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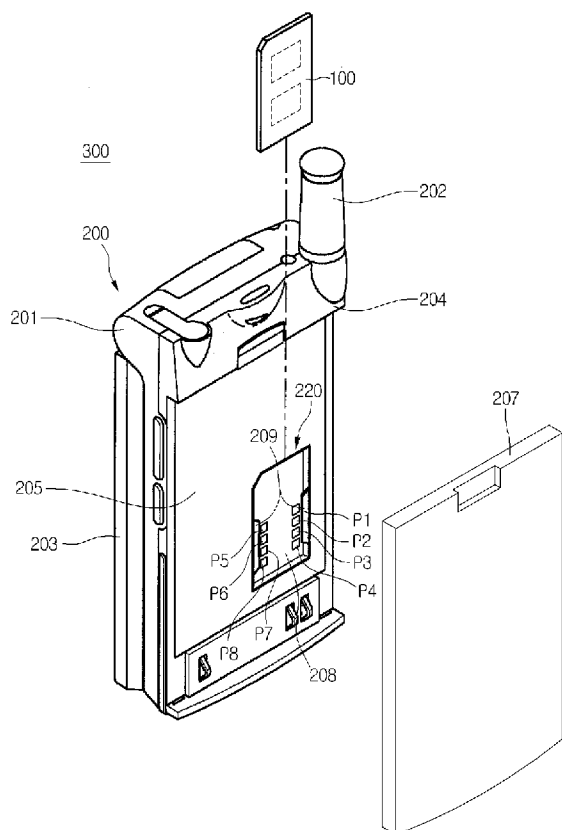
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(54) Title: ELECTRONIC CARD TERMINAL APPARATUS

[Fig. 1]



(57) Abstract: An embodiment provides an electronic card terminal apparatus comprising: a mobile terminal comprising a card socket; and an electronic card coupled to the card socket, the electronic card comprising: a connector comprising a plurality of terminals connected to the card socket; at least one wireless short distance communication module electrically connected to the connector and performing wireless short distance communication through a predetermined frequency band; a card module storing user information and electrically connected to the connector and the wireless short distance communication module; and an antenna transmitting/receiving data of the wireless short distance communication module.



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Description

ELECTRONIC CARD TERMINAL APPARATUS

Technical Field

- [1] Embodiments relate to an electronic card terminal apparatus.

Background Art

- [2] Currently, as demand for mobile communication terminals increases, information communication technology and various network technologies associated with the mobile communication terminal are under development, and particularly, user authentication and payment process immerse as important fields in an aspect of electronic commerce.
- [3] As processes for user authentication and payment are complicated, a smart card is proposed to resolve a limitation such as illegal use of personal information.

Disclosure of Invention

Technical Problem

- [4] Embodiments provide an electronic card terminal apparatus using an electronic card mounting at least one wireless short distance communication module therein.
- [5] Embodiments provide an electronic card terminal apparatus using an electronic card comprising at least one wireless short distance communication module and a pattern-type antenna thereof.
- [6] Embodiments provide an electronic card terminal apparatus mounting an electronic card comprising at least one wireless short distance communication module in a mobile terminal, and allowing an interface between the electronic card and the mobile terminal.
- [7] Embodiments provide an electronic card terminal apparatus that allows an antenna for a wireless short distance communication module to be formed in an electronic card and/or a mobile terminal (comprising a battery).

Technical Solution

- [8] An embodiment provides an electronic card terminal apparatus comprising: a mobile terminal comprising a card socket; and an electronic card coupled to the card socket and comprising a wireless short distance communication module.
- [9] An embodiment provides an electronic card terminal apparatus comprising: a mobile terminal comprising a card socket; and an electronic card coupled to the card socket, the electronic card comprising: a connector comprising a plurality of terminals connected to the card socket; at least one wireless short distance communication module electrically connected to the connector and performing wireless short distance communication through a predetermined frequency band; a card module storing user

information and electrically connected to the connector and the wireless short distance communication module; and an antenna transmitting/receiving data of the wireless short distance communication module.

[10] An embodiment provides an electronic card terminal apparatus comprising: a mobile terminal comprising a card socket; and an electronic card mounted in or separated from the card socket, storing user information, and comprising a wireless short distance communication module, the mobile terminal performing at least one of user authentication, electronic payment, traffic fare payment, building entrance authentication, and digital copyright authentication.

[11] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings, and from the claims.

Advantageous Effects

[12] Embodiments can easily download or upload data, an operating system, and an application program necessary for a mobile terminal by mounting an electronic card such as a smart card having at least one wireless short distance communication module to the mobile terminal in order to perform bi-direction data communication.

[13] Embodiments can provide various application services using a wireless short distance communication module in a terminal apparatus having an electronic card.

[14] According to embodiments, since a mobile terminal does not require a separate wireless short distance communication module, the manufacturing costs of the mobile terminal can be reduced. Also, since an electronic card is optionally provided to the mobile terminal, the reliability of a mobile terminal can be improved.

[15] Embodiments extend the number of terminals in an electronic card and a mobile terminal, so that they are used for various purposes.

[16] Embodiments can mount a plurality of radio communication modules to an electronic card to provide various application services in cooperation with a mobile terminal.

[17] Embodiments can provide an additional communication function to an electronic card to differentiate the electronic card from other electronic cards, and can optionally provide service in cooperation with a mobile terminal.

Brief Description of the Drawings

[18] Fig. 1 is an exploded perspective view of an electronic card and a mobile terminal in the electronic card according to a first embodiment.

[19] Fig. 2 is a plan view of the electronic card according to the first embodiment.

[20] Fig. 3 is a lower side view of Fig. 2.

[21] Fig. 4 is a side cross-sectional view of the electronic card according to the first embodiment.

- [22] Fig. 5 is a block diagram of the electronic card and the mobile terminal according to the first embodiment.
- [23] Fig. 6 is a block diagram of a wireless short distance communication module according to the first embodiment.
- [24] Fig. 7 is a plan view of an electronic card according to a second embodiment.
- [25] Fig. 8 is an exploded perspective view of an electronic card and a mobile terminal in the electronic card according to a third embodiment.
- [26] Fig. 9 is a plan view of the electronic card according to the third embodiment.
- [27] Fig. 10 is a lower side view of Fig. 9.
- [28] Fig. 11 is a block diagram of the electronic card and the mobile terminal according to the third embodiment.
- [29] Fig. 12 is a block diagram of first and second wireless short distance communication modules according to the third embodiment.
- [30] Fig. 13 is a plan view of the electronic card according to a fourth embodiment.
- [31] Fig. 14 is a lower side view of Fig. 13.

Best Mode for Carrying Out the Invention

- [32] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings.
- [33] Fig. 1 is an exploded perspective view of an electronic card and a mobile terminal in the electronic card according to a first embodiment.
- [34] Referring to Fig. 1, an electronic card terminal apparatus 300 comprises an electronic card 100 and a mobile terminal 200. The electronic card 100 is connected to a pre-determined region of the mobile terminal 200, exchanges data with the mobile terminal 200, and can provide various authentication functions using a wireless short distance communication function.
- [35] The mobile terminal 200 can comprise a terminal that can move such as a personal digital assistant (PDA), a cellular phone, a traffic terminal, a media terminal, etc. The mobile terminal 200 comprises a bar type terminal, a folder type terminal, a slide type terminal, etc, but is not limited to these kinds, characteristics, and functions. In the description of embodiments, a folder type mobile terminal is exemplarily described.
- [36] The mobile terminal 200 has a structure in which a folder 203 is folded on or rotates around a main body 201. A display unit can be provided to the main body 201 and/or the folder 203. A mobile communication antenna 202 installed in the main body 201 can be disposed inside or outside the main body but is not limited thereto.
- [37] Also, a card socket 220 is formed in a battery coupling portion 205 of a rear side 204 of the main body 201. The card socket 220 comprises a groove 208 receiving the electronic card 100, protrusions 209 fixing the received electronic card 100, and a

plurality of pins P1-P8. The plurality of pins P1-P8 comprise a power pin, a clock pin, a reset pin, an input/output signal pin, and supports an interface with the electronic card 100. There is no limitation in the formation position and structure of the card socket 220, and they can change depending on the electronic card 100.

