(54) Title: DETERMINING PRESENCE OF A CLIENT APPLICATION

(57) Abstract: A method and system is provided for determining presence of a client application (209) on a communication device (208). A communication server (201) generates a message and transmits the generated message to a messaging network element (207). The messaging network element (207) transmits a confirmation message to the communication server (201) on rendering the generated message to the communication device (208). The confirmation message indicates availability of the communication device (208). The communication server (201) awaits an acknowledgement message from the client application (209) on receipt of the confirmation message. The communication server (201) determines the presence of the client application (209) on receipt of the acknowledgement message from the client application (209) via the messaging network element (207) within a pre-defined period of time. The messaging network element (207) receives the acknowledgement message from the client application (209) and renders the acknowledgement message to the communication server (201). The acknowledgement message indicates presence of the client application (209) on the communication device (208).
DETERMINING PRESENCE OF A CLIENT APPLICATION

CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of provisional patent application number 91/ CHE/2009 titled "Determining Presence Of A Client Application", filed on January 12, 2009 in the Indian Patent Office.

The specification of the above referenced patent application is incorporated herein by reference in its entirety.

BACKGROUND

In the current technology setup, when a client application on a mobile device, which asynchronously communicates with a server side application, is deleted from any binary runtime environment for wireless (BREW) phones in a code division multiple access (CDMA) network, there is no reliable way to communicate this deletion action to a server side application. The server side application has information that a particular version of a client application exists on the mobile device and therefore when the server side application tries to send communication per the protocol specific to the client, a communication failure occurs. Since the server side application is not informed that the specific client application does not exist on the mobile device, the server side application does not use alternative means of communication with the mobile device. A simple communication acknowledgement mechanism will not work in this case since it is quite likely that the mobile device is powered off and will not receive the communication from the server side application and hence cannot send an acknowledgement.

The server side application needs to differentiate between phones being powered off versus a specific client being absent.

The only means available today to obtain this information is via a carrier transaction manager (CTXN) server which provides some log information at periodic intervals regarding when the specific client was downloaded. Similarly, this CTXN server has some delayed means to recognize that the specific client application has been deleted. However, per the current limitation of the CTXN server, the logging of this information is not in real time and may vary.
from a few minutes to a few years or even infinitely. Since the server side application needs to communicate with a specific client in real time, this delayed log information is not useful.

Hence, there is a long felt but unresolved need for a method and system that determines presence of a client application on a communication device in real time. Furthermore, there is a need for distinguishing between communication devices being powered off and a specific client being absent.

SUMMARY OF THE INVENTION

This summary is provided to introduce a selection of concepts in a simplified form that are further described in the detailed description of the invention. This summary is not intended to identify key or essential inventive concepts of the claimed subject matter, nor is it intended for determining the scope of the claimed subject matter.

The method and system disclosed herein address the above stated need for determining presence of a client application on a communication device in real time. The method and system disclosed herein also distinguishes between communication devices being powered off and a specific client application being absent.

The computer implemented method disclosed herein comprises: a) generating a message by a communication server and transmitting the generated message to a messaging network element; b) rendering the generated message to the communication device by the messaging network element; c) transmitting a confirmation message to the communication server by the messaging network element on rendering the generated message to the communication device, wherein the confirmation message indicates availability of the communication device; d) awaiting an acknowledgement message from the client application on receipt of the confirmation message by the communication server; and e) determining the presence of the client application on the communication device by the communication server on receipt of the acknowledgement message from the client application via the messaging network element, wherein the messaging network element receives the acknowledgement message from the client application and renders the acknowledgement message to the communication server.
The communication server determines unavailability of the communication device if the communication server does not receive the confirmation message from the messaging network element within a predefined period of time. The communication server determines absence of the client application on the communication device if the communication server receives the confirmation message but does not receive an acknowledgement message from the client application within a predefined period of time. The communication server configures timeout parameters that enable determination of receipt of the confirmation message from the messaging network element and receipt of the acknowledgement message from the client application. The client application may be implemented on one or more hardware components, operating systems, development platforms, and runtime environments.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing summary, as well as the following detailed description of the invention, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, exemplary constructions of the invention are shown in the drawings. However, the invention is not limited to the specific methods and instrumentalities disclosed herein.

FIG. 1 illustrates a method for determining presence of a client application on a communication device.

FIG. 2 illustrates a system for determining presence of a client application on a communication device.

FIG. 3 exemplarily illustrates a computer system employed for determining the presence of a client application on a communication device.

