

**COMMUNICATION TERMINAL FOR MULTI-NUMBER SERVICE AND
METHOD FOR DISPLAYING DIFFERENTIATED INFORMATION FOR
COMMUNICATION TERMINAL**

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TECHNICAL FIELD

The present application claims priority to Korean Patent Application No. 10-2015-0090774 filed on June 25, 2015, and Korean Patent Application No. 10-2015-0098674 filed on July 10, 2015 in the Republic of Korea, the disclosures of which are incorporated
10 herein by reference.

The present disclosure relates to a multi-number service, and more particularly, to a multi-number service which enables to use a plurality of phone numbers by endowing an additional phone number other than a default phone number in a single communication terminal.

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BACKGROUND ART

Recently, due to the rapid development of mobile communication technology, mobile communication terminals have been popularized fast and changed daily life of most persons so that they always carry a mobile communication terminal such as a hand-held
20 phone and PDA. The mobile communication terminal allows a user to more easily access the communication network and efficiently distributes system resources of a conventional communication system.

In addition, recently, the mobile communication service not only provides the

communication service for a voice call but also provides various additional services according to the preferences of the user. As one of these additional services, a ‘multi-number service’ is widely used in which two or more phone numbers are endowed to a single mobile communication terminal so that a subscriber may select a desired phone number and originate a call. As a representative example of ‘multi-number service’, a Korean mobile communication company, KT, provides Two Number Plus service.

For the multi-number service, the communication terminal also needs to multiplex the interface according to the number of phone numbers. In other words, a single communication terminal should distinguish an address book, incoming/outgoing call logs, a message box and the like according to each phone number, suitable for the number of phone numbers. Currently, a communication terminal customized for the multi-number service is available only on feature phones. A representative example of the feature phone is a Two Phone terminal of KT. However, this service is not available at smartphones.

When a multi-number service is used in an Android-based communication terminal (hereinafter, referred to as a multi-number communication terminal), an address book, incoming/outgoing call logs, a message box and the like are not distinguished by each phone number. Also, when an incoming call is received, it is not possible to know which phone number is used for the incoming call among a plurality of phone numbers of the user. The Android-based communication terminal may endow and recognize two or more phone numbers at a single communication terminal based on the multi-user mode (MUM) for the multi-number service. However, the Android-based communication terminal does not yet provide the multi-number service based on the multi-user mode.

DISCLOSURE

Technical Problem

The present disclosure is designed to solve the problems of the related art, and therefore the present disclosure is directed to providing a method for distinguishing an interface and an operational mode of each phone number, and displaying various kinds of distinguished information at the interface of each operational mode in providing a multi-number service in a communication terminal such as a smart phone, and a communication terminal for the method.

Technical Solution

In one aspect of the present disclosure, there is provided a communication terminal for providing multi phone number service using a single communication terminal, comprising: a plurality of interface modules configured to provide an independent operational mode corresponding to each of the plurality of phone numbers; and a switching module configured to switch and activate the plurality of interface modules to each other, wherein when an incoming call is received from a communication network, the activated interface module among the plurality of interface modules checks a called phone number included in the incoming call, and if the receiver phone number corresponds to an operational mode of another interface module, changes a color of a state display bar of the communication terminal.

When a called phone number input to a called phone number input window for call originating includes an identification code for the multi phone number service, the

activated interface module may change a color of a button for call originating.

The activated interface module may search an address book of an operational mode corresponding to the called phone number included in the incoming call by priority to display caller information.

5 When related information is not searched in the address book of the operational mode corresponding to the called phone number included in the incoming call, the activated interface module may search an address book of another operational mode.

 The activated interface module may store a call log of the incoming call only in a call list of the operational mode corresponding to the called phone number included in the
10 incoming call.

The activated interface module may store only information searched by priority as the call log in the call list of the operational mode corresponding to the called phone number included in the incoming call.

 The activated interface module may use a hidden API of an Android operating
15 system to search an address book of another operational mode.

When a called phone number input to a called phone number input window for call originating includes an identification code for the multi phone number service, the activated interface module may change a color of a button for call originating.

 When a message corresponding to an operational mode of another interface
20 module is received from the communication network, the activated interface module may display a message receipt notification, and when a detailed view option is input from a user, the activated interface module may request the switching module to change the operational mode, the switching module may activate the another interface module according to the

operational mode changing request, and the another interface module may display detailed contents of the received message on a screen.

In another aspect of the present disclosure, there is also provided a communication terminal for providing multi phone number service using a single communication terminal, comprising: a plurality of interface modules configured to provide an independent operational mode corresponding to each of the plurality of phone numbers; and a switching module configured to switch and activate the plurality of interface modules to each other, wherein when an incoming call is received from a communication network, the activated interface module among the plurality of interface modules searches an address book of an operational mode corresponding to a called phone number included in the incoming call by priority to display caller information.

When related information is not searched in the address book of the operational mode corresponding to the called phone number included in the incoming call, the activated interface module may search an address book of another operational mode.

The activated interface module may store a call log of the incoming call only in a call list of the operational mode corresponding to the called phone number included in the incoming call.