[38] The card socket 220 of the mobile terminal 200 is formed in a structure to/from which the electronic card 100 is attached/detached, so that the electronic card 100 can be optionally selected.

[39] When the electronic card 100 is coupled to the card socket 220 of the mobile terminal 200, and a battery pack 207 is coupled to the battery coupling portion 205, the mobile terminal 200 can normally operate. The inner system of the mobile terminal 200 and the electronic card 100 communicate electrically to exchange various data and perform wireless short distance communication with an external apparatus to provide various services.

[40] The electronic card 100 can be realized in a subscriber identity module (SIM) card or a user subscriber identity module (USIM) card. That is, the electronic card 100 can be realized in an integrated circuit (IC) card such as a smart card having a security chip.

[41] The electronic card 100 can provide various services in cooperation with the mobile terminal 200. For example, the electronic card 100 can comprise at least one of user authentication, security transaction, electronic payment, traffic fare payment, building entrance authentication, and digital copyright authentication. The mobile terminal 200 can process functions such as a building pass, a traffic card, a check/credit card, and an electronic card using the electronic card 100. Also, the mobile terminal 200 can download various data such as user information, download or upload data, an operating system, and an application program using a wireless short distance communication function provided to the electronic card 100, and can upload data if necessary.

[42] The mobile terminal 200 can directly communicate with an external electronic card reader wirelessly using information stored in the electronic card 100. Also, the information of the electronic card 100 can be displayed on the display unit of the mobile terminal 200, and the mobile terminal 200 can also perform a communication control of the electronic card 100 directly or indirectly.

[43] Figs. 2 and 3 are a plan view and a lower side view of the electronic card according to the first embodiment.

[44] Referring to Figs. 2 and 3, the electronic card 100 comprises a card module 110 and a wireless short distance communication module 130, and a connector 160 comprising a plurality of terminals T1-T8.

[45] For example, the card module 110 and the wireless short distance communication module 130 are disposed on an upper surface 120 of the electronic card 100, and the connector 160 comprising the plurality of terminals T1-T8 can be disposed on a lower

surface 103.

- [46] The card module 110 can perform an IC card function such as electronic payment and user authentication using user information and encoding function, and can communicate with the mobile terminal 200 using a communication operation protocol. Here, the communication operation protocol of the card module 110 can communicate with a card reader using one protocol of ISO 7816, ISO 14443 type A, ISO 14443 type B, ISO 15693, ISO 18092, ISO 21481, enzymatic cleavage mismatched analysis (ECMA) (340, 352, 356), European Telecommunications Standards Institute (ETSI) technical specification (TS) 102 190, MIFARE technology, and Felica technology. Also, MIFARE technology or Felica technology is compatible with ISO 14443 type A.
- [47] The wireless short distance communication module 130 can use one of a radio frequency identification (RFID) frequency such as 13.56 MHz, 433 MHz, 860~960 MHz, 2.45 GHz, and a short distance radio frequency in a 5.8 GHz band. Here, the RFID frequency can be divided into an NFC type in a high frequency (HF) band which is a 13.56 MHz band, an ultra high frequency (UHF) RFID type in 300 MHz and 900 MHz bands, and a microwave in a 2.45 GHz band. Here, the wireless short distance communication module 130 can be designed using a tag or a reader. In case of the tag, the NFC module can be realized in a passive type, an active type, and a semi-passive type. Also, the wireless short distance communication module 130 can be designed using a Zigbee type using 868MHz, 902~928MHz, and 2.4GHz bands.
- [48] Also, the wireless short distance communication module 130 can be realized in one of an RFID type, an NFC type, a Bluetooth type, a Zigbee type, an ultra-wide band type, a dedicated short range communication (DSRC) type, a wireless local area network (LAN), a Wibree, and a Z-wave.
- [49] The plurality of terminals T1-T8 are formed on the lower side of the electronic card 100, and the plurality of terminals T1-T8 are connected to the pins of the card socket 220 by one-to-one. That is, the electronic card 100 and the card socket 220 are connected to each other through eight pins to support an operation protocol such as ISO 7816 and ISO 14443.
- [50] Referring to Figs. 1 and 3, the kinds of the terminals T1-T8 on the lower side of the electronic card 100 and the pins P1-P8 of the card socket 220 are illustrated in Table 1.
- [51] Table 1

[Table 1]

[Table]

Card socket	Electronic card	Terminal kind
First pin (P1)	First terminal (T1)	Power terminal
Second pin (P2)	Second terminal (T2)	Rest signal terminal
Third pin (P3)	Third terminal (T3)	Clock signal terminal
Fourth pin (P4)	Fourth terminal (T4)	Antenna terminal
Fifth pin (P5)	Fifth terminal (T5)	Ground terminal
Sixth pin (P6)	Sixth terminal (T6)	SWP terminal
Seventh pin (P7)	Seventh terminal (T7)	Input/output signal terminal
Eighth pin (P8)	Eighth terminal (T8)	Antenna terminal

- [52] The electronic card 100 receives power through the power terminal T1, and can be reset by a signal input to the reset signal terminal T2, and receives a periodical clock signal through the clock signal terminal T3. Also, the electronic card 100 is connected with an antenna for a wireless short distance communication through the two antenna terminals T4 and T8, and inputs/outputs data through the input/output terminal T7. Also, the electronic card 100 can be connected to another communication module provided inside the mobile terminal 200 through a single wire protocol (SWP) terminal T6. Here, in the case where another communication module is not provided inside the mobile terminal 200, the SWP terminal T6 can be left as a reserved terminal.
- [53] The electronic card 100 can comprises a plurality of wireless short distance communication modules. For example, a NFC module and Zigbee module are disposed in the electronic card 100. At this point, the SWP terminal T6 can be used as a switch function. The SWP terminal T6 can be selectively connected to the NFC module and Zigbee module.
- [54] Here, referring to Figs. 1 to 3, when a wireless short distance communication module 130 is exemplarily mounted in the electronic card 100, the antenna for the wireless short distance communication module can be provided in the form of a loop antenna in the mobile terminal 200, for example, a battery pack. The antenna for the wireless short distance communication module can be connected to the wireless short distance communication module 130 through the antenna pins P4 and P8 of the card socket 220.
- [55] Fig. 4 is a schematic side cross-sectional view of the electronic card according to the first embodiment.
- [56] Referring to Fig. 4, the electronic card 100 comprises a substrate 101, a card module 110, a wireless short distance communication module 130, a resin material 107, and a

plurality of terminals T1-T4. The card module 110 and the wireless short distance communication module 130 are disposed on the substrate 101. The card module 110 and the wireless short distance communication module 130 can be realized in the form of individual chips or a cooperated one chip. There is no limitation in the number of chips and the realization shape. The chip disposed on the substrate 101 is bonded using a flip method and/or a wire method 104 but is not limited thereto. The chip and the device 105 and 106 on the substrate 101 are protected by the resin material 107. Here, the device comprises a resistor, a capacitor, etc. Examples of a material that can be used for the resin material 106 comprise silicon, epoxy, and an insulating material such as a plastic based synthetic resin.