FIGS. 4A-4B exemplarily illustrate a flowchart comprising the steps of determining the presence of a client application on a communication device.

DETAILED DESCRIPTION OF THE INVENTION
FIG. 1 illustrates a method for determining presence of a client application on a communication device. The communication device is, for example, a personal computer, a laptop, a mobile phone with internet capabilities, a personal digital assistant (PDA), etc. As used herein, the term "client application" refers to an application installed on the communication device for performing one or more specific functions.

A communication server generates 101 a message. As used herein, the term "communication server" refers to any combination of hardware and software designed to provide services to clients. The message is, for example, a short message service (SMS) message. The communication server transmits 102 the generated message to a messaging network element. The messaging network element is, for example, a short message service center (SMSC) which is a network element in a mobile telephone network that delivers SMS messages. The messaging network element renders 103 the generated message to the communication device.

The messaging network element generates a confirmation message and transmits 104 the generated confirmation message to the communication server on rendering the message generated by the communication server to the communication device. The confirmation message is transmitted, for example, using a short message peer-to-peer (SMPP) protocol. The confirmation message indicates the availability of the communication device. As used herein, the term "availability of the communication device" refers to the communication device being reachable and contactable by, for example, a mobile communication service provider. The communication server determines availability of the communication device on receipt of the confirmation message from the messaging network element within a predefined period of time.

In an embodiment, if the communication device is unavailable, the generated message is configured to expire after a predefined period of time. The communication device may be unavailable, for example, due to the communication device being out of range of the mobile communication service provider, the communication device being switched off, etc. The communication server determines the unavailability of the communication device on non-receipt of the confirmation message from the messaging network element within the predefined period of time.

The communication server awaits 105 an acknowledgement message from the client application on receipt of the confirmation message. The client application on receiving the
message generated by the communication server from the messaging network element generates an acknowledgement message and transmits the acknowledgement message to the communication server via the messaging network element. The messaging network element receives the acknowledgement message from the client application and renders the acknowledgement message to the communication server. The acknowledgement message is transmitted, for example, using a short message peer-to-peer (SMPP) protocol. The communication server determines 106 the presence of the client application on the communication device on receipt of the acknowledgement message from the client application via the messaging network element. The configuration of the communication server comprises two or more timeout parameters. The first timeout parameter is a timeout value, for example, in seconds, minutes, hours, days, etc. for receiving the confirmation message transmitted by the messaging network element. The second timeout parameter is a timeout value, for example, in seconds, minutes, hours, days, etc. for receiving the acknowledgement message from the client application. The timeout parameters need to be defined explicitly or assumed implicitly by the implementation of the communication server.

FIG. 2 illustrates a system 200 for determining presence of a client application 209 on a communication device 208. The system 200 comprises a communication server 201 and a messaging network element 207. The communication server 201 comprises a messaging module 202, a message waiting module 203, an availability determination module 204, a presence determination module 205, and a timer module 206. The messaging module 202 generates a message and transmits the generated message to the messaging network element 207. The messaging network element 207 renders the generated message to a communication device 208, for example, a mobile phone. The messaging network element 207 then generates a confirmation message and transmits the generated confirmation message to the communication server 201. The message waiting module 203 of the communication server 201 awaits the confirmation message from the messaging network element 207. The availability determination module 204 of the communication server 201 determines the availability of the communication device 208 on receipt of the confirmation message from the messaging network element 207 within a predefined period of time. In case of non-receipt of the confirmation message within the predefined period of time, the availability determination module 204 determines unavailability of the communication device 208.
The message waiting module 203 of the communication server 201 awaits an acknowledgement message from the client application 209 on receipt of the confirmation message. A message processing engine 209a on the client application 209 generates the acknowledgement message and transmits the generated acknowledgement message to the communication server 201 via the messaging network element 207. The messaging network element 207 receives the generated acknowledgement message from the client application 209 and renders the received acknowledgement message to the communication server 201. The presence determination module 205 of the communication server 201 determines the presence of the client application 209 on the communication device 208 on receipt of the awaited acknowledgement message within a predefined period of time. In case of receipt of the confirmation message and non-receipt of the acknowledgement message within a predefined period of time, the presence determination module 205 determines absence of the client application 209 on the communication device 208.

The timer module 206 of the communication server 201 configures timeout parameters that enable determination of receipt of the confirmation message from the messaging network element 207 and receipt of the acknowledgement message from the client application 209 as disclosed in the detailed description of FIG. 1.

