupler is provided with a parallel inductor in addition to the series inductor, thereby inducing a larger electric field and causing strong coupling between the electrodes. When a large electric field is induced near the electric field as shown in FIG. 7A, the generated electric field propagates in the front direction of the electrode surface as a longitudinal wave that vibrates in the traveling direction. This electric wave makes it possible to propagate a signal between the electrodes even when the distance between the electrodes is relatively large.

Therefore, in a communication system that transmits high-frequency signals such as UWB signals by electric field coupling, the essential conditions for a high-frequency coupler are as follows.

- (1) There is an electrode for coupling by an electric field.
- (2) There is a parallel inductor for coupling with a stronger electric field.
- (3) in the frequency band used for communication, the inductor and capacitor constants are set so that impedance matching can be achieved when the coupler is placed face to face.

As shown in FIG. 5, the band-pass filter comprising a pair of high-frequency couplers whose electrodes face each other has its pass frequency f_0 determined by the inductance of the series inductor and the parallel inductor and the capacitance of the capacitor constituted by the electrodes. can do. FIG. 8 shows an equivalent circuit of a bandpass filter composed of a set of high-frequency couplers. If the characteristic impedance R_0 [Ω], the center frequency f_0 [Hz], the phase difference between the input signal and the passing signal is α [radian] ($\pi < \alpha < 2\pi$), and the capacitance of the capacitor constituted by the electrodes is $C/2$. The constants L_1 and L_2 of the parallel and series inductances constituting the band pass filter can be obtained by the following equations according to the operating frequency f_0 .

Further, when the coupler functions as an impedance conversion circuit as a single unit, the equivalent circuit is as shown in FIG. in the illustrated circuit diagram, an impedance conversion circuit that converts the characteristic impedance from R_1 to R_2 by selecting the parallel inductance L_1 and the series inductance L_2 in accordance with the operating frequency f_0 so as to satisfy the following equation. Can be configured.

As described above, in the non-contact communication system shown in FIG. 1, a communication device that performs UWB communication uses the high-frequency coupler shown in FIG. 4 instead of using an antenna in a conventional radio communication device of radio wave communication system. As a result, it is possible to realize ultra-short distance data transmission having unprecedented characteristics.

As shown in FIG. 5, the two high-frequency couplers whose electrodes face each other with a very short distance operate as a band-pass filter that passes a signal in a desired frequency band, and a single high-frequency coupler. Acts as an impedance conversion circuit that amplifies the current. On the other hand, when the high-frequency coupler is placed alone in free space, the input impedance of the high-frequency coupler does not match the characteristic impedance of the high frequency signal transmission path, so that the signal entering from the high-frequency signal transmission path is reflected in the high-frequency coupler. Not radiated outside.

Therefore, in the non-contact communication system shown in FIG. 1, when there is no partner to communicate with on the transmitter side, radio waves do not flow like an antenna, and the partner to communicate with approaches each electrode. Only when a capacitor is formed, high-frequency signals are transmitted by impedance matching as shown in FIG.

Here, consider the electromagnetic field generated in the coupling electrode on the transmitter side. FIG. 10 shows an electromagnetic field generated by a minute dipole. As shown in the figure, the electromagnetic field is roughly divided into an electric field component (transverse wave component) E_θ that vibrates in a direction perpendicular to the propagation direction and an electric field component (longitudinal wave component) E_R that vibrates in a direction parallel to the propagation direction. . In addition, a magnetic field H_ϕ is generated around the minute dipole. The following equation represents the electromagnetic field due to a small dipole, but since an arbitrary current distribution can be considered as a continuous collection of such small dipoles, the electromagnetic field induced thereby has similar properties (for example, (See, "Antenna / Radio Wave Propagation" by Yasuto Mushiaki (Corona, pages 16-18)).

As can be seen from the above equation, the transverse wave component of the electric field includes a component that is inversely proportional to the distance (radiated electric field), a component that is inversely proportional to the square of the distance (induced electric field), and a component that is inversely proportional to the cube of the distance (electrostatic field).). Further, the longitudinal wave component of the electric field is composed of only a component inversely proportional to the square of the distance (inductive electric field) and a component inversely proportional to the cube of the distance (electrostatic field), and does not include the component of the radiated electromagnetic field. Further, the electric field E_R becomes maximum in the direction in which $|\cos \theta| = 1$, that is, in the direction of the arrow in FIG.

In the radio communications are widely used in wireless communication, radio wave emitted from an antenna is a transverse wave $E_{\theta\text{eta}}$ oscillating in the perpendicular direction its traveling direction, the radio wave can not communicate with the direction of polarization is orthogonal. In contrast, electromagnetic waves emitted from the coupling electrode in a communication system utilizing an electrostatic field or an induced electric field, in addition to the transverse wave $E_{\theta\text{eta}}$, including longitudinal wave E_R which oscillates in the traveling direction. The longitudinal wave E_R is also called "surface wave". Incidentally, a surface wave can also propagate through the inside of a medium such as a conductor, a dielectric material, or a magnetic material.

Of the transmission waves using an electromagnetic field, those having a phase velocity v smaller than the light velocity c are called slow waves, and those having a larger phase velocity v are called fast waves. The surface wave corresponds to the former slow wave.

longitudinal wave electric field component E_z is generated on the surface of the coupling electrode, but the transverse wave component E_θ including the radiation electric field is changed to E_R . Since it is relatively small, almost no radio waves are emitted. That is, no disturbing wave to other neighboring systems is generated. Also, most of the signal input to the high frequency coupler is reflected by the electrode and returns to the input end.

On the other hand, when one set of high-frequency couplers is used, that is, when the high-frequency couplers are arranged at a short distance between the transmitter and the receiver, the coupling electrodes are coupled mainly by a quasi-electrostatic field component to form one capacitor. It works like a bandpass filter and is in a state where impedance matching is achieved. Therefore, most of the signal / power is transmitted to the other party in the passing frequency band, and the reflection to the input end is small. The "short distance" here is defined by the wavelength λ , and corresponds to the distance d between the coupling electrodes being $d \ll \lambda / 2\pi$. For example, when the use frequency f_0 is 4 GHz, the distance between the electrodes is 10 mm or less.

Also, when placing the EFC medium distance between the transmitter and the receiver are on the periphery of the coupling electrode of the transmitter, the electrostatic field is attenuated, the longitudinal wave electric field E_R mainly composed of an induced electric field is generated. Longitudinal wave electric field E_R is received by the coupling electrode of the receiver, the signal is transmitted. However, in comparison with the case where both couplers are arranged at a short distance, in the high frequency coupler on the transmitter side, the ratio of the input signal reflected by the electrode and returning to the input end becomes higher. The "medium distance" here is defined by the wavelength λ , the distance d between the coupling electrodes is about 1 to several times larger than $\lambda / 2\pi$, and the distance between the electrodes is 10 to 40 mm when the use frequency f_0 is 4 GHz. At the time.

As described above, in the high-frequency coupler shown in FIG. 4, the operating frequency f_0 of the impedance matching unit is determined by the constants L_1 and L_2 of the parallel inductor and the series inductor. It is a general circuit manufacturing method to configure these series inductors 12 and 22 and parallel inductors 13 and 23 with circuit elements that are regarded as lumped constant circuits. However, it is known that a lumped constant circuit has a narrower band than a distributed constant circuit in a high-frequency circuit, and the inductor constant becomes small when the frequency is high, so that there is a problem that the resonance frequency shifts due to variations in the constant.

Therefore, in the present invention, the high frequency coupler is configured by replacing the lumped constant circuit from the lumped constant circuit and the distributed constant circuit in the impedance matching section and the resonance section, thereby realizing a wide band. FIG. 11 shows a configuration example of a high-frequency coupler using a distributed constant circuit for the impedance matching unit and the resonance unit.