The activated interface module may store only information searched by priority as the call log in the call list of the operational mode corresponding to the called phone number included in the incoming call.

In another aspect of the present disclosure, there is also provided a method for differentially displaying information at a communication terminal including a plurality of interface modules which provide an independent operational mode corresponding to each

of a plurality of phone numbers for the purpose of multi phone number service using a single communication terminal, the method comprising: receiving an incoming call from a communication network; extracting a called phone number from the incoming call; and changing a color of a state display bar of the communication terminal if the called phone number corresponds to an operational mode other than a current operational mode.

The method may further comprise searching an address book of an operational mode corresponding to the called phone number included in the incoming call by priority to display caller information.

The method may further comprise searching an address book of another operational mode, when related information is not searched in the address book of the operational mode corresponding to the called phone number included in the incoming call.

The method may further comprise storing a call log of the incoming call only in a call list of the operational mode corresponding to the called phone number included in the incoming call.

In the step of storing a call log, only information searched by priority may be stored as the call log in the call list of the operational mode corresponding to the called phone number included in the incoming call.

In another aspect of the present disclosure, there is also provided a method for differentially displaying information at a communication terminal including a plurality of interface modules which provide an independent operational mode corresponding to each of a plurality of phone numbers for the purpose of multi phone number service using a single communication terminal, the method comprising: receiving an incoming call from a communication network; extracting a called phone number from the incoming call; and

searching an address book of an operational mode corresponding to the called phone number included in the incoming call by priority to display caller information.

The method may further comprise searching an address book of another operational mode, when related information is not searched in the address book of the
5 operational mode corresponding to the called phone number included in the incoming call.

The method may further comprise storing a call log of the incoming call only in a call list of the operational mode corresponding to the called phone number included in the incoming call.

In the step of storing a call log, only information searched by priority may be
10 stored as the call log in the call list of the operational mode corresponding to the called phone number included in the incoming call.

In another aspect of the present disclosure, there is also provided a method for differentially displaying information at a communication terminal including a plurality of interface modules which provide an independent operational mode corresponding to each
15 of a plurality of phone numbers for the purpose of multi phone number service using a single communication terminal, the method comprising: receiving a message corresponding to an operational mode other than a current operational mode from a communication network; displaying a message receipt notification by an interface module of the current operational mode and displaying an operational mode changing confirmation
20 request; activating the interface module of the another operational mode according to the operational mode changing confirmation input from a user; and displaying detailed contents of the received message on a screen by the interface module of the another operational mode.

Advantageous Effects

In the present disclosure, in providing a multi-number service in a single communication terminal, when an incoming call is received, it is possible to easily know
5 an operational mode which the received incoming call corresponds to, so that a user may receive calls according to the purpose thereof.

In addition, in the present disclosure, when an incoming call is received in any operational mode, a caller information is searched and displayed at the address book regardless of the operational mode, so that a call log is left in the call list of the operational
10 mode corresponding to the incoming call. Thus, it is possible to allow the user to receive calls according to the purpose thereof and also to allow the user to clearly classify and manage call logs.

Also, in the present disclosure, when an incoming call is received and an address book is searched, it is possible to quickly find caller information by searching the address
15 book of the operational mode corresponding to the called phone number included in the incoming call by priority.

In addition, in the present disclosure, when a call is originated so that an additional phone number is displayed to the called party as the caller phone number in the operational mode of a default phone number, the color of the button for call originating is differently
20 expressed so that the user may easily recognize that the call is being originated using the additional phone number, thereby preventing a wrong call from being originated.

DESCRIPTION OF DRAWINGS

FIG. 1 is a diagram showing a communication network according to an embodiment of the present disclosure.

FIG. 2 is a diagram showing a communication terminal for multi-number service according to an embodiment of the present disclosure.

5 FIG. 3 is a diagram showing components for providing the multi-number service at a communication terminal according to an embodiment of the present disclosure.

FIG. 4 is a diagram showing a screen when a call is received to an additional phone number in a P mode according to an embodiment of the present disclosure.

FIG. 5 is a diagram showing a screen when a message is received to an additional
10 phone number in a B mode according to an embodiment of the present disclosure.

FIG. 6 is a diagram showing a processing screen when a call or a message is originated using an additional phone number in the P mode according to an embodiment of the present disclosure.

FIG. 7 is a table showing the cases where it is possible to search an address book
15 and display a call log when an incoming call is received according to an embodiment of the present disclosure.

FIG. 8 is a flowchart for illustrating a method of receiving an incoming call according to an embodiment of the present disclosure.

FIG. 9 is a flowchart for illustrating a method of receiving an incoming call
20 according to another embodiment of the present disclosure.

FIG. 10 is a flowchart for illustrating a method for call originating according to an embodiment of the present disclosure.

BEST MODE

The foregoing objects, features, and advantages will become apparent from the following detailed description with reference to the accompanying drawings, and accordingly, those skilled in the art will be able to easily practice the technical aspects of the present disclosure. Furthermore, in the description of the present disclosure, when it is deemed that certain detailed description of known technology related to the present disclosure may unnecessarily make the essence of the disclosure vague, its detailed description is omitted herein. Hereinafter, a preferred embodiment of the present disclosure is described in detail with reference to the accompanying drawings.