FIG. 3 exemplarily illustrates a computer system 300 employed for determining the presence of a client application 209 on a communication device 208 by a communication server 201. The client application 209 is deployed on, for example, the computer system 300 of the communication device 208. The communication server 201 may also employ the computer system 300 exemplarily illustrated in FIG. 3. The communication server 201 and the communication device 208 communicate with each other via the messaging network element 207 connected to a communication network. The communication network is, for example, a local area network (LAN), a wide area network (WAN), a cellular network, a satellite network, etc.

The computer system 300 comprises, for example, a processor 301, a memory unit 302 for storing programs and data, an input/output (I/O) controller 303, a network interface 304, a network bus 305, a display unit 306, input devices 307, a fixed media drive 308, a removable media drive 309, a baseband processor 310, etc.
The processor 301 is an electronic circuit that executes computer programs. The memory unit 302 is used for storing programs and applications. The memory unit 302 is, for example, a random access memory (RAM) or another type of dynamic storage device that stores information and instructions for execution by the processor 301. The memory unit 302 also stores temporary variables and other intermediate information used during execution of the instructions by the processor 301. The computer system 300 further comprises a read only memory (ROM) or another type of static storage device that stores static information and instructions for the processor 301. The network interface 304 enables connection of the computer system 300 to the messaging network element 207 connected to a communication network.

In case of a mobile computing device, the network interface 304 connects the mobile computing device wirelessly to the messaging network element 207 connected to the communication network. The mobile computing device further comprises a baseband processor 310 for processing communication functions and managing communication transactions with the messaging network element 207 connected to the communication network. The I/O controller 303 controls the input and output actions performed by the communication server 201 and the communication device 208. The network bus 305 permits communication between the modules, for example, 202, 203, 204, 205, and 206 of the communication server 201 and the message processing engine 209a of the client application 209.

The display unit 306 displays computed results and the input devices 307 are used for inputting data, for example, setting timeout parameters, into the computer system 300. The input devices 307 are, for example, a keyboard 311 such as an alphanumeric keyboard, a joystick 312, a mouse 313, a touch pad 314, a light pen 315, etc. The computer system 300 further comprises a fixed media drive 308 and a removable media drive 309 for receiving removable media.

Computer applications and programs are used for operating the computer system 300. The programs are loaded onto the fixed media drive 308 and into the memory unit 302 of the computer system 300 via the removable media drive 309. In an embodiment, the computer applications and programs may be loaded directly through the communication network. Computer applications and programs are executed by double clicking a related icon displayed on the display unit 306 using one of the input devices 307.
The computer system 300 of the communication server 201 and the communication device 208 employs operating systems for performing multiple tasks. An operating system is responsible for the management and coordination of activities and the sharing of the resources of the computer system 300. The operating system further manages security of the computer system 300, peripheral devices connected to the computer system 300, and network connections. The operating system employed on the computer system 300 recognizes, for example, inputs provided using one of the input devices 307, the output display, files and directories stored locally on the fixed media drive 308, etc. The operating system on the computer system 300 of the communication server 201 and the communication device 208 executes different programs initiated using the processor 301. Instructions for execution are retrieved by the processor 301 from the program memory in the form of signals. The location of the instructions in the program memory is determined by a program counter (PC).

The instructions fetched by the processor 301 from the program memory after being processed are decoded. After processing and decoding, the processor 301 executes the instructions. For example, the messaging module 202 of the communication server 201 defines instructions for generating a message to be transmitted to the messaging network element 207. The availability determination module 204 defines instructions for determining availability or unavailability of the communication device 208 based on receipt and non-receipt of a confirmation message from the messaging network element 207 respectively. The message waiting module 203 defines instructions for awaiting an acknowledgement message that indicates presence of the client application 209. The timer module 206 defines instructions for configuring timeout parameters that enable determination of receipt of the confirmation message from the messaging network element 207 and receipt of the acknowledgement message from the client application 209. The presence determination module 205 defines instructions for determining presence or absence of the client application 209 on the communication device 208 based on receipt and non-receipt of the acknowledgement message from the client application 209. The message processing engine 209a of the client application 209 defines instructions for generating the acknowledgement message. The defined instructions are stored in the program memory or received from a remote server.

The processor 301 on the communication server 201 retrieves the instructions defined by the messaging module 202, the message waiting module 203, the availability determination module 204, the presence determination module 205, and the timer module 206 and executes
them. The processor 301 on the communication device 208 retrieves the instructions defined by
the message processing engine 209a and executes them.

The client application 209 may be implemented on operating systems for mobile devices, for example, Windows Mobile®, Symbian, Google™ Android, or Apple® iPhone. Mobile implementation uses similar algorithms but may involve different hardware interfaces.