In the illustrated example, a high-frequency coupler is disposed on a printed circuit board 101 having a ground conductor 102 formed on the lower surface and a printed pattern formed on the upper surface. Instead of a parallel inductor and a series inductor, a microstrip line or a coplanar waveguide, that is, a stub 103 is formed as an impedance matching unit and a resonance unit of a high frequency coupler, and a transmission / reception circuit is connected via a signal line pattern 104. The module 105 is connected. The stub 103 is connected to the ground 102 on the lower surface via a through hole 106 penetrating the printed circuit board 101 at the tip, and is short-circuited, and is connected to the coupling electrode 108 via a metal wire 107 near the center of the stub 103. is done.

The "stub" in the technical field of electronics is a general term for electric wires with one end connected and the other end not connected or connected to the ground, and is used for adjustment, measurement, impedance matching, filters, etc. Provided on the way.

The length of the stub 103 is about a half wavelength of the high frequency signal, and the signal line 104 and the stub 103 are formed by a microstrip line, a coplanar line, or the like on the printed circuit board 101. When the length of the stub 103 is a half wavelength and the tip is short-circuited, the voltage amplitude of the standing wave generated in the stub 103 becomes 0 at the tip of the stub, and from the center of the stub, that is, from the tip of the stub 103. It is maximum at a quarter wavelength (see FIG. 12). By connecting the coupling electrode 108 with the metal wire 107 at the center of the stub 103 having the maximum voltage amplitude, a high-frequency coupler with good propagation efficiency can be made.

Since the impedance matching section is composed of a stub 103, that is, a distributed constant circuit composed of a microstrip line or a coplanar waveguide on the printed circuit board 101, uniform characteristics can be obtained over a wide band. Therefore, the communication system shown in FIG. On the other hand, it is possible to apply a frequency spread modulation scheme such as DSSS (Direct Sequence Spread Spectrum) and OFDM (Orthogonal Frequency Division Multiplexing). The stub 103 is a microstrip line or a coplanar waveguide on the printed circuit board 101, and since its direct current resistance is small, there is little loss even for a high-frequency signal, and propagation loss between high-frequency couplers can be reduced.

Since the size of the stub 103 constituting the distributed constant circuit is as large as about a half wavelength of a high-frequency signal, the dimensional error due to manufacturing tolerances is very small compared to the overall length, resulting in variations in characteristics. Hateful.

FIG. 13 shows a comparison of frequency characteristics of the high-frequency coupler when the impedance matching unit is composed of a lumped constant circuit and a distributed constant circuit. However, the high-frequency coupler in which the impedance matching unit is configured by a lumped constant circuit, as shown in FIG. 14, a coupling electrode is disposed at the tip of the signal line pattern on the printed circuit board via a metal wire, and the signal line it is assumed that a parallel inductor component is mounted at the tip of the pattern, and the other end of the parallel inductor is connected to a ground conductor through a through hole in the printed circuit board. Moreover, as shown in FIG. 15, the high frequency coupler which comprised the impedance matching part with the distributed constant circuit has a metal wire in the center of the stub formed on the printed circuit board and having a length of a half wavelength. It is assumed that a coupling electrode is provided and the stub is connected to the ground conductor at the tip thereof through a through hole in the printed circuit board. It is assumed that each high frequency coupler is adjusted so that the operating frequency is around 3.8 GHz. 14 and 15, a high frequency signal is transmitted from the port 1 to the port 2 by the microstrip line, and each high frequency coupler is disposed in the middle of the microstrip line. The frequency characteristic is measured as a transfer characteristic from port 1 to port 2 and the result is shown in FIG.

Since the high-frequency coupler can be regarded as an open end when it is not coupled with other high-frequency couplers, the high-frequency signal input from the port 1 is not supplied to the high-frequency coupler but is transmitted to the port 2 as it is. Therefore, in the vicinity of 3.8 GHz, which is the operating frequency of the high frequency coupler, the propagation loss S_{21} representing the signal intensity transmitted from the port 1 to the port 2 is a large value in either high frequency coupler. However, in the case of the high frequency coupler shown in FIG. 14, the value of S_{21} is greatly reduced at a frequency deviating back and forth from the operating frequency. On the other hand, it can be seen that the high frequency coupler shown in FIG. 15 maintains good characteristics with a large value of S_{21} over a wide frequency band centered on the operating frequency. That is, it can be said that the high-frequency coupler operates effectively in a wide band by configuring the impedance matching unit with a distributed constant circuit.

In the vicinity of the center of the stub 103, the coupling electrode 108 is connected via the metal wire 107, and it is preferable that the metal wire is connected at the approximate center of the coupling electrode 108. This is because, by connecting a high-frequency transmission line to the center of the coupling electrode, current flows evenly in the electrode, and unnecessary radio waves are not emitted in the direction substantially perpendicular to the electrode surface in front of the electrode (see FIG. 16A). For example, if a high-frequency transmission line is connected at a position offset from the center of the coupling electrode, an unequal current flows in the termination electrode and operates like a microstrip antenna, radiating unnecessary radio waves. (See FIG. 16B).

Also, in the field of radio wave communication, as shown in FIG. 17, a "capacitance loaded type" antenna is widely known in which a metal is attached to the tip of an antenna element to provide a capacitance, and the height of the antenna is shortened. At first glance, the structure is similar to the coupler shown in FIG. Here, the difference between the coupler used in the transceiver in this embodiment and the capacity loaded antenna will be described.

The capacitively loaded antenna shown in FIG. 17 radiates radio waves in the directions B_1 and B_2 around the radiating element of the antenna, but the A direction is a null point that does not radiate radio waves. When the electric field generated around the antenna is examined in detail, the radiation electric field attenuated in inverse proportion to the distance from the antenna, the induced electric field attenuated in inverse proportion to the square of the distance from the antenna, and the distance from the antenna 3 An electrostatic field that decays in inverse proportion to the power is generated. Since the induced electric field and the electrostatic field are attenuated more rapidly depending on the distance than the radiated electric field, only the radiated electric field is discussed in a normal wireless system, and the induced electric field and the electrostatic field are often ignored. Therefore, even the capacitively loaded antenna shown in FIG. 17 generates an induced electric field and an electrostatic field in the direction A, but since it attenuates quickly in the air, it is actively used in radio communication. Absent.

Up to this point, the configuration of a high-frequency coupler used in a transceiver has been described in an electric field coupling type non-contact communication system in which a communication distance is limited to a short distance and coupling is performed by an electrostatic field or an induction electric field. If the coupling electrode is ideally designed, generation of unnecessary radio waves can be suppressed and reception of external radio waves can be prevented. This also applies to a magnetic field coupling type non-contact communication system in which coupling is performed by an induction magnetic field between coupling coils.

However, in practice, it is difficult to design a high-frequency circuit so as to completely suppress the radiated electric field, and even a communication device originally designed to be an electric field coupling type may not be able to detect minor mismatches in the circuit or the ground. There is a problem that unnecessary radio waves are oscillated or received by a flowing current or the like.

For example, in the high frequency coupler shown in FIG. 11, in order to avoid the electric field coupling between the ground conductor 102 and the coupling electrode 108 and to ensure the electric field coupling action with the high frequency coupler on the receiver side, the printed circuit board 101 is used. A sufficient height from the stub 103 on the circuit mounting surface to the coupling electrode 108 connected through the metal wire 107 must be taken. However, if the height from the circuit mounting surface to the coupling electrode 108 is too large, the metal wire 107 connecting the printed circuit board 101 and the coupling electrode 108 acts as an antenna, which is unnecessary due to the current flowing through the inside. Radio waves are emitted.

For example, assuming that the input power to the coupler is 100, a situation in which a power of 10 is radiated as a radio wave can be considered. As described above, the radio wave generated by the radiated electric field propagates farther than the static electric field and the induced electric field, so that the influence on the external electronic device and the influence on the external electronic device are large.