FIG. 1 is a diagram showing a communication network according to an embodiment of the present disclosure. Referring to FIG. 1, a communication system of this embodiment includes a communication terminal 10 and a mobile communication system 20, and the communication terminal 10 accesses the mobile communication system 20 to use a mobile communication service. The mobile communication system 20 is connected to a public network and provides a communication service between a wired terminal and a mobile terminal. The mobile communication system 20 is a communication system supporting protocols such as CDMA, WCDMA, LTE or the like. However, the present disclosure is not limited thereto. The communication terminal 10 accesses the mobile communication system 20 to perform default call processing, and uses a mobile communication service and a multi-number service. The mobile communication system 20 stores information of subscribers subscribed to the multi-number service.

The multi-number service endows an additional phone number to the communication terminal 10 and displays the endowed additional phone number to a called

party as caller information when a user originates a call. For example, when the user using the multi-number service is endowed with an additional phone number and attempts to originate a call to another user, if the user wants to display the additional phone number as the caller information, the user adds an identification code to the called phone number and then originates a call. At this time, the mobile communication system 20 interprets the identification code and changes a caller phone number to the additional phone number to process the call. Here, as an example of the identification code, a special number (*77) may be added in front of the called phone number.

Meanwhile, a multi-number service user may receive a call or message using an additional phone number. In this case, the calling user attempts to make a call using the additional phone number of the multi-number service user, and the mobile communication system 20 routes the originated call of the calling user to multi-number service user by using a mapping table where the additional phone number is mapped with a default phone number. At this time, from the call routed to the multi-number service user, it is identified whether the call is received to the default phone number or the additional phone number. For example, in case of a voice call, it is identified to which phone number the corresponding voice call is received, by inserting the default phone number or the additional phone number in a specific field of the call incoming to the multi-number service user in the mobile communication system 20. The communication terminal 10 of the multi-number service user controls and manages a ring tone, a call log or the like for the incoming voice call according to the phone number inserted into the specific field.

Hereinafter, the communication terminal 10 having a multi interface according to the present disclosure, which receives a multi-number service through the communication

network, will be described in detail.

FIG. 2 is a diagram showing a communication terminal for multi-number service according to an embodiment of the present disclosure.

As shown in FIG. 2, the communication terminal 10 includes a memory 110, a
5 memory controller 121, at least one processor (CPU) 122, a peripheral interface 123, an
input/output (I/O) sub-system 130, a display device 141, an input device 142 and a
communication circuit 152. These components communicate through at least one
communication bus or signal line. Various components depicted in FIG. 2 may be
implemented in hardware, software, or a combination of hardware and software, including
10 at least one signal processing and/or application specific integrated circuit.

The memory 110 may include a high-speed random access memory, and may also
include at least one magnetic disk storage device, a non-volatile memory such as a flash
memory device, or another non-volatile semiconductor memory device. In some
embodiments, the memory 110 may include a storage device located far from at least one
15 processor 122, for example a network attached storage device accessing the
communication circuit 152 through a communication network (not shown) such as the
Internet, an intranet, a local area network (LAN), a wide area network (WLAN), a storage
area network (SAN), or any suitable combination thereof. The access to the memory 110
by other components of communication terminal 10, such as the processor 122 and the
20 peripheral interface 123, may be controlled by the memory controller 121.

The peripheral interface 123 connects input/output peripheral devices of the
communication terminal 10 to the processor 122 and the memory 110. At least one
processor 122 executes various software programs and/or instruction sets stored in the

memory 110 to perform various functions for the communication terminal 10 and process data. In some embodiments, the peripheral interface 123, the processor 122 and the memory controller 121 may be implemented on a single chip, such as a chip 120. In other embodiments, they may be implemented as separate chips.

5 The I/O sub-system 130 provides an interface between the input/output peripheral devices of the communication terminal 10, such as the display device 141 and the input device 142, and the peripheral interface 123.

 The display device 141 may use liquid crystal display (LCD) technology or light emitting polymer display (LPD) technology. The display device 141 may be a touch
10 display in a capacitive type, a resistive type, an infrared type, or the like. The touch display provides an output interface and an input interface between a terminal and a user. The touch display displays a visual output to the user. The visual output may include text, graphics, video, or combinations thereof. All or some of the visual outputs may correspond to a user interface object. The touch display forms a touch sensitive surface
15 that receives a user input.

 The processor 122 is configured to perform operations associated with the communication terminal 10 and to perform instructions. For example, the processor 122 may control to receive and manipulate input and output data among components of the communication terminal 10 by using instructions searched from, for example, the memory
20 110.

 In some embodiments, software components such as an operating system 111, a graphic module (an instruction set) 112 and a multi-number service application (an instruction set) 113 is loaded (installed) in the memory 110. The processor 122 may

execute the multi-number service application (an instruction set) 113 stored in the memory 110.