[57] The plurality of terminals T1-T4 are disposed under the substrate 101, and each of the terminals T1-T4 can be electrically connected to the chips through a circuit pattern on the substrate 101 through a via hole.

[58] Fig. 5 is a block diagram of the electronic card and the mobile terminal according to the first embodiment.

[59] Referring to Fig. 5, the electronic card 100 comprises the card module 110, the wireless short distance communication module 130, and the connector 160. The card module 110 comprises a card controller 111, a card memory 113, and an auxiliary operator 115. The wireless short distance communication module 130 can be realized in an NFC module, for example. The connector 160 comprises a plurality of terminals T1-T8 as illustrated in Fig. 3.

[60] The mobile terminal 200 comprises a communication control module 210, a host processor 230, and a battery 240. The communication control module 210 comprises a main controller 212, a memory 214, a host interface 216, and a card socket 220. The main controller 212 performs a communication control with the electronic card 100. The host interface 216 is responsible for communication between the main controller 212 and the host processor 230. The card socket 220 is electrically connected to the connector 160 of the electronic card 100.

[61] In detail, the card controller 111 of the card module 110 reads/writes data from/to the card memory 113, and encodes or decodes data using the auxiliary operator 115. Also, the card controller 111 is electrically connected to the wireless short distance communication module 130, delivers transmission data to the wireless short distance communication module 130, and stores data received in the wireless short distance communication module 130 or delivers the data to the card socket 220. Also, the wireless short distance communication module 130 can be connected to the card socket 220 through the connector 160 to operate under control of the host processor 230 of the mobile terminal 200.

[62] Also, the card controller 111 can prevent an operation collision with the wireless

short distance communication module 130, and can support to encode or decode data transmitted/received wirelessly through the wireless short distance communication module 130.

- [63] The card controller 111 is connected to the card socket 220 of the control module 210 through the connector 160 to perform communication with the host processor 230, and executes an application program on an elementary file (EF) and a dedicate file (DF).
- [64] The card controller 111 processes at least one of an operation protocol, application protocol data unit (ADPU) command and response structure, a directory structure, a security command structure, a security process procedure, and a payment process procedure.
- [65] Also, the card controller 111 operates on an operating system such as a chip operation system (COS), and processes an application program such as a terminal-cooperative operation, user authentication, and electronic payment. The card controller 111 can use one protocol of ISO 7816, ISO 14443 type A, ISO 14443 type B, ISO 15693, ISO 18092, ISO 21481, ECMA (340, 352, 356), ETSI TS 102 190, MIFARE technology, and Felica technology through the wireless short distance communication module 130. Terminal operation information, encoding information, authentication information, payment information, user information, phone numbers, and network information are selectively recorded in the card memory 113. Also, an operating system driving the card controller 111 is stored in the card memory 113. The card memory 113 can comprise various memory devices depending on the kind of the electronic card 100. For example, the card memory 113 can comprise a flash memory, electrically erasable and programmable read only memory (EEPROM), and random access memory (RAM).
- [66] The auxiliary operator 115 can share the function of the card controller 111, and can be used as an exclusive processor for encoding process. The auxiliary operator 115 generates a random number of a code using a chip serial number (CSN), records a code key in a DF file, and processes an encoding algorithm such as a public key infrastructure (PKI), 3 data encryption standard (DES), T-DES, and SEED and an exclusive crypto process for a code process. The encoding method of the auxiliary operator 115 can change and is not limited thereto.
- [67] The wireless short distance communication module 130 processes a NFC protocol and can be formed as one node of a wireless short distance communication network, and transmits/receives data between the card controller 111 and an external communication module through the wireless short distance communication network. Here, when the wireless short distance communication module 130 is an NFC module, the NFC protocol is a protocol that can be used for a short range where a distance between

communication devices is about tens of centimeters. The NFC protocol can use 13.56 MHz in an industrial scientific medical (ISM) band as a frequency of a carrier wave. The wireless short distance communication module performs data communication with an external wireless short distance communication module to receive an application program such as terminal operation information, encoding information, authentication information, payment information, user information, phone numbers, network information, an operating system, and a game. That is, a user of the mobile terminal 200 connects the electronic card 100 to an external apparatus in a contact or contactless manner wirelessly to easily download or upload data or a program related to the operation of the mobile terminal 200.

- [68] Meanwhile, the communication control module 210 of the mobile terminal 200 transfers power and a clock signal to the electronic card 100, and gives/takes various data to/from the electronic card 100 through the card socket 220. The card socket 220 is connected to the electronic card 100 in parallel and is responsible for asynchronous half duplex mode communication. Such a communication method can change.
- [69] The main controller 212 controls data transmitted/received to/from the host interface 216 and the card socket 220, and provides a clock signal, a reset signal, a power signal, and an input/output signal to drive the electronic card 100.
- [70] The memory 214 stores data transmitted/received between the host interface 216 and the electronic card 100. The memory 214 can be disposed as a buffer.
- [71] The host interface 216 performs communication with the host processor 230, and is connected to RS-232 to process universal asynchronous receiver/transmitter (UART) communication. Such a communication method can change but is not limited thereto.
- [72] The host processor 230 controls an operation of reading/writing data from/to the electronic card 100. The host processor 230 can be realized as a controller unit such as a central processing unit (CPU), a micro controller unit (MCU), and a micro processing unit (MPU).
- [73] The battery 240 supplies power necessary for the card socket 220 through the communication control module 210.
- [74] Fig. 6 is a block diagram of a wireless short distance communication module according to the first embodiment. Here, description is made using a case where the near field communication module is an NFC module for example.
- [75] Referring to Fig. 6, the wireless short distance communication module 130 can be realized as an NFC module, and an antenna 131 of the NFC module is mounted inside the main body or the battery pack.
- [76] The wireless short distance communication module 130 comprises a receiver 132, a demodulator 133, a decoder 134, a data processor 135, an encoder 136, a selector 137, a modulator 138, a load modulator 139, a detector 140, and an electromagnetic wave

output unit 141. These elements can change or an additional element can be provided but is not limited thereto. The wireless short distance communication module 130 can be connected to the antenna 131 through the antenna terminals of the connector 160 in Fig. 5.

- [77] The receiver 132 receives signals input through the antenna 131, the demodulator 133 demodulates the received signals, the decoder 134 decodes the demodulated signals, and the data processor 135 analyzes the data decoded by the decoder 134 to transfer the data to the card module 110 or the connector 160 of Fig. 5. Also, the data processor 135 generates data and transfers the data to the encoder 136. The encoder 136 encodes the data, and the selector 137 transfers the encoded data to the modulator 138 or the load modulator 139 in response to a control signal of the data processor 135. The modulator 138 conveys the data transferred from the selector 137 on a carrier wave to modulate the same. The load modulator 139 changes the impedance of the antenna 131 according to a signal supplied from the selector 137.
- [78] Here, the wireless short distance communication module 130 can operate in an active mode or a passive mode by the operation of the modulator 138 or the load modulator 139. In the active mode, inside power is used and two apparatuses communicating with each other transmit data while transmitting unique radio frequency (RF) magnetic fields. In the passive mode, only one apparatus that has started communication transmits an RF magnetic field without power of itself and a counterpart apparatus processes a signal using load modulation. Also, the wireless short distance communication module 130 can operate in the passive mode even without a battery voltage.
- [79] The modulator 138 conveys signals transferred from the selector 137 on carrier waves to modulate the same. The load modulator 139 changes the impedance of the antenna 131 according to a signal supplied from the selector 137. For example, when a signal is received, an RF magnetic field is formed around the antenna 131, and the impedance changes. Accordingly, the carrier of the received signal can be modulated according to a signal supplied from the selector 137.
- [80] The detector 140 detects magnetic flux density of the antenna 131 according to a current of a received signal. The electromagnetic wave output unit 141 controls a current flowing through the antenna 131, thereby allowing an output signal to have a single frequency.
- [81] Fig. 7 is a plan view of an electronic card according to a second embodiment. Same reference numerals are used for the same parts as those of the first embodiments, and description of the same parts are omitted.
- [82] Referring to Fig. 7, an electronic card 100A comprises a card module 110, a wireless short distance communication module 130, and an antenna 131A. The card module 110

is the same as that of the first embodiment, the wireless short distance communication module 130 supports a carrier frequency in a 2.45 GHz, 5.8 GHz, or micro wave band, and the antenna 131A can be realized in a pattern on the substrate of the electronic card 100A. The antenna 131A is a printed circuit board (PCB) pattern and can be realized in the form of a micro strip line, a strip line, or a slot-type antenna.