Therefore, in the communication system according to the present invention, the impedance matching section and the resonance section of the high frequency coupler are configured by a distributed constant circuit to widen the band, and a radio wave absorber is not provided in the high frequency coupler. Introducing a system that suppresses the exchange of radio waves, suppresses electromagnetic waves emitted from radios, and prevents adverse effects on other electronic devices and malfunctions caused by external interference radio waves.

It is effective to use a radio wave absorber to suppress a radiation electric field that propagates far away and has a large influence between electronic devices. When the radio wave absorber is considered as a distributed constant circuit at a high frequency, the distributed series resistance R (Ω / m) and the distributed parallel conductance G (S / m) play a role of absorbing energy. Here, the distributed series resistance R corresponds to μ'' representing the imaginary part of the complex permeability, and the distributed parallel conductance G is the sum of ϵ'' representing the imaginary part of the complex permittivity and the conductivity σ divided by the angular frequency ω . That is, it corresponds to $\epsilon'' + \sigma / \omega$. The electromagnetic wave absorber is composed of a magnetic loss material having a complex dielectric constant μ'' , a dielectric loss material having a complex dielectric constant ϵ'' , and a conductivity having a conductivity σ depending on the material constant responsible for the loss. There are three types of lossy materials.

The magnetic loss μ'' here is caused by the fact that the spin responsible for the magnetization in the magnetic material is delayed in the change of the high-frequency magnetic field. The magnetic material causing such magnetic loss has a high magnetic permeability such as ferrite. In addition, the dielectric loss ϵ'' is caused by the fact that the dipole providing the dielectric property is delayed from the change of the high frequency electric field. Further, the conductor loss σ is generated when a current having the same phase as the electric field flows and the energy of the electromagnetic wave is converted into heat. Incidentally, in the high frequency region, absorption due to dielectric loss of radio waves and absorption due to conductor loss may not be distinguished, and they may be collectively defined as dielectric loss. As

a dielectric loss material, what impregnated carbon to resin, such as urethane foam and styrene, is mentioned, for example.

Here, radio waves are waves in which "electric field waves" and "magnetic field waves" are sequentially transmitted through the air. Electric field waves and magnetic field waves interact like a chain and maintain an orthogonal relationship. Proceed in the direction of wave travel (see FIGS. 27 and 28). That is, since a radio wave is accompanied by both an electric field wave and a magnetic field wave, only one of the waves is suppressed, and the other wave is significantly attenuated, so that the propagation can be suppressed.

Magnetic loss materials can absorb radio waves by losing magnetic field waves and disrupting their interaction with electric field waves, but they do not affect electric fields such as electrostatic and induction fields. It is done. Therefore, in the present embodiment, as the radio wave absorber, a magnetic loss material that mainly absorbs and attenuates the magnetic field is disposed in the vicinity of the coupling electrode of the high frequency coupler. For example, a magnetic material such as ferrite can be used as the radio wave absorber.

The magnetic loss material disposed in the vicinity of the coupling electrode absorbs unwanted radio waves generated from the coupling electrode and interference waves coming from the outside as a result of the loss of the magnetic field component of the electromagnetic wave. In addition, although the induction magnetic field also suffers loss, there is no influence on the electric field coupling by the electrostatic field or induction electric field with the high frequency coupler on the communication partner side. Therefore, in the electric field coupling type non-contact communication system as shown in FIG. 1, it is possible to suppress the influence of unnecessary radio wave emission and external interference radio waves, and at the same time, stable data by electric field coupling of an electrostatic field at a short distance. Transmission can be performed.

As a modification of the above, in a magnetic field coupling type non-contact communication system in which the transmitter / receiver includes a coil coupled by an induction magnetic field and performs non-contact communication at a short distance by magnetic coupling, the coupling coil is a dielectric loss. It is conceivable to arrange it inside or on the surface of the material.

As already mentioned, radio waves are waves in which "electric field waves" and "magnetic field waves" are sequentially transmitted through the air. However, dielectric loss materials lose electric field waves and interact with magnetic field waves. By disrupting the action, radio waves can be absorbed, but it is considered that magnetic fields such as induced magnetic fields are not affected. Therefore, a dielectric loss material that mainly absorbs and attenuates the electric field is disposed as a radio wave absorber in the vicinity of the coupling coil of the high frequency coupler. For example, a resin such as urethane foam or styrene impregnated with carbon can be used as the radio wave absorber.

The dielectric loss material disposed in the vicinity of the coupling coil, the electric field component of the electromagnetic wave as a result of loss, interference waves coming from unwanted radio waves or external generated by coupling coil is absorbed. In addition, although an electric field such as an electrostatic field or an induction field also suffers a loss, there is no influence on the magnetic field coupling by the induction magnetic field with the high frequency coupler on the communication partner side. Therefore, in the magnetic field coupling type non-contact communication system, it is possible to suppress the influence of unnecessary radio wave radiation and external interference radio waves, and at the same time, perform stable data transmission by magnetic field coupling of induction magnetic fields at a short distance.

Hereinafter, a case where a magnetic loss material is applied to a coupling electrode of a high-frequency coupler for performing electric field coupling type non-contact communication will be described as a specific example.

FIG. 18 shows a configuration example in which a magnetic loss material is arranged in the vicinity of the coupling electrode of the high frequency coupler shown in FIG. As shown in the figure, by covering the coupling electrode, the metal wire, and the resonance part with a magnetic loss material, it is possible to suppress the influence of unnecessary radio wave radiation and external noise.

Here, the current flowing through the coupling electrode will be examined in detail. When the center of the coupling electrode is connected to the resonance part composed of the stub through the metal wire, as shown in FIG. 19, the current A and the current B are opposite to each other in the outer peripheral direction from the center of the coupling electrode. Flows. The radio waves generated by the currents A and B are also opposite to each other and cancel each other, so that no radio waves are emitted. On the other hand, a current C flows through the metal wire connecting the coupling electrode and the resonance part toward the coupling electrode. No current flows in the opposite direction to this current C. That is, the current C flowing through the metal wire is not canceled and causes unnecessary radio waves.

On the other hand, in the present embodiment, as shown in FIG. 18, a magnetic loss material is disposed so as to cover the metal wire, and a magnetic field wave generated as a current passes through the gold loss wire. As a result, the generation of radio waves can be suppressed.

As a modification of the high frequency coupler shown in FIG. 18, as shown in FIG. 20, the magnetic loss material may be removed from the surface of the coupling electrode. As described with reference to FIG. 19, when joining with a metal wire at the center of the coupling electrode, currents flowing through the coupling electrode cancel each other and no radio wave is generated (see FIG. 19A). There is no need to coat with a magnetic loss material. Further, according to such a configuration, the distance between the two coupling electrodes for communication can be further reduced, and the communication quality can be improved by increasing the electric field strength.

FIG. 21 shows another configuration example of the high-frequency coupler in which a magnetic loss material is disposed in the vicinity of the coupling electrode. In the drawing, a $\lambda/2$ -length stub as a resonance part is formed on a printed circuit board as a print pattern, and a conductor pin as a metal wire protrudes from a substantially central part thereof. On the other hand, the box made of magnetic loss material has a depth substantially equal to the height of the pin, and a coupling electrode is formed on the bottom surface thereof by plating or the like. Attach this box so that it is joined to the printed circuit board at the edge of the opening (or accommodate the pin inside the box), and attach so that the tip of the pin abuts at the approximate center of the coupling electrode. Determine the position. The box-shaped magnetic loss material is mounted on the printed circuit board by a process such as reflow soldering.

22 and 23 show still another configuration example of the high-frequency coupler in which a magnetic loss material is disposed in the vicinity of the coupling electrode.

As shown in FIG. 22, for example, a magnetic loss material having an appropriate height in a quadrangular prism shape is provided with a through hole to be inserted. A conductive material is formed on the top surface of the magnetic loss material and the inner periphery of the through hole by a process such as vapor deposition. The conductive pattern on the upper surface forms a coupling electrode, the conductive part attached to the inner periphery of the through hole corresponds to a metal wire for supplying current, and the conductive part at the lower end of the through hole is a connection terminal for a resonance part made of a stub. It becomes. Similar to the above, a $\lambda/2$ -length stub as a resonance part is formed on the printed circuit board as a print pattern, and the position of the magnetic loss material is determined and attached so that the connection terminal abuts substantially at the center. The magnetic loss material is mounted on the printed circuit board by a process such as reflow soldering. Further, as shown in FIG. 23, the magnetic loss material can be formed in a hollow shape.