FIGS. 4A-4B exemplarily illustrate a flowchart comprising the steps of determining the presence of a client application 209 on a communication device 208. The communication server 201 generates 401 a message. The communication server 201 transmits 402 the generated message to the messaging network element 207. The messaging network element 207 scans to determine the availability of the communication device 208. The messaging network element 207 checks 403 whether the communication device 208 is available. If the communication device 208 is available, the messaging network element 207 renders 406 the generated message to the communication device 208. The messaging network element 207 then transmits 407 a confirmation message to the communication server 201. On receipt of the confirmation message, the communication server 201 determines 408 the availability of the communication device 208.

If the communication device 208 is unavailable, the messaging network element 207 discards 404 the generated message after a predefined period of time. The communication server 201 determines 405 the unavailability of the communication device 208 on non-receipt of the confirmation message from the messaging network element 207 within the predefined period of time.

On receipt of the confirmation message, the communication server 201 awaits 409 an acknowledgement message from a client application 209 on the communication device 208 to determine 410 whether the client application 209 is present on the communication device 208. If the client application 209 is present on the communication device 208, the client application 209 generates 412 the acknowledgement message. The client application 209 then transmits 413 the generated acknowledgement message to the communication server 201 via the messaging network element 207. The communication server 201 on receipt of the transmitted acknowledgement message determines 414 the presence of the client application 209 on the communication device 208.
If the client application 209 is not present on the communication device 208, the communication server 201 on receipt of the confirmation message and non-receipt of the acknowledgement message determines 411 the absence of the client application 209 from the communication device 208.

The communication server 201 determines the absence of the client application 209 on the communication device 208 on receipt of the confirmation message and non-receipt of the awaited acknowledgement message from the client application 209 within a predefined period of time. The client application 209 may be absent from the communication device 208, for example, due to deletion or disabling of the client application 209. If the client application 209 is absent from the communication device 208, the communication server 201 may choose an alternative method of communicating with the communication device 208. For example, in an embodiment, the communication server 201 communicates with the communication device 208 directly, for example, by transmitting a typical SMS message to the communication device 208, instead of sending a client specific SMS message. In another embodiment, the communication server 201 transmits an alert signal to the communication device 208. The communication device 208, on receiving the SMS message or the alert signal, acts as per the device implementation. The end user, for example, a subscriber, may be informed of the communication.

Consider an example where a client application 209, for example, a web browser is installed on a communication device 208, for example, a mobile phone, of a user. The client application 209 asynchronously communicates with the communication server 201, for example, a web server, via the messaging network element 207.

If the communication server 201 chooses to determine the presence of the client application 209 on the communication device 208, the communication server 201 generates a message and transmits the generated message to the messaging network element 207. The messaging network element 207 scans for the availability of the communication device 208. In a mobile/cellular network, the availability of the communication device 208 is known to the messaging network element 207 because the communication device 208 is connected to the messaging networking element 207 using, for example, radio signaling. When the communication device 208 is powered on/off, the messaging network element 207 is informed regarding the on/off state of the communication device 208 as per the established communication protocol between the communication device 208 and the messaging network element 207. If the
communication device 208 is available, the messaging network element 207 renders the generated message to the communication device 208. The messaging network element 207 then generates a confirmation message and transmits the generated confirmation message to the communication server 201 to indicate to the communication server 201 that the communication device 208 is available and the generated message has been rendered to the communication device 208. The communication device 208 then awaits an acknowledgement message from the client application 209.

The client application 209 present on the communication device 208 now generates the acknowledgement message and transmits the generated acknowledgement message to the communication server 201 via the messaging network element 207. The communication server 201 on receipt of the transmitted acknowledgement message determines presence of the client application 209 on the communication device 208.

Consider another example where a client application 209 is installed on communication device 208, for example, a mobile phone of a user, but the user has switched off the user's mobile phone. The communication server 201 generates a message and transmits the generated message to the messaging network element 207. The messaging network element 207 scans to determine the availability of the user's mobile phone for rendering the generated message to the user's mobile phone. The messaging network element 207 determines the unavailability of the user’s mobile phone since the user's mobile phone is switched off and discards the generated message after a predefined period of time. When the mobile phone is switched off or is not reachable, the mobile phone's radio connectivity with the messaging network element 207 is broken. Therefore, in the absence of radio network connectivity between the communication device 208 and the messaging network element 207, the messaging network element 207 determines that the communication device 208 is not available.