[83] The wireless short distance communication module 130 uses the mobile terminal for an identification (ID) purpose using RFID of 2.45 GHz to realize an anti-forgery system, and can be used as a telematics using RFID of 5.8 GHz.

[84] Here, a separate antenna does not need to be formed on the main body or the battery pack of the mobile terminal by forming the antenna 131A for the wireless short distance communication module in a pattern form on the electronic card 100A. Also, pins that are not used for the card socket of the mobile terminal can be removed or used for other purposes by connecting the antenna 131A of the electronic card 100A to the wireless short distance communication module.

[85] Figs. 8 to 12 are views illustrating a third embodiment. In describing the third embodiment, same reference numerals are used for the same parts as those of the first embodiments, and description of the same parts are omitted.

[86] Fig. 8 is an exploded perspective view of an electronic card and a mobile terminal in the electronic card according to a third embodiment.

[87] Referring to Fig. 8, a card socket 220B of a mobile terminal 200 in an electronic card terminal apparatus 300A comprises fourteen pins P11-P24. An electronic card 100B is connected to the pins P11-P24 of the card socket 220B. The arrangement structure of the pins P11-P24 of the card socket 220B can change and is not limited thereto. First and second antennas for wireless short distance communication module can be installed in a predetermined region or the battery pack 207 of a main body 201 of the mobile terminal 200.

[88] Fig. 9 is a plan view of the electronic card according to the third embodiment, and Fig. 10 is a lower side view of Fig. 9.

[89] Referring to Figs. 9 and 10, the electronic card 100B comprises a card module 110, a first wireless short distance communication module 130A, a second wireless short distance communication module 150, and a connector 160A comprising fourteen terminals T11-T24.

[90] The first wireless short distance communication module 130A and the second wireless short distance communication module 150 can use different communication frequencies, respectively. For example, the first wireless short distance communication module 130A can be realized in an RFID type, and the second wireless short distance communication module 150 can be realized in a Zigbee type. Alternatively, the first wireless short distance communication module 130A can use NFC

in an HF band, and the second wireless short distance communication module 150 can use RFID in an UHF band or a micro wave band.

- [91] Also, the second wireless short distance communication module 150 is a communication system that can apply wireless personal area networks (WPAN) in broad meaning. For example, the second wireless short distance communication module 150 can be realized in a system such as a Zigbee, an active RFID, WiFi, and Wibree. According to the WPAN technology, a plurality of devices can communicate using an ad hoc method, and can perform high speed data transmission by IEEE 802.15 standard. Hereinafter, it is assumed that the second wireless short distance communication module 150 is realized in a Zigbee system for convenience in description.
- [92] Here, the Zigbee system is a wireless personal area communication network standard that uses frequency bands of 868MHz, 902~928MHz, and 2.4GHz. A mobile terminal can perform a wireless access to a peripheral device through a Zigbee module of an electronic card.
- [93] The first or second wireless short distance communication modules 130A and 150 can be realized using one selected from RFID, NFC, Zigbee, ultra-wide band, DSRC, a wireless LAN, Wibree, and Z-wave.
- [94] Referring to Figs. 8 and 10, the pins P11-P24 of the card socket 220B are formed at positions corresponding to the terminals T11-T24 of the electronic card 100B. The kinds and structures of the pins and terminals are illustrated in Table 2 below.
- [95] Table 2

[Table 2]

[Table]

Card socket	Electronic card	Terminal kind
Eleventh pin (P11)	Eleventh terminal (T11)	Antenna terminal (for Zigbee)
Twelfth pin (P12)	Twelfth terminal (T12)	Ground terminal (for Zigbee)
Thirteenth pin (P13)	Thirteenth terminal (T13)	Transmission terminal (for Zigbee)
Fourteenth pin (P14)	Fourteenth terminal (T14)	Antenna terminal (for Zigbee)
Fifteenth pin (P15)	Fifteenth terminal (T15)	Reset signal terminal (for Zigbee)
Sixteenth pin (P16)	Sixteenth terminal (T16)	Reception signal terminal (for Zigbee)
Seventeenth pin (P17)	Seventeenth terminal (T17)	Power terminal (for card)
Eighteenth pin (P18)	Eighteenth terminal (T18)	Reset signal terminal (for card)
Nineteenth pin (P19)	Nineteenth terminal (T19)	Clock signal terminal (for card)
Twentieth pin (P20)	Twentieth terminal (T20)	Antenna terminal (for RFID)
Twenty first pin (P21)	Twenty first terminal (T21)	Ground terminal (for card)
Twenty sencond pin (P22)	Twenty second terminal (T22)	SWP terminal (for card)
Twenty third pin (P23)	Twenty third terminal (T23)	Input/output signal terminal (for card)
Twenty fourth pin (P24)	Twenty fourth terminal (T24)	Antenna terminal (for RFID)

[96] Here, the eleventh to sixteenth terminals T11-T16 of the electronic card 100B are terminals for Zigbee, the twentieth and twenty fourth terminals T20 and T24 are terminals for RFID, and the seventeenth, eighteenth, nineteenth, twenty first, twenty second, and twenty third terminals T17, T18, T19, T21, T22, and T23 can be used for a card. The eleventh terminal T11 and the fourteenth terminal T14 are connected with an antenna for Zigbee, and the twentieth and twenty fourth terminals T20 and T24 are connected with an antenna for RFID. The antenna for Zigbee and the antenna for RFID

are installed on a battery pack or a main body of a mobile terminal, and are connected through the antenna terminal.

[97] Fig. 11 is a block diagram of the electronic card and the mobile terminal according to the third embodiment.

[98] Referring to Fig. 11, the electronic card 100B comprises a card module 110, a first wireless short distance communication module 130A and a second wireless short distance communication module 150, and a connector 160A comprising a plurality of terminals. The first wireless short distance communication module 130A can be realized in an RFID type, and the second wireless short distance communication module 150 can be realized in a Zigbee system.

[99] The card module 110 comprises a card controller 111, a card memory 113, and an auxiliary operator 115. The card controller 111 is connected with the first and second wireless short distance communication modules 130A and 150, prevents collision when transmitting and receiving data to/from the first or second wireless short distance communication module 130A or 150, and can control the operations of the first and second wireless short distance communication module 130A and 150. Also, the card controller 111 can encode data transmitted through the first and second wireless short distance communication modules 130A and 150, and decode received data.

[100] The card controller 111 communicates with a host processor 230, operates on an operating system such as COS (chip operating system), and processes an application program such as a terminal-cooperative operation, user authentication, and electronic payment. The card controller 111 can selectively apply a protocol of ISO 7816, ISO 14443 type A, ISO 14443 type B, ISO 15693, ISO 18092, ISO 21481, ECMA (340, 352, 356), ETSI TS 102 190, MIFARE technology, and Felica technology using the first and second wireless short distance communication modules 130A and 150.