Although the electric field coupling type non-contact communication system has been described above, the effect of the magnetic loss material on the electrode that performs electric field coupling is the same as the coupling coil that performs magnetic field coupling in the magnetic field coupling type non-contact communication system. This is similar to the effect brought about by the dielectric loss material. Therefore, as shown in FIG. 24, even when the coupling coil is covered with a dielectric

loss material, the electromagnetic wave generated from the wireless device is prevented from adversely affecting other electronic devices, and the malfunction due to the external interference radio wave is prevented. Can be prevented.

So far, a mechanism for transmitting signals between a pair of high frequency couplers in the electric field coupling type non-contact communication system shown in FIG. 1 has been described. Here, when a signal is transmitted between two devices, energy transfer is inevitably involved. Therefore, this type of communication system can be applied to power transmission. As described above, the electric field E generated by the EFC antenna of the transmitter is the air propagates as a surface wave, power can be taken out by rectifying and stabilizing a signal received by the EFC at the receiver.

FIG. 25 shows a configuration example when a communication system using a high frequency coupler is applied to power transmission.

In the illustrated system, a charger connected to an AC power source and a wireless communication device are brought close to each other, so that power is transmitted and charged to the wireless communication device in a non-contact manner via a high-frequency coupler built in them. However, the high frequency coupler is used only for power transmission.

When the receiving high-frequency coupler is not near the transmitting high-frequency coupler, most of the power input to the transmitting high-frequency coupler is reflected and returns to the DC / AC inverter side. Radiation can be suppressed. In addition, slight radio wave radiation leaking from the metal wire connected to the center of the coupling electrode is absorbed by the magnetic loss material provided in the vicinity of the metal wire, thereby further suppressing the leaked radio wave to the outside. It becomes possible. When performing non-contact power transmission, since the transmission output is generally larger than the output power for communication purposes, suppression of leaked radio waves is particularly demanding.

Moreover, although the example which performs charge to a radio | wireless communication apparatus was given in the figure, you may make it perform the non-contact electric power transmission not only to a radio | wireless machine but the music player or a digital camera, for example.

FIG. 26 shows another configuration example in which a communication system using a high-frequency coupler is applied to power transmission. The illustrated system is configured to use a high-frequency coupler and a surface wave transmission line for both power transmission and communication.

The timing for performing communication and power transmission is switched by a communication / transmission (reception) switching signal sent from the transmission circuit unit. For example, communication and power transmission may be switched at a predetermined cycle. At this time, the power transmission output can be kept optimal by adding the charging state to the communication signal and feeding back to the charger side. For example, when charging is completed, the information may be sent to the charger side, and the power transmission output may be set to zero.

In the system shown in the figure, the charger is connected to an AC power supply. However, for example, the battery can be used to distribute power from another mobile phone to a mobile phone with a low battery. It may be used.

The present invention has been described in detail above with reference to specific embodiments. However, it is obvious that those skilled in the art can make modifications and substitutions of the embodiment without departing from the gist of the present invention.

In the present specification, the embodiment applied to a communication system in which a UWB signal is data-transmitted by electric field coupling in a cableless manner has been mainly described, but the gist of the present invention is not limited to this. For example, the present invention can be similarly applied to a communication system that uses a high-frequency signal other than the UWB communication method and a communication system that performs data transmission by electric field coupling using a relatively low frequency signal.

In this specification, the embodiment applied to a communication system that performs non-contact communication by electric field coupling between opposing electrodes has been mainly described. However, the transmitter / receiver includes a coil that couples to an induced magnetic field, and is magnetically It can also be applied to magnetic-field-coupled communication systems that perform non-contact communication at short distances by coupling, and is stable while suppressing adverse effects on other systems caused by unnecessary radio waves and malfunctions caused by external interference radio waves. Non-contact communication can be realized.

In the present specification, the embodiment in which the present invention is applied to a system that performs data communication between a pair of high-frequency couplers has been mainly described. However, when a signal is transmitted between two devices, it is inevitable. It is naturally possible to apply this type of communication system to power transmission because it involves energy transfer.

In short, the present invention has been disclosed in the form of exemplification, and the description of the present specification should not be interpreted in a limited manner. In order to determine the gist of the present invention, the claims should be taken into consideration.

FIG. 1 is a diagram illustrating a configuration example of a non-contact communication system using electric field coupling by an electrostatic field or an induction electric field. FIG. 2 is a diagram showing a configuration example in which a transmitter and a receiver include a coupler composed only of electrodes in a communication using frequencies in the kHz or MHz band, and the coupling portion simply operates as a parallel plate capacitor. FIG. 3 is a diagram illustrating a state in which a propagation loss occurs due to reflection of a signal in an impedance mismatching portion in a coupling portion in communication using a high frequency in the GHz band. FIG. 4 is a diagram showing an equivalent circuit of a high-frequency coupling circuit in which an impedance matching unit and a resonance unit are configured by a lumped constant circuit. FIG. 5 is a diagram illustrating a state in which the electrodes of the high-frequency coupler illustrated in FIG. 4 are arranged to face each other. FIG. 6A is a diagram for explaining the characteristics of the high-frequency coupler shown in FIG. 4 alone. FIG. 6B is a diagram for explaining the characteristics of the high-frequency coupler shown in FIG. 4 alone. FIG. 7A is a diagram illustrating a state in which the high frequency coupler induces an electric field by the function as an impedance converter. FIG. 7B is a diagram illustrating a state in which the high frequency coupler induces an electric field by the function as an impedance converter. FIG. 8 is a diagram showing an equivalent circuit of a bandpass filter configured by arranging the two high-frequency couplers shown in FIG. 4 to face each other. FIG. 9 is a diagram showing an equivalent circuit of an impedance conversion circuit configured as a single high-frequency coupler. FIG. 10 is a diagram showing an electromagnetic field generated by a minute dipole. FIG. 11 is a diagram illustrating a configuration example of a high-frequency coupler using a distributed constant circuit for the impedance matching unit and the resonance unit. FIG. 12 is a diagram illustrating a state in which a standing wave is generated in the stub 103. FIG. 13 is a diagram showing a comparison of the frequency characteristics of the high-frequency coupler when the impedance matching unit is composed of a lumped constant circuit and a distributed constant circuit. FIG. 14 is a diagram illustrating a high-frequency coupler in which an impedance matching unit is configured by a lumped constant circuit. FIG. 15 is a diagram illustrating a high-frequency coupler in which an impedance matching unit is configured by a distributed constant circuit. FIG. 16A is a diagram illustrating a state in which a high-frequency transmission line is connected to the center of the coupling electrode. FIG. 16B is a diagram illustrating a state in which a high-frequency transmission line is connected to a position having an offset from the center of the coupling electrode, and an unequal current flows in the conclusion electrode. FIG. 17 is a diagram showing a configuration example of a "capacitance loaded type" antenna in which a metal is attached to the tip of the antenna element to give a capacitance and the height of the antenna is shortened. 18 is a diagram showing a configuration example in which a magnetic loss material is arranged in the vicinity of the coupling electrode of the high-frequency coupler shown in FIG. FIG. 19 is a diagram for explaining radio waves generated in the high frequency coupler. FIG. 20 is a diagram illustrating a configuration example of a high-frequency coupler in which a magnetic loss material is removed from the

surface of the coupling electrode. FIG. 21 is a diagram illustrating another configuration example of the high-frequency coupler in which a magnetic loss material is disposed in the vicinity of the coupling electrode. FIG. 22 is a diagram showing another configuration example of the high-frequency coupler in which a magnetic loss material is disposed in the vicinity of the coupling electrode. FIG. 23 is a diagram showing another configuration example of the high-frequency coupler in which a magnetic loss material is arranged in the vicinity of the coupling electrode. FIG. 24 is a diagram illustrating a configuration example of a wireless device in which a dielectric loss material is disposed in the vicinity of a coil that performs magnetic field coupling. FIG. 25 is a diagram showing a configuration example when the communication system using the high-frequency coupler shown in FIG. 1 is applied to power transmission. FIG. 26 is a diagram showing another configuration example in which the communication system using the high-frequency coupler shown in FIG. 1 is applied to power transmission. FIG. 27 is a diagram showing a state in which when a current is passed through a conductor such as an antenna, a magnetic field is generated around the conductor, an electric field is generated in conjunction with this, and a magnetic field is generated by this electric field. FIG. 28 is a diagram showing a state in which an electric wave and a magnetic wave interact like a chain and proceed in the wave traveling direction while maintaining an orthogonal relationship.