The operating system 111 may be an embedded operating system such as, for example, Darwin, RTXC, LINUX, UNIX, OS X, WINDOWS, VxWorks, Android, or the like. The operating system 111 includes various software components and/or devices for controlling and managing general system tasks (for example, memory management, storage control, power management or the like) and may promote communication among various hardware and software components.

The graphics module 112 includes various software components well known in the art in order to provide and display graphics on the display device 141. The term “graphics” includes texts, web pages, icons (for example, user interface objects including soft keys), digital images, video, animations, or the like, without limitations, and may include all objects which can be displayed to the user.

The communication circuit 152 transmits or receives signals in a wired way or transmits or receives electromagnetic waves in a wireless way. The communication circuit 152 converts electrical signals to electromagnetic waves, or vice versa, and communicates with the communication network, or other mobile gateways or communication devices, by means of the electromagnetic waves. The communication circuit 152 includes, for example, an antenna system, an RF transceiver, at least one amplifier, a tuner, at least one oscillator, a digital signal processor, a CODEC chipset, a subscriber identity module (SIM) card, a memory and so on, but may include a well-known circuit for performing such functions, without being limited thereto. The communication circuit 152 may communicate with other devices by means of a network such as the

Internet called a world wide web (WWW), an intranet and a network and/or a cellular telephone network, a wireless network such as a wireless LAN, and a local wireless communication network. The wireless communication may use any one selected from a plurality of communication standards, protocols and techniques, which include Global
5 System for Mobile Communications (GSM), Enhanced Data GSM Environment (EDGE), wideband code division multiple access (WCDMA), code division multiple access (CDMA), time division multiple access (TDMA) voice over Internet Protocol (VoIP), Wi-MAX, Bluetooth, ZigBee, Near Field Communication (NFC), or any other suitable communication protocols including communication protocols not yet developed at the time
10 of filing of this application, without any limitations.

FIG. 3 is a diagram showing components for providing the multi-number service at a communication terminal according to an embodiment of the present disclosure. Referring to FIG. 3, in this embodiment, the communication terminal 10 includes a first interface module 310, a second interface module 320 and a switching module 330. In this
15 embodiment, it is assumed that the communication terminal is endowed with two phone numbers, so it is explained that two interface modules 310, 320 are provided. The components of this embodiment may be implemented as a combination of hardware and/or software components of the communication terminal 10 as described above with reference to FIG. 2.

20 The first interface module 310 is an interface corresponding to the default phone number endowed to the communication terminal 10. The first interface module 310 sets an independent screen and allocates an independent storage area to the memory 110 to store terminal functions and additional functions related to the default phone number in the

area and also access the storage area to manage data. A state in which the first interface module 310 is activated is called a P (private) mode.

When the user attempts to originate a call using an additional phone number in a state where the first interface module 310 is activated, the user inserts an identification
5 number (for example, *77) directly into the called phone number and then originates a call. This is for allowing the mobile communication system 20 described above to display the additional phone number as caller information to the called party according to the multi-number service. In this case, the first interface module 310 may store the calling record in a memory area managed by the second interface 320, namely a call log, and the calling
10 details thereof may be checked by activating the second interface module 320.

The second interface module 320 provides an interface corresponding to the additional phone number additionally endowed to the communication terminal according to the multi-number service. The second interface module 320 also sets an independent screen, allocates an independent storage area, and stores and manages data related to the
15 additional phone number. When a call is originated, the second interface module 320 automatically adds an identification code (for example, *77) to the called phone number. By doing so, if a call is originated in a state where the second interface module 320 is activated, the additional terminal number is displayed as caller information in the called terminal without any special action. A state where the second interface module 330 is
20 activated called a B (Business) mode.

In each of the interface modules 310, 320, terminal setting values such as background, ring tone, vibration/blinking or the like are set independently. This means that background, ring tone and vibration/blinking are applied independently from each

other depending on the default phone number and the additional phone number,.

Each interface module 310, 320 displays an indicator for distinguishing a current operational mode on the screen. For example, P (Private) is displayed in a state display bar in the operational mode corresponding to the default phone number, and B (Business) is displayed in the state display bar in the operational mode corresponding to the additional phone number.

The switching module 330 switches the first interface module 310 and the second interface module 320 to each other and activates any one of them to apply the module as an interface to the communication terminal 10. The switching module 330 receives a predetermined manipulation from a user and switches two interfaces to each other. The predetermined manipulation may include pressing a function key provided at the communication terminal 10, pressing a specific key of a keypad for a predetermined time or selecting an application installed in the communication terminal 10. In addition, various manipulations not overlapping with manipulations for other functions of the communication terminal 10 may also be used.

In addition, when switching two interfaces, the switching module 330 may allow the switching after the user enters a password and performs authentication. After the user sets a password in advance, when switching an interface, the user enters the set password and performs authentication. The switching function using a password as described above may be set according to the selection of the user. Here, though it is described that two interfaces are used in this embodiment, in the multi-number service, a plurality of additional phone numbers may be endowed and a plurality of interfaces corresponding thereto are further added, so that the switching module 330 selects and activates any one of

the plurality of interfaces.