[101] Terminal operation information, encoding information, authentication information, payment information, user information, phone numbers, and network information are recorded in the card memory 113. The card memory 113 stores an operating system driving the card controller 111.

[102] The auxiliary operator 115 has an infrastructure generating a random number of a code using the unique number of a CSN (chip serial Number), records a code key in a DF, and processes a plurality of encode algorithms such as PKI and 3DES, and an exclusive crypto process for a code process. The code algorithm or processor of the auxiliary operator 115 can change and is not limited thereto.

[103] The connector 160A is connected to the fourteen pins of the card socket 220A through the fourteen terminals, and allows the electronic card 100B to normally operate.

[104] Fig. 12 is a block diagram of the first and second wireless short distance com-

munication modules in the electronic card according to the third embodiment. Here, descriptions will be made on the assumption that the first wireless short distance communication module 130A is an RFID module, and the second wireless short distance communication module 150 is a Zigbee module.

- [105] Referring to Fig. 12, the first wireless short distance communication module 130A comprises a demodulator 143, a decoder 144, a controller 145, an encoder 146, and a modulator 147. The antenna of the first wireless short distance communication module 130A is disposed in a battery pack, and can be connected through the card socket.
- [106] The first wireless short distance communication module 130A is activated by a signal of an RFID reader received through the antenna 131B. The demodulator 143 demodulates the signal received through the antenna 131B. The decoder 144 decodes the demodulated RF signal into digital data and transfers the data to the controller 145. The encoder 146 encodes data to be transmitted, and the modulator 147 modulates encoded information into an RF signal and outputs the RF signal via the antenna 131B. Here, the first wireless short distance communication module 130A can comprise a separate memory to store data regarding user information.
- [107] The first wireless short distance communication module 130A is an RFID module, and receives data from the card module 110 to form an RFID signal. The RFID signal can be transmitted to an external tag or reader depending on an RFID channel standard. For example, in the case where payment information is received after payment from the external reader is completed, the received information can be transmitted to the card module 110.
- [108] Meanwhile, the second wireless short distance communication module 150 is a Zigbee module, and comprises a controller 151, a media access controller (MAC) processor 152, an RF receiver 153, an RF transmitter 154, a power control circuit 155, and a phase synchronization circuit 156. An antenna 157 for Zigbee can be connected through the card socket.
- [109] The RF receiver 153, the RF transmitter 154, and the phase synchronization circuit 156, and the power control circuit 155 are elements processing a physical (PHY) layer of a Zigbee protocol stack, and determines an RF communication structure and a network topology.
- [110] The RF receiver 153 and the RF transmitter 154 comprise a filter to process an RF signal. The phase synchronization circuit 156 provides a reference frequency so that the RF receiver 153 and the RF transmitter 154 can synthesize an intermediate frequency signal, and the power control circuit 155 controls transmission power under control of the controller 151.
- [111] Here, the Zigbee module conforms to IEEE 802.15.4 standard, and defines two kinds of PHY layers of 2.4 GHz and 866/915 MHz. Sixteen channels are assigned to a 2.4

GHz band, ten channels are assigned to a 902 MHz-928 MHz band, and one channel is assigned to a 868 MHz-870 MHz band.

- [112] The RF receiver 153 and the RF transmitter 154 process a digital signal in a baseband. When the digital process of the PHY layer is completed, the MAC processor 152 analyzes transmitted data frame structure to approve the frame, detects an error (CRC or Checksum) to determine whether to retransmit, and processes a packet routing.
- [113] The controller 151 performs the functions of the rest MAC layers, the function of network/security, and the function of a framework layer to form a network topology, and performs the function of an application/profiles layer to analyze Zigbee communication data and control each element.
- [114] The controller 151 is connected to the card module 110 or connected to the host processor through the card socket to transmit/receive data, and can generate data on the electronic card 100B or data on the mobile terminal 200 in the form of Zigbee data to perform communication with an external Zigbee module.
- [115] Here, the antennas 131B and 157 of the first and second wireless short distance communication modules 130A and 150 can be formed in the main body or the battery pack of the mobile terminal, and the positions thereof are not limited.
- [116] Figs. 13 and 14 are a plan view and a lower side view of the electronic card according to a fourth embodiment, respectively. Same reference numerals are used for the same parts as those of the third embodiments, and description of the same parts are omitted.
- [117] Referring to Figs. 13 and 14, the electronic card 100C comprises an antenna 157 of one of a first wireless short distance communication module 130A and a second wireless short distance communication module 150. The antenna 157 is an antenna of the second wireless short distance communication module 150. The antenna 157 can be realized in the form of a pattern, for example, a micro strip line or a strip line on the substrate of the electronic card 100C. Also, the antenna of the first wireless short distance communication module 130A can be realized in the form of a loop antenna in a battery pack, for example.
- [118] At this point, antenna terminals T11 and T14 of the second wireless short distance communication module 150 can be removed, and can be also used as reserved terminals.
- [119] As described above, according to the embodiments, at least one wireless short distance communication module is disposed on the electronic card mounted in the mobile terminal, and the antenna is formed in the mobile terminal and/or the electronic card, so that various wireless short distance communication services can be provided through the mobile terminal.

[120] Also, in describing the first to fourth embodiments, the characteristics or elements of each embodiment are not limited to the descriptions set forth therein but can be added or modified as elements of other embodiments.

[121] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Industrial Applicability

[122] Embodiments can easily download or upload data, an operating system, and an application program necessary for a mobile terminal by disposing at least one wireless short distance communication module in an electronic card such as a smart card in order to perform dual direction data communication.

[123] Embodiments can extend the application field of an electronic card and develop an application service in cooperation with a mobile terminal.

[124] According to embodiments, a separate wireless short distance communication module does not need to be provided to a mobile terminal, the manufacturing costs of the mobile terminal can be reduced. Also, since an electronic card is optionally provided to a mobile terminal, the reliability of the mobile terminal can be improved.

[125] Embodiments extend the number of terminals of an electronic cards and a mobile terminal so that the terminals can be used for various purposes.

[126] Embodiments can mount a plurality of wireless communication modules in an electronic card to provide various application services in cooperation with a mobile terminal.

[127] Embodiments provide an additional communication function to an electronic card to differentiate functions from those of other electronic cards, and can optionally provide a service in cooperation with a mobile terminal.