Explanation of symbols

DESCRIPTION OF SYMBOLS 101 ... Printed circuit board 102 ... Ground 103 ... Stub 104 ... Signal line 105 ... Transmission / reception circuit 106 ... Through hole 107 ... Metal wire 108 ... Coupling electrode 109 ... Spacer 110 ... Through hole 111, 112 ... Microstrip line or coplanar waveguide

Patent Citations (17)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
JPH01198835A	1987-10-30	1989-08-10	Anten Kogyo Kk	Transmitter
JP250946782	1992-12-16	1996-06-19	第一電波工業株式会社	Coaxial cable coupling device and antenna device
JP347558282	1995-06-29	2003-12-08	松下電工株式会社	Non-contact high-frequency signal transmission device
US6356244B1 *	1999-03-30	2002-03-12	Ngk Insulators, Ltd.	Antenna device
WO2001024316A1 *	1999-09-30	2001-04-05	Murata Manufacturing Co., Ltd.	Surface-mount antenna and communication device with surface-mount antenna
JP2002293131A *	2000-12-18	2002-10-04	Mitsubishi Materials Corp	Antenna for transponder
JP2004214879A	2002-12-27	2004-07-29	Casio Comput Co Ltd	Data communication apparatus
WO2004100314A1 *	2003-05-12	2004-11-18	Kabushiki Kaisha Kobe Seiko Sho	Radio lan antenna
JP2004341895A	2003-05-16	2004-12-02	Sony Corp	Ic card
JP2004364199A *	2003-06-06	2004-12-24	Sony Corp	Antenna module and portable communication terminal equipped therewith
JP2005018671A	2003-06-30	2005-01-20	Hitachi Ltd	Memory card and cellular phone
JP2006060283A	2004-08-17	2006-03-02	Toppan Printing Co Ltd	Communication auxiliary body set, communication auxiliary system, and communication method
JP2006106612A	2004-10-08	2006-04-20	Fuji Photo Film Co Ltd	Image recording device
US20060202269A1 *	2005-03-08	2006-09-14	Semiconductor Energy Laboratory Co., Ltd.	Wireless chip and electronic appliance having the same
EP1724703B1 *	2005-04-26	2016-02-24	Amotech Co., Ltd.	Magnetic sheet for radio frequency identification antenna, method of manufacturing the same.
JP4565145B2	2005-09-02	2010-10-20	独立行政法人情報通信研究機構	Ultra-wideband bandpass filter
US7519328B2 *	2006-01-19	2009-04-14	Murata Manufacturing Co., Ltd.	Wireless IC device and component for wireless IC device

* Cited by examiner, † Cited by third party

Cited By (45)

Publication number	Priority date	Publication date	Assignee	Title
Family To Family Citations				
US7581678B2	2005-02-22	2009-09-01	Tyfone, Inc.	Electronic transaction card
JP4923975B2 *	2006-11-21	2012-04-25	ソニー株式会社	Communication system and communication apparatus
JP4605203B2 *	2007-10-15	2011-01-05	ソニー株式会社	Communication system and communication apparatus
US9741027B2	2007-12-14	2017-08-22	Tyfone, Inc.	Memory card based contactless devices
JP4562761B2 *	2008-03-13	2010-10-13	日本電信電話株式会社	Data communication device

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JP4616366B2 *	2008-03-24	2011-01-19	日本電信電話株式会社	Electric field communication device
US8451122B2	2008-08-08	2013-05-28	Tyfone, Inc.	Smartcard performance enhancement circuits and systems
US20100933316A1 *	2008-08-08	2010-02-11	Narendra Siva G	Power negotiation for small rfid card
US7961101B2	2008-08-08	2011-06-14	Tyfone, Inc.	Small RFID card with integrated inductive element
US8682261B2 *	2009-02-13	2014-03-25	Qualcomm Incorporated	Antenna sharing for wirelessly powered devices
EP2401703A4	2009-02-24	2012-08-15	Tyfone Inc	Contactless device with miniaturized antenna
JP5287377B2 *	2009-03-12	2013-09-11	ソニー株式会社	COMMUNICATION DEVICE, HIGH FREQUENCY COUPLER, AND COMPOSITE COMMUNICATION DEVICE
JP5282626B2 *	2009-03-30	2013-09-04	ソニー株式会社	Communication device and high frequency coupler
KR101232857B1	2009-06-25	2013-02-13	가부사키가야사 무라타 세이사쿠쇼	Power transfer system and noncontact charging device
CN103401321B *	2009-06-25	2016-05-25	株式会社村田製作所	Power delivery system and non-contact charging device
JP5310316B2 *	2009-06-30	2013-10-09	ソニー株式会社	High frequency coupler and communication device
JP5347813B2 *	2009-08-03	2013-11-20	ソニー株式会社	Communication apparatus and communication method
JP4897028B2 *	2009-10-21	2012-03-14	Ｓｍｋ株式会社	Coupling electrode unit
JP5451345B2 *	2009-12-01	2014-03-26	キャノン株式会社	Wireless communication device
JP2011193088A *	2010-03-12	2011-09-29	Sony Corp	High-frequency coupler, and communication device
US20120203620A1	2010-11-08	2012-08-09	Douglas Howard Dobyns	Techniques For Wireless Communication Of Proximity Based Marketing
US892989B2	2011-03-22	2015-01-06	Radium, Inc.	Techniques for wireless communication of proximity based content
US8880100B2	2011-03-23	2014-11-04	Radium, Inc.	Proximity based social networking
CN202127130U *	2011-06-17	2012-01-25	百慕大商泰科资讯科技有限公司	Intelligent card connector with radio frequency identification module
JP6074747B2	2011-11-01	2017-02-08	パナソニックＩｐマネジメント株式会社	Resonant coupler
WO2014017419A1 *	2012-07-23	2014-01-30	株式会社東芝	Magnetic resonance imaging apparatus, bed device, and rf coil device
JP6211807B2 *	2012-07-23	2017-10-11	東芝メディカルシステムズ株式会社	Magnetic resonance imaging system
US9883281B2	2012-07-23	2018-05-29	Toshiba Medical Systems Corporation	Magnetic resonance imaging apparatus, bed device and RF coil device
JP6073606B2	2012-09-03	2017-02-01	東芝メディカルシステムズ株式会社	Magnetic resonance imaging apparatus and digital wireless communication apparatus
US9927504B2	2012-09-12	2018-03-27	Toshiba Medical Systems Corporation	Magnetic resonance imaging apparatus
JP6184067B2 *	2012-09-12	2017-08-23	東芝メディカルシステムズ株式会社	Magnetic resonance imaging system
JP6088814B2 *	2012-12-17	2017-03-01	古河電気工業株式会社	Wireless power transmission system
JP6021652B2 *	2013-01-16	2016-11-09	東芝メディカルシステムズ株式会社	Magnetic resonance imaging apparatus and RF coil apparatus
JP6281863B2 *	2013-03-08	2018-02-21	国立大学法人大阪大学	Photonic crystal slab electromagnetic wave absorber and high-frequency metal wiring circuit, electronic component, transmitter, receiver and proximity wireless communication system
JP6328678B2 *	2013-03-18	2018-05-09	昭和電工株式会社	Wireless power feeding method and wireless power feeding system