Receiving a call

If an incoming call is received in an activated state, when displaying a caller phone
5 number, the first interface module 310 and the second interface module 320 notifies the
phone number to which the corresponding incoming call is received through a label and/or
a state display bar at a top of the screen. For example, if the incoming call is received to
the default phone number, a label 'one phone' is displayed when the caller phone number
is displayed, and if the incoming call is received to the additional phone number, a label
10 'two phone' is displayed when the caller phone number is displayed. If the incoming call
is received to a phone number corresponding to the current mode, the label may not be
displayed.

If an incoming call is received to a phone number of another mode, the first and
interface modules 310, 320 may change the color of the state display bar at the top of the
15 screen into another color or take an action such as blinking the state display bar. FIG. 4 is
a diagram showing a screen when a call is received to an additional phone number in a P
mode according to an embodiment of the present disclosure. As shown in FIG. 4, a label
'two phone' 410 representing that the call is received to the additional phone number is
displayed above a caller name, and the color of a state display bar 420 is also changed.
20 By doing so, the user may recognize that the current incoming call is received to the
additional phone number of the user based on the label displayed together with the caller
phone number.

When displaying a missed call because the user does not answer a call, if the call

is received to a phone number corresponding to another mode, the first interface module 310 and the second interface module 320 display the missed call but do not leave a missed call record in the call log of the user. In addition, when displaying a missed call, the first interface module 310 and the second interface module 320 may display an icon such as 'P'/'B' or a label such as 'one phone'/'two phone' so that the user may know the mode of the phone number to which the call is received.

Receiving a message

If a message is received to a phone number corresponding to the current operational mode, the first interface module 310 and the second interface module 320 perform a general message receiving process. Meanwhile, if a message is received to a phone number corresponding to another mode, the first and second interface modules 310, 320 store the corresponding message only in a message box of another mode but notify the receipt. Thus, if a message is received to a phone number corresponding to another mode, the first and second interface modules 310, 320 notifies the receipt, and if the user selects the receipt notification for a detailed view, the first and second interface modules 310, 320 request the switching module 330 to shift the mode. The switching module 330 switches the mode. After the mode switching, a detailed view of the message is provided. FIG. 5 is a diagram showing a screen when a message is received to an additional phone number in a B mode according to an embodiment of the present disclosure. As shown in the portion (a) of FIG. 5, in the B mode, if a message is received to the additional phone number, the receipt of the message is notified. If the user selects the notification for a detailed view, as shown in portion (b) of FIG. 5, the second interface module 320 displays

an operational mode changing request. If the user selects 'Yes', as shown in the portions (c) and (d) of FIG. 5, the mode is switched to the P mode to display the message notification, if and the user selects a detailed view, detailed contents of the message are displayed.

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Originating a call or a message

When originating a call or a message, the second interface module 320 automatically adds an identification code (for example, *77) to the called phone number.

When originating a call or a message, the first interface module 310 does not add
10 the identification code to the called phone number. If the user directly adds the identification code to the called phone number, the first interface module 310 changes the color of the call button or the message send button into another color different from the background. FIG. 6 is a diagram showing a processing screen when a call or a message is originated with an additional phone number in the P mode according to an embodiment of
15 the present disclosure. The portion (a) of FIG. 6 shows the screen when a call is originated, and if the identification code is put in front of the called phone number, the color of the call button 610 is changed. The portion (b) of FIG. 6 shows the screen when a message is originated, and if the identification code is put in front of the called phone number, the color of the send button 620 is changed, similarly. Thus, the user may easily
20 recognize that a call is originated using the additional phone number in the P mode.

Searching an address book

If an incoming call is received to the communication terminal 10, the

communication terminal 10 searches the address book by using the caller phone number, and if the name is stored in the address book, the communication terminal 10 displays the name and the caller phone number as caller information on the screen. At this time, the communication terminal 10 is endowed with a plurality of phone numbers, and the address
5 book is independently stored and used in each mode.

In detail, when an incoming call is received and the first and second interface modules 310, 320 search the address book by using the caller phone number included in the incoming call, the first and second interface modules 310, 320 firstly search the address book of a mode corresponding to the incoming call by priority, and if there is no
10 information in the address book, the first and second interface modules 310, 320 searches the address book of the other mode in a later order. For example, if there is an incoming call received to the additional phone number, the first interface module 310 does not search the address book of the first interface module 310 but search the address book of the second interface module 310, namely the address book of the B mode, by priority. If
15 there is related information in the address book of the B mode, the corresponding information (for example, the name) is displayed as caller information. However, if there is no related information in the address book of the B mode, the address book of the P mode is searched, and if there is related information, the corresponding information is displayed as caller information.

20 In order to search the address book, a specific address book searching API may be prepared and then sent to an address book in another operational mode. In other case, a hidden API of the Android operating system may also be used.