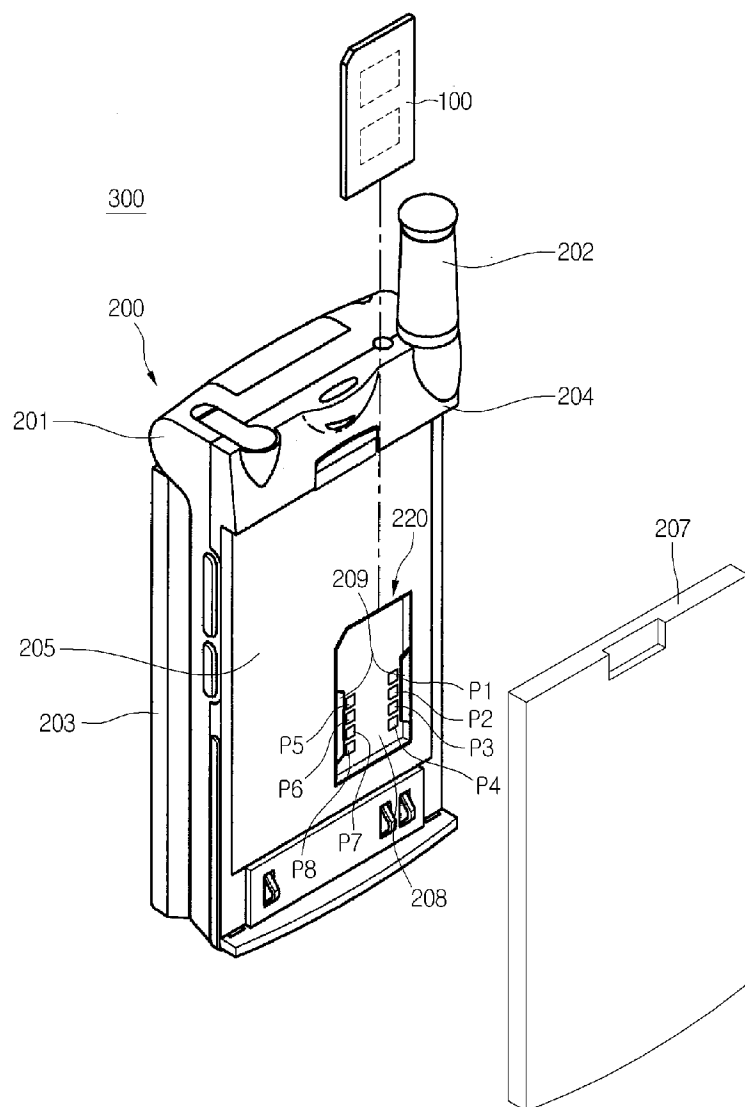
Claims

- [1] An electronic card terminal apparatus comprising:
a mobile terminal comprising a card socket; and
an electronic card coupled to the card socket and comprising a wireless short distance communication module.
- [2] The electronic card terminal apparatus according to claim 1, wherein the electronic card comprises:
a connector comprising a plurality of terminals electrically connected to the card socket;
a first wireless short distance communication module connected to the connector and performing wireless short distance communication through a first frequency band; and
a card module storing user information and electrically connected to the connector and the first wireless short distance communication module.
- [3] The electronic card terminal apparatus according to claim 2, wherein the electronic card comprises a second wireless short distance communication module electrically connected to the connector, communicating with the card module, and performing wireless short distance communication through a second frequency band.
- [4] The electronic card terminal apparatus according to claim 1, wherein the wireless short distance communication module comprises at least one of radio frequency identification, near field communication, Bluetooth, Zigbee, an ultra-wide band method, dedicated short range communication, wireless local area network, Wibree, and Z-wave.
- [5] The electronic card terminal apparatus according to claim 3, wherein the electronic card comprises an antenna transmitting/receiving data of the first wireless short distance communication module or the second wireless short distance communication module.
- [6] The electronic card terminal apparatus according to claim 2, wherein the card module comprises a card memory storing user information and a card controller recording information in the card memory, and reading the recorded information.
- [7] The electronic card terminal apparatus according to claim 6, wherein the card module comprises an auxiliary operator performing a code processing function of radio transmission /reception data.
- [8] The electronic card terminal apparatus according to claim 6, wherein the card memory stores at least one of a card operating system, terminal information, code information, authentication information, electronic payment information,

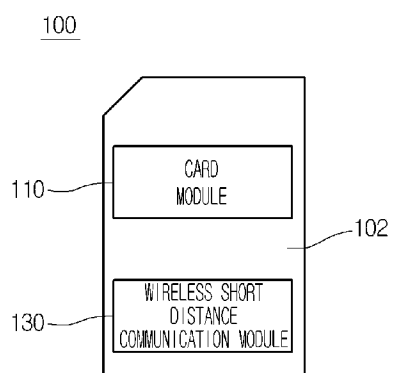
- user information, and network information.
- [9] The electronic card terminal apparatus according to claim 1, wherein the electronic card operates using at least one protocol of ISO 7816, ISO 14443 type A, ISO 14443 type B, ISO 15693, ISO 18092, ISO 21481, enzymatic cleavage mismatched analysis (ECMA) (340, 352, 356), European Telecommunications Standards Institute (ETSI) technical specification (TS) 102 190, MIFARE technology, and Felica technology.
- [10] The electronic card terminal apparatus according to claim 1, wherein the electronic card and the card socket communicate with each other using eight pins, and the eight pins comprise a power terminal, a reset terminal, a clock signal terminal, two antenna terminals, an input/output terminal, a single wire protocol terminal, and a ground terminal.
- [11] The electronic card terminal apparatus according to claim 3, wherein the first wireless short distance communication module comprises one of near field communication, radio frequency identification, and Zigbee, and the second wireless short distance communication module uses a frequency band different from that of the first wireless short distance communication module, and comprises a communication method of a band of 2 GHz or more.
- [12] The electronic card terminal apparatus according to claim 1, wherein the mobile terminal comprises an antenna for the wireless short distance communication module in its predetermined region.
- [13] An electronic card terminal apparatus comprising:
a mobile terminal comprising a card socket; and
an electronic card coupled to the card socket,
the electronic card comprising:
a connector comprising a plurality of terminals connected to the card socket;
at least one wireless short distance communication module electrically connected to the connector and performing wireless short distance communication through a predetermined frequency band;
a card module storing user information and electrically connected to the connector and the wireless short distance communication module; and
an antenna transmitting/receiving data of the wireless short distance communication module.
- [14] The electronic card terminal apparatus according to claim 13, wherein the wireless short distance communication module is mounted on one side of a substrate of the electronic card, and the card module is mounted on the other side of the substrate in the form of individual chips, and the plurality of terminals are formed under the substrate to correspond to the card socket.

- [15] The electronic card terminal apparatus according to claim 13, wherein the connector and the card socket communicate with each other using eight pins, and the eight pins comprise a power terminal, a reset terminal, a clock signal terminal, two antenna terminals, input/output terminals, a single wire protocol terminal, and a ground terminal.
- [16] The electronic card terminal apparatus according to claim 13, wherein the electronic card comprises a second wireless short distance communication module electrically connected to the connector, communicating with the card module, and performing wireless short distance communication through a second frequency band.
- [17] The electronic card terminal apparatus according to claim 13, wherein the wireless short distance communication module comprises at least one of radio frequency identification, near field communication, Bluetooth, Zigbee, an ultra-wide band method, dedicated short range communication, wireless local area network, Wibree, and Z-wave.
- [18] The electronic card terminal apparatus according to claim 13, wherein the electronic card comprises a plurality of wireless short distance communication modules, and the card socket and the electronic card are connected to each other using fourteen pins.
- [19] An electronic card terminal apparatus comprising:
a mobile terminal comprising a card socket; and
an electronic card mounted in or separated from the card socket, storing user information, and comprising a wireless short distance communication module, the mobile terminal performing at least one of user authentication, electronic payment, traffic fare payment, building entrance authentication, and digital copyright authentication using the mounted electronic card.
- [20] The electronic card terminal apparatus according to claim 19, wherein the wireless short distance communication module performs communication using a radio frequency in at least one of 13.56MHz, 433MHz, 860~960MHz, 2.4GHz, 2.45GHz, and 5.8GHz bands.