CN1053559437B *	2013-06-24	2018-06-19	英賽爾庫尔公司	Portable device including being used for the electrode for being transmitted by internal electric current data
KR10210264481 *	2013-12-24	2020-04-21	엘지전자 주식회사	Mobile terminal
US9838082B2	2014-08-29	2017-12-05	Freelink Technologies	Proximity boundary based communication
US10079573B2 *	2014-09-11	2018-09-18	Opg Technologies, Llc	Embedding data on a power signal
JP6670452B2 *	2014-12-08	2020-03-25	ソニー株式会社	Antenna and communication device
US10164685B2	2014-12-31	2018-12-25	Freelink Technologies Inc.	Spatially aware wireless network
JP5975555B1 *	2015-12-08	2016-03-23	株式会社 e N F C	Transmission system, transmission apparatus, and transmission method
US10373045B2	2016-12-01	2019-09-06	Avery Dennison Retail Information Services, Llc	Coupling of RFID straps to antennae using a combination of magnetic and electric fields
JP2019036823A	2017-08-14	2019-03-07	ソニーセミコンダクタソリューションズ株式会社	Communication device, communication system, and communication method
CN109802235B *	2017-11-16	2021-11-30	华为技术有限公司	Surface wave excitation device

* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
JP4403431B2	2010-01-27	Communication system and communication apparatus
JP4915058B2	2012-04-11	Power transmission device, power reception device, and power transmission system
JP4345851B2	2009-10-14	Communication system and communication apparatus
JP5003625B2	2012-08-15	High frequency coupler
JP5267638B2	2013-08-21	High frequency coupler
JP4345850B2	2009-10-14	Communication system and communication apparatus
JP4893488B2	2012-03-07	Communications system
US8013795B2	2011-09-06	Communication system and communication apparatus
JP5083122B2	2012-11-28	High frequency coupler and electric field signal radiating element
JP4983425B2	2012-07-25	Communication device
JP2011193086A	2011-09-29	High-frequency coupler, and communication device
JP4983749B2	2012-07-25	High frequency coupler and electric field signal radiating element
JP4983418B2	2012-07-25	Communication device

Priority And Related Applications

Child Applications (1)

Application	Priority date	Filing date	Relation	Title
JP2008216229A	2008-08-26	2008-08-26	Division	High frequency coupler and electric field signal radiating element

Priority Applications (1)

Application	Priority date	Filing date	Title
JP2007157986A	2007-06-14	2007-06-14	Communication system and communication apparatus

Applications Claiming Priority (3)

Application	Filing date	Title
JP2007157905A	2007-06-14	Communication system and communication apparatus
US12/138,803	2008-06-13	Communication system and communication apparatus
CNA2006101259709A	2006-06-16	Communication system and communication apparatus

Legal Events

Date	Code	Title	Description
2009-04-10	A977	Report on retrieval	Free format text: JAPANESE INTERMEDIATE CODE: A971007 Effective date: 20090410
2009-04-22	A131	Notification of reasons for refusal	Free format text: JAPANESE INTERMEDIATE CODE: A131 Effective date: 20090421
2009-06-17	A521	Written amendment	Free format text: JAPANESE INTERMEDIATE CODE: A523 Effective date: 20090616
2009-09-29	TRDD	Decision of grant or rejection written	
2009-10-07	A01	Written decision to grant a patent or to grant a registration (utility model)	Free format text: JAPANESE INTERMEDIATE CODE: A01 Effective date: 20091006
2009-10-08	A01	Written decision to grant a patent or to grant a registration (utility model)	Free format text: JAPANESE INTERMEDIATE CODE: A01
2009-11-09	A61	First payment of annual fees (during grant procedure)	Free format text: JAPANESE INTERMEDIATE CODE: A61 Effective date: 20091019
2009-11-13	R151	Written notification of patent or utility model registration	Ref document number: 4403431 Country of ref document: JP Free format text: JAPANESE INTERMEDIATE CODE: R151
2009-11-13	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20121113 Year of fee payment: 3
2009-11-16	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20121113 Year of fee payment: 3
2012-11-13	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2012-11-13	FPAY	Renewal fee payment (event date is renewal date of database)	Free format text: PAYMENT UNTIL: 20131113 Year of fee payment: 4
2013-11-12	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2014-11-11	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2015-11-10	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2016-11-15	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2017-11-14	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2018-11-13	R250	Receipt of annual fees	Free format text: JAPANESE INTERMEDIATE CODE: R250
2019-11-13	LAPS	Cancellation because of no payment of annual fees	

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☒ Practitioners associated with Customer Number: 175023**OR**☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☒ The address associated with Customer Number: 175023**OR**

☐	Firm or individual name		
	Address		
	City	State	Zip
	Country		
	Telephone	Email	

Assignee name and address: iCashe, Inc.
5331 S. Macadam Ave. #251
Portland, OR 97239

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature 	Date 10/14/2020
Name Siva G. Narendra	Telephone 503-704-7204
Title President, iCashe, Inc	

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 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.

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ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
17/021,347

RECEIPT DATE / TIME
01/14/2022 07:16:13 PM ET

ATTORNEY DOCKET #
18.115.001US9.10

Title of Invention

MOBILE PHONE WITH MAGNETIC CARD EMULATION

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 2310

FILED BY Katherine Campbell

PATENT CENTER # 60489060

FILING DATE 09/15/2020

CUSTOMER # 35781

FIRST NAMED
INVENTOR Siva G. Narendra

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Usman Mughal

Documents

TOTAL DOCUMENTS: 3

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
18P115001US9_10_CADS.pdf	10	Application Data Sheet	604 KB
Warning: This is not a USPTO supplied ADS fillable form. Data in the form cannot be automatically loaded to other USPTO systems.			
18P115001US9_10_iCashe_373C.pdf	3	Assignee showing of ownership per 37 CFR 3.73	117 KB
iCashe_GPOA_signed.pdf	1	Power of Attorney	2064 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
18P115001US9_10_CADS.pdf	086DA3675445FF1CE3B34BCADC009568731ECB965C3623E41 231513C3278EDB61390EFADC77C5BFAA3D7862B64E3DA8E5 1A1FAED508E79286D44EBE06BCE29A4
18P115001US9_10_iCashe_37 3C.pdf	4BBD50BA83B981F07929644BC8C0A5C6BCB8C50B528894B6C 4D11D6F80B13A360B6CF4D794EA6F06BA69A606D3752B65A6 24BE5C1F3BA3C12AE1F7875BB042B5
iCashe_GPOA_signed.pdf	78B281E25EAD72F7806857712BEF21246ED66F2F83FB7174AE E3944DC2C6E32C2BBD4EEDDED4D1DD9B0C94F138A195CC7 5430D944D923A8EE37468AA0C7627B2

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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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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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STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: iCashe, Inc.Application No./Patent No.: 17/021,347Filed/Issue Date: September 15, 2020Titled: MOBILE PHONE WITH MAGNETIC CARD EMULATIONiCashe, Inc., a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is ____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Inventors To: Tyfone, Inc.The document was recorded in the United States Patent and Trademark Office at
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Reel 053965, Frame 0413, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). 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 1.11 and 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.**

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As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Usman Mughal/

Signature

Usman Mughal

Printed or Typed Name

2022-01-14

Date

62887

Title or Registration Number

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		
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	
	Thomas	N.	Spitzer		
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	2642 SW Bucharest Ct.				
Address 2					
City	Portland	State/Province	OR		
Postal Code	97225	Country	US		

Inventor	3				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Prabhakar		Tadepalli		
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

City	Bangalore	Country of Residence ⁱ	N
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Mailing Address of Inventor:

Address 1	E24 Chaithanya Smaran		
Address 2	Whitefield Hoskote Road		
City	Bangalore	State/Province	Ka
Postal Code	560067	Country ⁱ	IN
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.			