The communication terminal 10 of this embodiment basically uses a multi-user

mode provided by the Android operating system. Here, if the user subscribes to the multi-number service, the communication terminal 10 generates an additional account for the multi number. After that, the communication terminal 10 adds the additional account for the multi number to mStartedUse of Activity Manager whenever booting. The interface modules 310, 320 access the address book of another operational mode and search the information by the following definition.

```
final UserManager userManager=  
(UserManager)context.getSystemService (Context.USER_SERVICE);  
10 List<UserInfo>users=userManager.getUsers (true);//import information of users of  
System.  
  
final UserInfo user=users.get (i);//import a specific user  
  
ContentProvider.maybeAddUserId (CONTENT_URI, user.id);//query
```

15 As described above, ,when an incoming call is received, in order to search the address book, the first and second interface modules 310, 320 give priority to the address book of a mode corresponding to the received incoming call but display caller information searched from the address book on the screen, regardless of the current mode. However, after displaying the caller information on the screen, in order to leave a call log, the first and second interface modules 310, 320 record the information of the incoming call only in
20 a call log of the mode corresponding to the incoming call. For example, if a call is received to the additional phone number in a state where the first interface module 310 is activated, the first interface module 310 searches caller information in the address book of

the B mode and then displays the searched sender information on the screen. Then, after the call is terminated, the call log is not stored in the P mode but is stored only in the B mode. In addition, when leaving the call log, the first and second interface modules 310, 320 record the caller information together, and at this time, the first and second interface modules 310, 320 record the caller information based on the address book of the mode corresponding to the incoming call. For example, if a call is received to the additional phone number in a state where the first interface module 310 is activated and the first interface module 310 cannot search the caller information in the address book of the B mode because there is no relevant information in the address book of the B mode, the first interface module 310 may search and display the caller information in the address book of the P mode. Then, after the call is terminated, the call log is not stored in the P mode but is stored only in the B mode, and at this time, the caller information (for example, the name) searched from the address book of the P mode is not recorded in the call list of the B mode, and only the caller phone number is left therein.

FIG. 7 is a table showing the cases where it is possible to search an address book and display a call log when an incoming call is received according to an embodiment of the present disclosure. Referring to FIG. 7, when an incoming call is received to the communication terminal 10, a call log of the corresponding incoming call is left only in a call log of a mode corresponding to the called phone number included in the corresponding incoming call. In addition, when the call log is left, the caller information is left based on the address book of the mode corresponding to the called phone number. However, when the caller information is displayed in real time in receiving the incoming call, the caller information is displayed regardless of the called phone number, but the address book of the

mode corresponding to the called phone number is searched by priority.

For example, in FIG. 7, when an incoming call is received to 'two phone' which is the additional phone number in the P mode, if the address book of the P mode stores the caller phone number and the name 'Tom' corresponding thereto but the address book of the B mode does not store the caller phone number and the name 'Tom' corresponding thereto, in the P mode, the name 'Tom' and the caller phone number are displayed as caller information. In addition, when a call log is left after the call is terminated, the call log is not left in the P mode, and only the caller phone number is left as the call log in the call list of the B mode. This is because the address book of the B mode does not store the caller phone number.

In the above embodiment, it has been explained that the address book is searched when an incoming call is received to the communication terminal 10, but this is identically applied when the communication terminal 10 originates a call. In other words, when the communication terminal 10 makes a call in the P mode after adding an identification code to the called phone number, on the call connecting screen, the name obtained by searching the address book by using the called phone number may be displayed. At this time, as described above, the address book corresponding to a mode that the user desires to use is searched by priority. In addition, the call log is left only in the call list corresponding to the mode that the user desires to use.

FIG. 8 is a flowchart for illustrating a method of receiving an incoming call according to an embodiment of the present disclosure.

Referring to FIG. 8, if an incoming process is initiated, the communication terminal 10 receives an incoming call (S801). The first interface module 310 or the

second interface module 320 of the communication terminal 10 extracts a called phone number from the incoming call (S803). The first interface module 310 or the second interface module 320 checks whether the extracted called phone number is a phone number of another mode (S805). For example, the first interface module 310 checks whether the
5 called phone number is an additional phone number, and the second interface module 320 checks whether the called phone number is a default phone number.

If the called phone number is a phone number of another mode, the first interface module 310 or the second interface module 320 displays a label to notify that the corresponding incoming call is received to the phone number of another mode, and
10 changes the color of the state display bar on the screen of the communication terminal 10 (S807). For example, when an incoming call is received to the additional phone number in the P mode, the first interface module 310 displays a label 'two phone' together with the caller information and changes the color of the state display bar. At this time, as the color of the state display bar is changed, the state display bar may be blinked. However, if the
15 called phone number is not a phone number of another mode, the first interface module 310 or the second interface module 320 gives a normal display, namely does not display the label and does not change the color of the state display bar (S809).

FIG. 9 is a flowchart for illustrating a method of receiving an incoming call according to another embodiment of the present disclosure and shows an example of
20 displaying sender information and storing call log.

Referring to FIG. 9, if the incoming process is initiated, the communication terminal 10 receives an incoming call (S901). The first interface module 310 or the second interface module 320 of the communication terminal 10 extracts a called phone

number from the incoming call (S903). The first interface module 310 or the second interface module 320 searches information corresponding to the called phone number from the address book of a mode corresponding to the extracted called phone number (S905). For example, if the called phone number is the additional phone number, the first interface
5 module 310 searches the address book of the B mode.