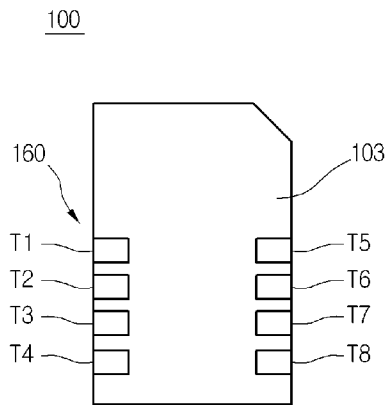
[Fig. 1]



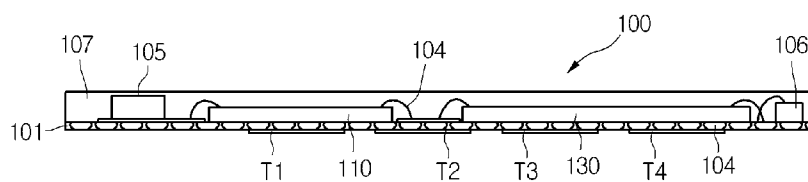
[Fig. 2]



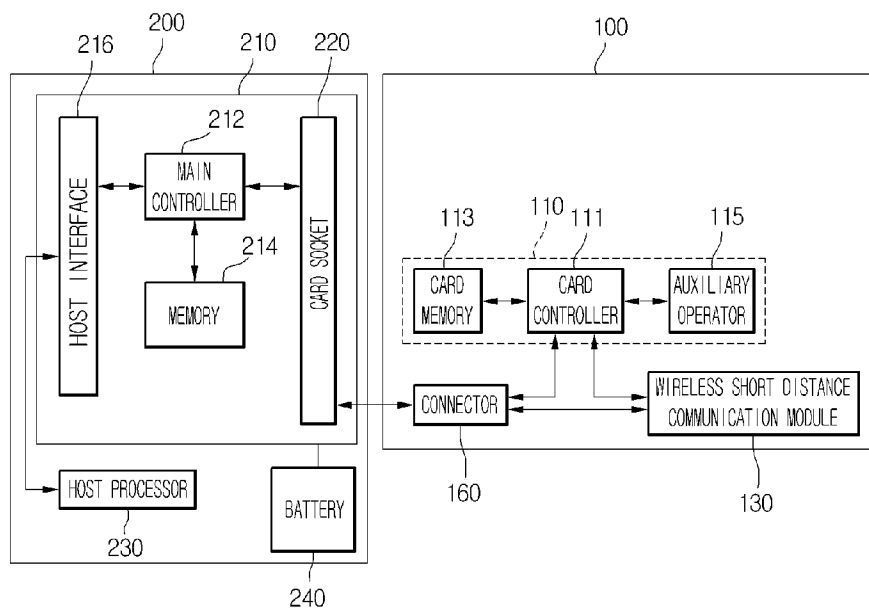
[Fig. 3]



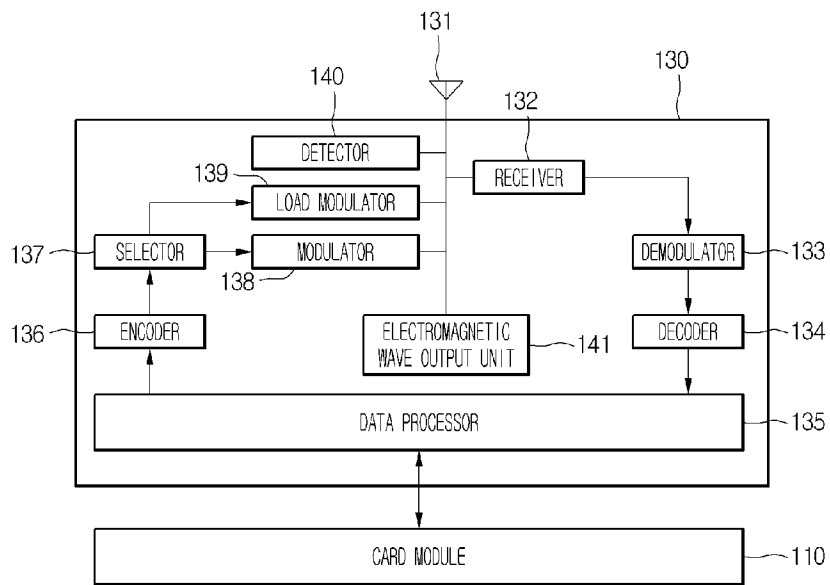
[Fig. 4]



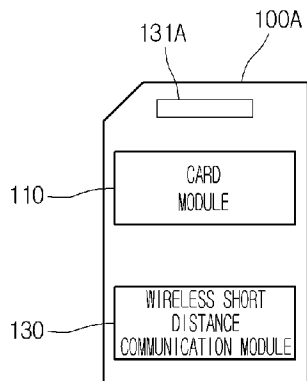
[Fig. 5]



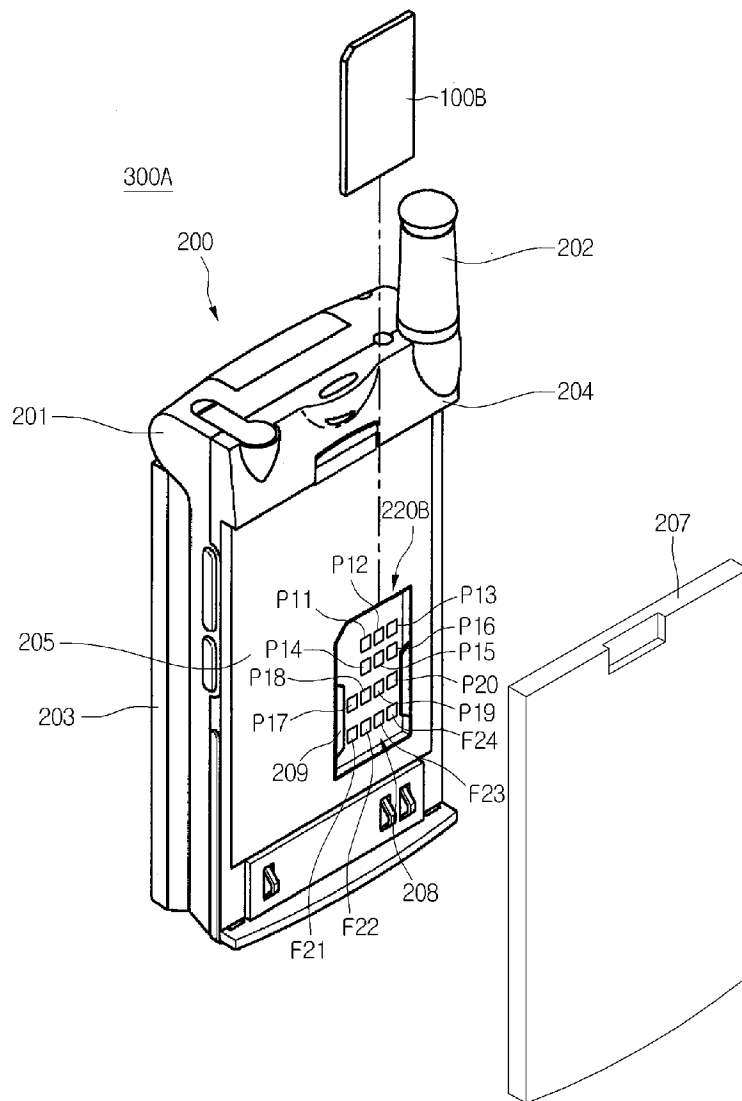
[Fig. 6]



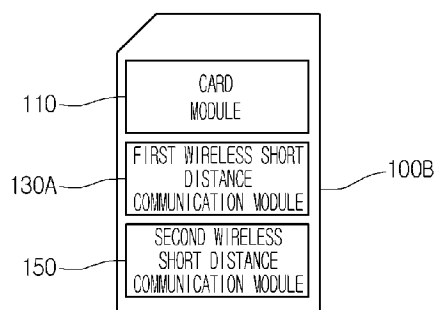
[Fig. 7]