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Email Address	dana.lemoine@tyfone.com	Add Email	Remove Email

Application Information:

Title of the Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		
Attorney Docket Number	115.001US9.10	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	16	Suggested Figure for Publication (if any)	23

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	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

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	35781		

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)		
17/021,347	Continuation of	16218733	2018-12-13		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16218733	Continuation of	15658208	2017-07-24	10185909	2019-01-22
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
15658208	Continuation of	14948325	2015-11-22	9715649	2017-07-25
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14948325	Continuation of	14747770	2015-06-23	9202156	2015-12-01

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14747770	Continuation of	14680684	2015-04-07	9092708	2015-07-28
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14680684	Continuation of	13592323	2012-08-22	9004361	2015-04-14
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13592323	Continuation of	13304663	2011-11-27	8573494	2013-11-05
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13304663	Continuation of	13114434	2011-05-24	8091786	2012-01-10
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13114434	Continuation of	12941410	2010-11-08	7954715	2011-06-07
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12941410	Continuation of	12539369	2009-08-11	7828214	2010-11-09
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12539369	Continuation of	11063291	2005-02-22	7581678	2009-09-01
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)¹ 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).

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

		Remove	
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

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.
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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

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.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

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.

☒ 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	Fyfone, Inc- iCashe, Inc.
-------------------	---------------------------

Mailing Address Information For Applicant:

Address 1	5331 SW Macadam Ave		
Address 2	Suite 251		
City	Portland	State/Province	OR
Country	US	Postal Code	97239
Phone Number	503-226-3939----	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	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

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	Tyfone, Inc. - 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	503-226-3939	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)	2022-01-14	
First Name	Usman	Last Name	Mughal	Registration Number	62887
Additional Signature may be generated within this form by selecting the Add button.					Add

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	115.001US9.10
		Application Number	17/021,347
Title of Invention	MOBILE PHONE WITH MAGNETIC CARD EMULATION		

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 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.



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.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10	2310
Tyfone, Inc. Patent Dept. 5331 SW Macadam Avenue Suite 251 Portland, OR 97239			EXAMINER HAUPT, KRISTY A	
			ART UNIT 2876	PAPER NUMBER
			NOTIFICATION DATE 01/14/2022	DELIVERY MODE ELECTRONIC

NOTICE OF NON-COMPLIANT INFORMATION DISCLOSURE STATEMENT

An Information Disclosure Statement (IDS) filed 1/10/2022 in the above-identified application fails to meet the requirements of 37 CFR 1.97(d) for the reason(s) specified below. Accordingly, the IDS will be placed in the file, but the information referred to therein has not been considered.

The IDS is not compliant with 37 CFR 1.97(d) because:

** Both*

- ☒ The IDS lacks a statement as specified in 37 CFR 1.97(e).
- ☐ The IDS lacks the fee set forth in 37 CFR 1.17(p).
- ☐ The IDS was filed after the issue fee was paid. Applicant may wish to consider filing a petition to withdraw the application from issue under 37 CFR 1.313(c) to have the IDS considered. See MPEP 1308.

N. Horne, for

571-272-4200 or 1-888-786-0101
Application Assistance Unit
Office of Data Management



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
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10

CONFIRMATION NO. 2310

POA ACCEPTANCE LETTER



OC000000131196136

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

Date Mailed: 01/20/2022

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/14/2022.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

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.

/megga/



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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
17/021,347	09/15/2020	2876	2070	18.115.001US9.10	18	3

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

CONFIRMATION NO. 2310
CORRECTED FILING RECEIPT



Date Mailed: 01/20/2022

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;
Thomas N. Spitzer, Portland, OR;
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 16/218,733 12/13/2018 PAT 10803370
which is a CON of 15/658,208 07/24/2017 PAT 10185909
which is a CON of 14/948,325 11/22/2015 PAT 9715649
which is a CON of 14/747,770 06/23/2015 PAT 9202156
which is a CON of 14/680,684 04/07/2015 PAT 9092708
which is a CON of 13/592,323 08/22/2012 PAT 9004361
which is a CON of 13/304,663 11/27/2011 PAT 8573494
which is a CON of 13/114,434 05/24/2011 PAT 8091786
which is a CON of 12/941,410 11/08/2010 PAT 7954715
which is a CON of 12/539,369 08/11/2009 PAT 7828214
which is a CON of 11/063,291 02/22/2005 PAT 7581678

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: 10/01/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 17/021,347**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

MOBILE PHONE WITH MAGNETIC CARD EMULATION

Preliminary Class

235

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 Assets Control, 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).

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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10

CONFIRMATION NO. 2310

POWER OF ATTORNEY NOTICE



OC000000131196110

35781
Tyfone, Inc.
Patent Dept.
5331 SW Macadam Avenue
Suite 251
Portland, OR 97239

Date Mailed: 01/20/2022

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 01/14/2022.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

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.

/megga/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:
Siva Narendra

Application No.: 17/021,347

Filed: September 15, 2020

For: MOBILE PHONE WITH MAGNETIC
CARD EMULATION

Examiner:
Kristy A. Haupt

Art Group: 2876

Confirmation No.: 2310

Docket No.: 115.001US9.10

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 November 10, 2021.
Applicants respectfully request the Examiner to enter this Amendment.

LISTING OF CLAIMS

1. (Previously Presented) A mobile phone comprising:
a memory to hold transaction data for use in a plurality of transactions;
a current carrying conductor capable of producing a time-varying magnetic field that represents the transaction data in the plurality of transactions;
a network interface for connecting the mobile phone to a network, wherein one or more parts of the transaction data are downloadable to the mobile phone via the network;
a driver to excite the current carrying conductor; and
a processor coupled to control the driver.
2. (Original) The mobile phone of claim 1 wherein the time-varying magnetic field represents a point-of-sale transaction.
3. (Original) The mobile phone of claim 1 wherein the time-varying magnetic field represents an access transaction.
4. (Original) The mobile phone of claim 1 wherein the time-varying magnetic field represents a credit card transaction.
5. (Original) The mobile phone of claim 1 wherein the time-varying magnetic field emulates a swipe of a magnetic card.
6. (Original) The mobile phone of claim 1 wherein the driver comprises a current driver.

7. (Previously Presented) A mobile phone comprising:
- a memory to hold transaction data for use in a plurality of transactions;
 - a conductor that when excited by a reversing polarity current produces a time-varying magnetic field that represents the transaction data in the plurality of transactions;
 - a network interface for connecting the mobile phone to a network, wherein one or more parts of the transaction data are downloadable to the mobile phone via the network;
 - a driver to excite the conductor; and
 - a processor coupled to control the driver.
8. (Original) The mobile phone of claim 7 wherein the time-varying magnetic field represents a point-of-sale transaction.
9. (Original) The mobile phone of claim 7 wherein the time-varying magnetic field represents an access transaction.
10. (Original) The mobile phone of claim 7 wherein the time-varying magnetic field represents a credit card transaction.
11. (Original) The mobile phone of claim 7 wherein the time-varying magnetic field emulates a swipe of a magnetic card.
12. (Original) The mobile phone of claim 7 wherein the driver comprises a current driver.
13. (Previously Presented) A mobile phone comprising:
- a memory to hold transaction data for use in a plurality of transactions;
 - a conductor that when excited by a reversing polarity current that varies in amplitude

produces a time-varying magnetic field that represents the transaction data in the plurality of transactions;

a network interface for connecting the mobile phone to a network, wherein one or more parts of the transaction data are downloadable to the mobile phone via the network;

a driver to excite the conductor; and

a processor coupled to control the driver.

14. (Original) The mobile phone of claim 13 wherein the time-varying magnetic field represents a point-of-sale transaction.

15. (Original) The mobile phone of claim 13 wherein the time-varying magnetic field represents an access transaction.