If the information corresponding to the called phone number is not searched in the address book as a result of searching, the first interface module 310 or the second interface module 320 searches information corresponding to the called phone number at the address book of another mode (S907, S909). For example, when the called phone number is the
10 additional phone number, if the first interface module 310 searches the address book of the B mode but does not find the information, the first interface module 310 searches the address book of the P mode.

If the information corresponding to the called phone number is also not found in the address book of another mode, the first interface module 310 or the second interface
15 module 320 displays only the caller phone number included in the incoming call as the caller information (S913).

Meanwhile, as a result of checking in Step S907 or Step S911, if the information corresponding to the additional phone number is found, the first interface module 310 or the second interface module 320 displays the found information and the caller phone
20 number on the screen as the caller information (S915).

Meanwhile, if the call connection is terminated, the first interface module 310 or the second interface module 320 stores the call log in the call list of the mode corresponding to the called phone number (S917). At this time, if the information

corresponding to the called phone number is found only in the address book of another mode other than the mode corresponding to the called phone number, the searched information is not recorded in the call list. The searched information is recorded in the call list only when the information corresponding to the called phone number is found in
5 the address book of the mode corresponding to the called phone number.

In the embodiment explained with reference to FIG. 9, if an incoming call is received in any mode, the user is capable of checking information of the caller. However, if the call is terminated, the call log is left only in the mode corresponding to the called phone number included in the incoming call, and thus it is possible to clearly distinguish
10 the call log according to the mode. At this time, while the call is being connected, if the caller information is searched in the address book of any mode, the caller information is displayed on the screen. However, only the information searched from the address book of the corresponding mode is displayed in the call log of the corresponding mode. Therefore, the user knows who made the call when the call is connected and also may use
15 the address book distinguishably.

FIG. 10 is a flowchart for illustrating a method for call originating according to an embodiment of the present disclosure and showing a method for call originating in the P mode.

Referring to FIG. 10, the first interface module 310 displays a called phone
20 number input window for originating a voice/image call or a text message and receives a called phone number from the user by using the called phone number input window (S1001).

The first interface module 310 checks whether an identification code for allowing

the additional phone number to be displayed as caller information is included in the received called phone number (S1003). If the identification code is included, the first interface module 310 changes the color of the call button or the message send button (S1005).

5 If an input of selecting the call button or the message send button is received from the user, the first interface module 310 originates a call for connecting the call or sending the message (S1007).

 In the embodiment explained with reference to FIG. 10, in the mode of the default phone number, namely in the P mode, when originating a call, the user is possible to check
10 whether the call is originated using the additional phone number or to the default phone number, before the button is finally pressed. Thus, it is possible to prevent the user from erroneously originating the call.

 While this specification contains many features, the features should not be construed as limiting the scope of the disclosure or the appended claims. Certain features
15 described in the context of separate exemplary embodiments can also be implemented in combination in a single exemplary embodiment. Conversely, various features described in the context of a single exemplary embodiment can also be implemented in multiple exemplary embodiments separately or in any suitable subcombination.

 Although the drawings describe the operations in a specific order, one should not
20 interpret that the operations are performed in a specific order as shown in the drawings or successively performed in a continuous order, or all the operations are performed to obtain a desired result. Multitasking or parallel processing may be advantageous under a particular environment. Also, it should be understood that all exemplary embodiments do

not require the distinction of various system components made in the above mentioned embodiment. The program components and systems may be generally implemented as a single software product or multiple software product packages.

5 The above mentioned method of the present disclosure may be implemented as program instructions and recorded in non-transitory computer-readable media (such as, for example, a compact disk-read only memory (CD ROM), random access memory (RAM), read-only memory (ROM), floppy disks, hard disks, magneto-optical disks, and the like). This process may be easily performed by person having ordinary skill in the technical field to which the present disclosure belongs, and its detailed description is omitted herein.

10 It should be noted various substitutions, modifications, and changes may be made to the present disclosure by person having ordinary skill in the technical field to which the present disclosure belongs without departing from the scope of the present disclosure, and the present disclosure is not limited by the above described embodiments and the accompanying drawings.

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WHAT IS CLAIMED IS:

1. A communication terminal for providing multi phone number service using a single communication terminal, comprising:

5 a plurality of interface modules configured to provide an independent operational mode corresponding to each of the plurality of phone numbers; and

a switching module configured to switch and activate the plurality of interface modules to each other,

wherein when an incoming call is received from a communication network, the
10 activated interface module among the plurality of interface modules checks a called phone number included in the incoming call, and if the called phone number corresponds to an operational mode of another interface module, changes a color of a state display bar of the communication terminal,

wherein when a called phone number input to a called phone number input
15 window for call originating includes an identification code for the multi phone number service, the activated interface module changes a color of a button for call originating.

2. A communication terminal for providing multi phone number service using
20 a single communication terminal, comprising:

a plurality of interface modules configured to provide an independent operational mode corresponding to each of the plurality of phone numbers; and

a switching module configured to switch and activate the plurality of interface

modules to each other,

wherein when an incoming call is received from a communication network, the activated interface module among the plurality of interface modules checks a called phone number included in the incoming call, and if the called phone number corresponds to an operational mode of another interface module, changes a color of a state display bar of the communication terminal,

wherein the activated interface module searches an address book of an operational mode corresponding to the called phone number included in the incoming call by priority to display caller information.