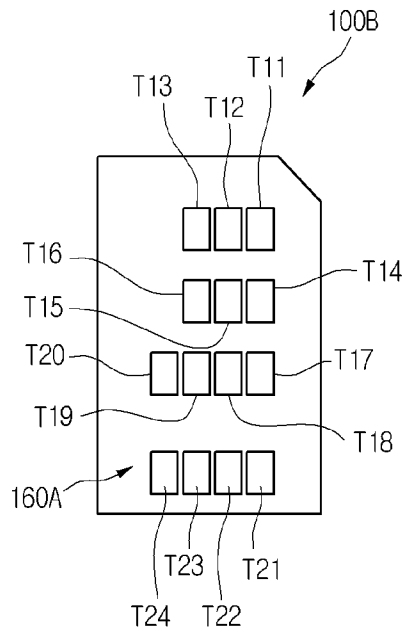
[Fig. 8]



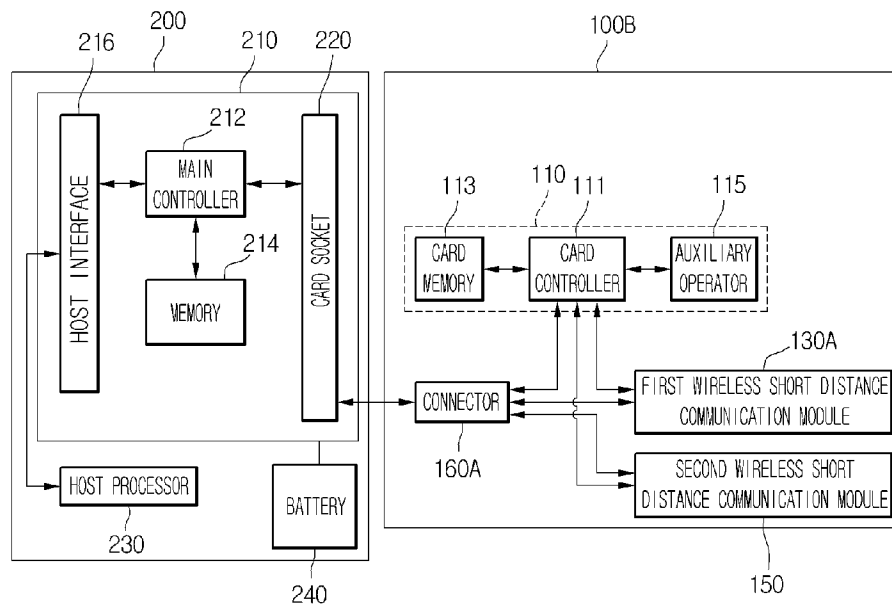
[Fig. 9]



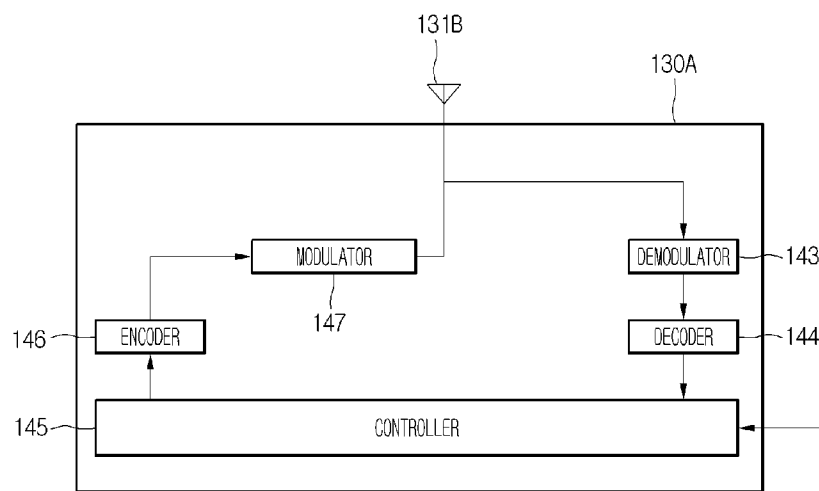
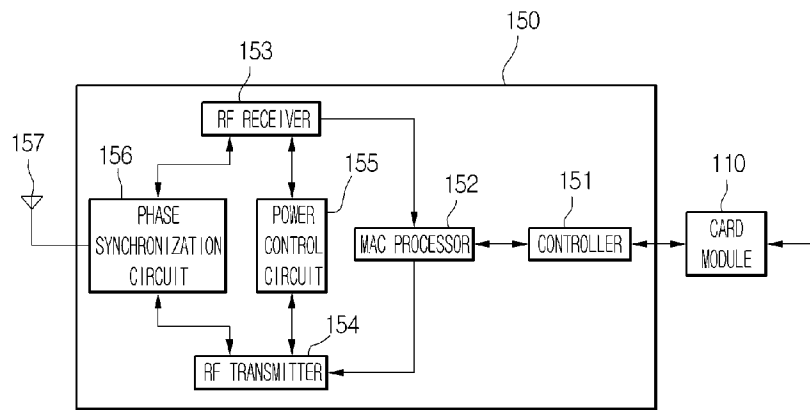
[Fig. 10]



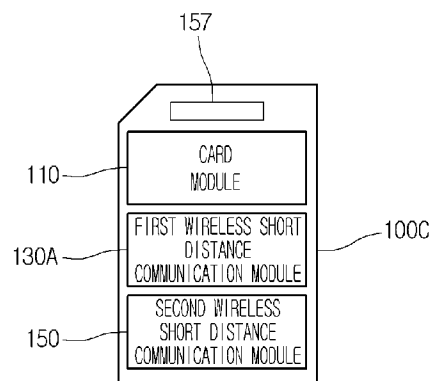
[Fig. 11]



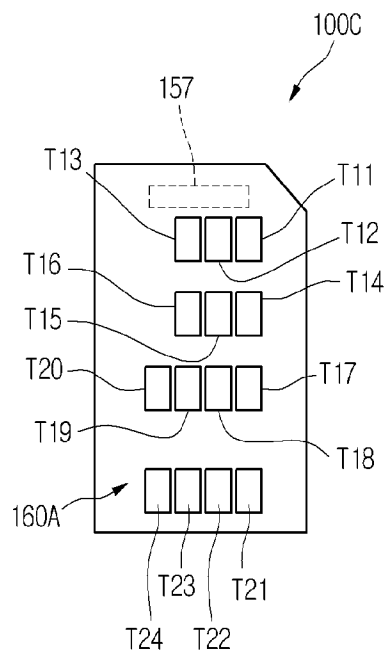
[Fig. 12]



[Fig. 13]



[Fig. 14]



A. CLASSIFICATION OF SUBJECT MATTER**G06K 19/07(2006.01)i**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 : G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility Models and applications for Utility Models since 1975; IPC above

Japanese Utility Models and applications for Utility Models since 1975; IPC above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal) "mobile", "smart", "card", "rfid", "bluetooth", "zigbee", "uwb", "socket"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	KR 10-2002-0052156 A (AN, JY YOUNG) 02 July 2002 See abstract and pages 2-3.	1 - 20
Y	KR 10-2004-0105094 A (HYUNDAI MOTOR COMPANY) 14 December 2004 See abstract and figure 1.	1 - 20
Y	KR 10-2005-0058560 A (SK TELETEC CO., LTD) 17 June 2005 See abstract and figures 1-2.	1 - 20
A	WO 2005-043826 A1 (SELA, YOSSY) 12 May 2005 See abstract and figures 1-3.	1 - 20
A	US 2005-0224589 A1 (Park, Young Soo et al.) 13 October 2005 See abstract and figures 1-7.	1 - 20



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

Date of the actual completion of the international search

29 OCTOBER 2008 (29.10.2008)

Date of mailing of the international search report

30 OCTOBER 2008 (30.10.2008)

Name and mailing address of the ISA/KR

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Telephone No. 82-42-481-8463



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/003049

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