16. (Original) The mobile phone of claim 13 wherein the time-varying magnetic field represents a credit card transaction.

17. (Original) The mobile phone of claim 13 wherein the time-varying magnetic field emulates a swipe of a magnetic card.

18. (Original) The mobile phone of claim 13 wherein the driver comprises a current driver.

19. (Previously Presented) The mobile phone of claim 1 wherein the network is one of a cellular network or a wireless local area network.

20. **(Currently Amended)** The mobile phone of claim 1 wherein [[the]]downloaded transaction data is valid for a limited number of transactions and the one or more parts of

the transaction data is downloaded periodically.

21. **(Currently Amended)** The mobile phone of claim 1, wherein the transaction data includes a transaction number used for each transaction of the plurality of transactions.

22. (Previously Presented) The mobile phone of claim 7 wherein the network is one of a cellular network or a wireless local area network.

23. **(Currently Amended)** The mobile phone of claim 7 wherein [[the]]downloaded transaction data is valid for a limited number of transactions and the one or more parts of the transaction data is downloaded periodically.

24. **(Currently Amended)** The mobile phone of claim 7, wherein the transaction data includes a transaction number used for each transaction of the plurality of transactions.

25. (Previously Presented) The mobile phone of claim 13 wherein the network is one of a cellular network or a wireless local area network.

26. **(Currently Amended)** The mobile phone of claim 13 wherein [[the]]downloaded transaction data is valid for a limited number of transactions and the one or more parts of the transaction data is downloaded periodically.

27. **(Currently Amended)** The mobile phone of claim 13, wherein the transaction data includes a transaction number used for each transaction of the plurality of transactions.

REMARKS

This listing of claims will replace all prior versions and listings of claims in the application. Claims 20, 21, 23, 24, 26, and 27 are amended. No claims are added. No claims are cancelled in this response. Hence, claims 1-27 are pending.

CLAIM AMENDMENTS

Applicants amend claims 20, 21, 23, 24, 26, and 27 to fix typographical errors. Applicants respectfully request Examiner to enter the amendments. No new matter has been introduced.

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 comply 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 IP P.C.

01/26/22

Date

/Usman Mughal/

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 PAYMENT RECEIPT

APPLICATION #
17/021,347

RECEIPT DATE / TIME
01/26/2022 07:54:18 PM ET

ATTORNEY DOCKET #
18.115.001US9.10

Title of Invention

MOBILE PHONE WITH MAGNETIC CARD EMULATION

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 2310

FILED BY Katherine Campbell

PATENT CENTER # 60501782

AUTHORIZED BY Usman Mughal

CUSTOMER # 175023

FILING DATE 09/15/2020

CORRESPONDENCE
ADDRESS -

FIRST NAMED
INVENTOR Siva G. Narendra

Payment Information

PAYMENT METHOD
CARD / 9863

PAYMENT TRANSACTION ID
E20221PJ54520435

PAYMENT AUTHORIZED BY
Katherine Campbell

FEE CODE	DESCRIPTION	ITEM PRICE(\$)	QUANTITY	ITEM TOTAL(\$)
2501	UTILITY ISSUE FEE	600.00	1	600.00
TOTAL AMOUNT:				\$600.00

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.

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.

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)

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.

35781 7590 11/10/2021
iCashe, Inc.
Patent Dept.
5331 SW Macadam Avenue
Suite 251
Portland, OR 97239

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.
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10	2310

TITLE OF INVENTION: MOBILE PHONE WITH MAGNETIC CARD EMULATION

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$600	\$0.00	\$0.00	\$600	02/10/2022

EXAMINER	ART UNIT	CLASS-SUBCLASS
HAUPT, KRISTY A	2876	235-492000

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/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 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 IP P.C.

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, US

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 /Usman Mughal/

Date January 25, 2022

Typed or printed name Usman Mughal

Registration No. 62887



ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #
17/021,347

RECEIPT DATE / TIME
01/26/2022 07:54:18 PM ET

ATTORNEY DOCKET #
18.115.001US9.10

Title of Invention

MOBILE PHONE WITH MAGNETIC CARD EMULATION

Application Information

APPLICATION TYPE Utility - Nonprovisional Application
under 35 USC 111(a)

PATENT # -

CONFIRMATION # 2310

FILED BY Katherine Campbell

PATENT CENTER # 60501782

FILING DATE 09/15/2020

CUSTOMER # 175023

FIRST NAMED
INVENTOR Siva G. Narendra

CORRESPONDENCE
ADDRESS -

AUTHORIZED BY Usman Mughal

Documents

TOTAL DOCUMENTS: 4

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
115P001US9_10_Issue_Fee _Transmittal.pdf	1	Issue Fee Payment (PTO-85B)	149 KB
115-001US9- 10_312_Amend.pdf	7	-	44 KB
115-001US9- 10_312_Amend-A.NA.pdf	(1-1) 1	Amendment after Notice of Allowance (Rule 312)	24 KB
115-001US9- 10_312_Amend-CLM.pdf	(2-5) 4	Claims	32 KB
115-001US9- 10_312_Amend-REM.pdf	(6-7) 2	Applicant Arguments/Remarks Made in an Amendment	29 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
115P001US9_10_Issue_Fee_Transmittal.pdf	7667B11EA16B6F13431353F7466A85D9518FFE1EDE1F88E715 ACCBAC4815A09ED927067759A0EB5F8B113B2F7F459111C5E 5E8A3D2FD3D1F560F75071E898FA8
115-001US9-10_312_Amend.pdf	7F338347AB76129094D2D14DCB0D4559F139655A73261E0320 EB3BA8CC43CCA5B63429758A9AC5352947B9596292438E81E 875F3CA6D3EC256E1B5AED6D42D6F
115-001US9-10_312_Amend-A.NA.pdf	FFA4E9C9713DE6DC60E8582975F340927BF2C2DD849A42FF5 8260CC75CCBE4AFC654717A3F97A0D630A46B6AA427F1DF5 A1E198CA5977ED4B79FBBD1830D56F5
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115-001US9-10_312_Amend-REM.pdf	E9232105951D122931B47E87EDF0F49F0D3B6FAA795BC751B9 DD99223073011BE26FE2439342672CC9A504A1DDF7A961041 DDF94EC0F202C7E199A33B0008CDE

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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.

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 NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/021,347	09/15/2020	Siva G. Narendra	18.115.001US9.10	2310
175023	7590	02/04/2022	EXAMINER	
Mughal IP PC			HAUPT, KRISTY A	
iCashe, Inc.			ART UNIT	PAPER NUMBER
1500 NW Bethany Blvd.			2876	
Suite 200			NOTIFICATION DATE	DELIVERY MODE
Beaverton, OR 97006			02/04/2022	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@apcoll.com

Response to Rule 312 Communication	Application No. 17/021,347	Applicant(s) Narendra et al.	
	Examiner KRISTY A HAUPT	Art Unit 2876	AIA (FITF) Status No

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

1. ☒ The amendment filed on 26 January 2022 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.

/KRISTY A HAUPT/ Primary Examiner, Art Unit 2876	
---	--

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:
Siva Narendra

Application No.: 17/021,347

Filed: September 15, 2020

For: MOBILE PHONE WITH MAGNETIC
CARD EMULATION

Examiner:
Kristy A. Haupt

Art Group: 2876

Confirmation No.: 2310

Docket No.: 115.001US9.10

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 November 10, 2021.
Applicants respectfully request the Examiner to enter this Amendment.

OK TO ENTER: /K.A.H/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
17/021,347	03/08/2022	11270174	18.115.001US9.10	2310

175023 7590 02/16/2022
Mughal IP PC
iCashe, Inc.
1500 NW Bethany Blvd.
Suite 200
Beaverton, OR 97006

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

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 0 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 Data Management (ODM) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional inventors):

Siva G. Narendra, Portland, OR;
Thomas N. Spitzer, Portland, OR;
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.