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3. The communication terminal according to claim 2,

wherein when related information is not searched in the address book of the operational mode corresponding to the called phone number included in the incoming call, the activated interface module searches an address book of another operational mode.

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4. The communication terminal according to claim 3,

wherein the activated interface module stores a call log of the incoming call only in a call list of the operational mode corresponding to the called phone number included in the incoming call.

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5. The communication terminal according to claim 4,

wherein the activated interface module stores only information searched by priority as the call log in the call list of the operational mode corresponding to the called

phone number included in the incoming call.

6. The communication terminal according to claim 2,
wherein the activated interface module uses a hidden API of an Android operating
5 system to search an address book of another operational mode.

7. A communication terminal for providing multi phone number service
using a single communication terminal, comprising:

10 a plurality of interface modules configured to provide an independent operational
mode corresponding to each of the plurality of phone numbers; and

a switching module configured to switch and activate the plurality of interface
modules to each other,

wherein when an incoming call is received from a communication network, the
15 activated interface module among the plurality of interface modules checks a called phone
number included in the incoming call, and if the called phone number corresponds to an
operational mode of another interface module, changes a color of a state display bar of the
communication terminal,

wherein when a message corresponding to an operational mode of another
20 interface module is received from the communication network, the activated interface
module displays a message receipt notification, and when a detailed view option is input
from a user, the activated interface module requests the switching module to change the
operational mode,

wherein the switching module activates the another interface module according to the operational mode changing request, and

wherein the another interface module displays detailed contents of the received message on a screen.

5

8. A communication terminal for providing multi phone number service using a single communication terminal, comprising:

a plurality of interface modules configured to provide an independent operational mode corresponding to each of the plurality of phone numbers; and

10 a switching module configured to switch and activate the plurality of interface modules to each other,

wherein when an incoming call is received from a communication network, the activated interface module among the plurality of interface modules searches an address book of an operational mode corresponding to a called phone number included in the
15 incoming call by priority to display caller information.

9. The communication terminal according to claim 8,

wherein when related information is not searched in the address book of the operational mode corresponding to the called phone number included in the incoming call,
20 the activated interface module searches an address book of another operational mode.

10. The communication terminal according to claim 9,

wherein the activated interface module stores a call log of the incoming call only

in a call list of the operational mode corresponding to the called phone number included in the incoming call.

11. The communication terminal according to claim 10,
5 wherein the activated interface module stores only information searched by priority as the call log in the call list of the operational mode corresponding to the called phone number included in the incoming call.

12. A method for differentially displaying information at a communication
10 terminal including a plurality of interface modules which provide an independent operational mode corresponding to each of a plurality of phone numbers for the purpose of multi phone number service using a single communication terminal, the method comprising:

receiving an incoming call from a communication network;
15 extracting a called phone number from the incoming call; and
changing a color of a state display bar of the communication terminal if the called phone number corresponds to an operational mode other than a current operational mode;
and

searching an address book of an operational mode corresponding to the called
20 phone number included in the incoming call by priority to display caller information.

13. The method according to claim 12, further comprising:

searching an address book of another operational mode, when related information is not searched in the address book of the operational mode corresponding to the called phone number included in the incoming call.

5 14. The method according to claim 13, further comprising:

storing a call log of the incoming call only in a call list of the operational mode corresponding to the called phone number included in the incoming call.

15. The method according to claim 14,

10 wherein in the step of storing a call log, only information searched by priority is stored as the call log in the call list of the operational mode corresponding to the called phone number included in the incoming call.

16. A method for differentially displaying information at a communication
15 terminal including a plurality of interface modules which provide an independent operational mode corresponding to each of a plurality of phone numbers for the purpose of multi phone number service using a single communication terminal, the method comprising:

receiving an incoming call from a communication network;

20 extracting a called phone number from the incoming call; and

searching an address book of an operational mode corresponding to the called phone number included in the incoming call by priority to display caller information.

17. The method according to claim 16, further comprising:

searching an address book of another operational mode, when related information is not searched in the address book of the operational mode corresponding to the called phone number included in the incoming call.

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18. The method according to claim 17, further comprising:

storing a call log of the incoming call only in a call list of the operational mode corresponding to the called phone number included in the incoming call.

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19. The method according to claim 18,

wherein in the step of storing a call log, only information searched by priority is stored as the call log in the call list of the operational mode corresponding to the called phone number included in the incoming call.

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20. A method for differentially displaying information at a communication terminal including a plurality of interface modules which provide an independent operational mode corresponding to each of a plurality of phone numbers for the purpose of multi phone number service using a single communication terminal, the method comprising:

20

receiving a message corresponding to an operational mode other than a current operational mode from a communication network;

displaying a message receipt notification by an interface module of the current operational mode and displaying an operational mode changing confirmation request;

activating the interface module of the another operational mode according to the operational mode changing confirmation input from a user; and

displaying detailed contents of the received message on a screen by the interface module of the another operational mode.