The communication server 201 on non-receipt of a confirmation message from the messaging network element 207 determines the unavailability of the mobile phone after the predefined period of time.

Consider another example where the client application 209 has been deleted from the user’s mobile phone. The communication server 201 generates a message and transmits the generated message to the messaging network element 207. The messaging network element 207
scans to determine the availability of the user's mobile phone and renders the generated message to the user's mobile phone. The messaging network element 207 then generates a confirmation message and transmits the generated confirmation message to the communication server 201. The communication server 201 determines presence of the mobile phone on receipt of the confirmation message. The communication server 201 now awaits an acknowledgement message from the client application 209 via the messaging network element 207.

The communication server 201 determines absence of the client application 209 on non-receipt of the acknowledgement message after a predefined period of time. The communication server 201 then chooses an alternative method of communicating with the communication device 208.

The method and system 200 disclosed herein is applicable to the client application 209 and the communication server 201 implemented, for example, on multiple hardware components, multiple operating systems, development platforms, runtime environments, etc. The hardware may be implemented on, for example, UNIX, Linux or its variants, Windows Server software, Mainframe, Mini and microcomputers, etc. For example, the client application 209 may be implemented on platforms, for example, Java™, BREW, Microsoft™, the iPhone® of Apple Inc., etc. independently or in any combination thereof. Although the method and system 200 disclosed herein uses SMS based communication, the method and system 200 disclosed herein may also be implemented in any communication setup using, for example, the communication server 201, a communication network, a client server, and the client application 209 using asynchronous communication.

It will be readily apparent that the various methods and algorithms described herein may be implemented in a computer readable medium appropriately programmed for general purpose computers and computing devices. Typically a processor, for example, one or more microprocessors will receive instructions from a memory or like device, and execute those instructions, thereby performing one or more processes defined by those instructions. Further, programs that implement such methods and algorithms may be stored and transmitted using a variety of media, for example, computer readable media in a number of manners. The computer readable media has stored thereon multiple sequences of instructions which, when executed by a processor, cause the processor to perform the method disclosed herein. In one embodiment, hard-wired circuitry or custom hardware may be used in place of, or in combination with, software.
instructions for implementation of the processes of various embodiments. Thus, embodiments are not limited to any specific combination of hardware and software. A “processor” means any one or more microprocessors, central processing unit (CPU) devices, computing devices, microcontrollers, digital signal processors or like devices. The term “computer readable medium” refers to any medium that participates in providing data, for example instructions that may be read by a computer, a processor or a like device. Such a medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. Non volatile media include, for example, optical or magnetic disks and other persistent memory volatile media include dynamic random access memory (DRAM), which typically constitutes the main memory. Transmission media include coaxial cables, copper wire and fiber optics, including the wires that comprise a system bus coupled to the processor. Common forms of computer readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, any other magnetic medium, a compact disc-read only memory (CD-ROM), digital versatile disc (DVD), any other optical medium, punch cards, paper tape, any other physical medium with patterns of holes, a random access memory (RAM), a programmable read only memory (PROM), an erasable programmable read only memory (EPROM), an electrically erasable programmable read only memory (EEPROM), a flash memory, any other memory chip or cartridge, a carrier wave as described hereinafter, or any other medium from which a computer can read. In general, the computer readable programs may be implemented in any programming language. Some examples of languages that can be used include assembly level languages, C, C++, C#, Python, Perl, or JAVA. The software programs may be stored on or in one or more mediums as an object code. A computer program product comprising computer executable instructions embodied in a computer readable medium comprises computer parsable codes for the implementation of the processes of various embodiments.

The present invention can be configured to work in a network environment including a computer that is in communication, via a communications network, with one or more devices. The computer may communicate with the devices directly or indirectly, via a wired or wireless medium such as the Internet, Local Area Network (LAN), Wide Area Network (WAN) or Ethernet, Token Ring, or via any appropriate communications means or combination of communications means. Each of the devices may comprise computers, such as those based on the Intel® processors, AMD® processors, UltraSPARC® processors, Sun® processors, IBM® processors, etc. that are adapted to communicate with the computer. Any number and type of machines may be in communication with the computer.
The foregoing examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting of the present invention disclosed herein. While the invention has been described with reference to various embodiments, it is understood that the words, which have been used herein, are words of description and illustration, rather than words of limitation. Further, although the invention has been described herein with reference to particular means, materials and embodiments, the invention is not intended to be limited to the particulars disclosed herein; rather, the invention extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims. Those skilled in the art, having the benefit of the teachings of this specification, may effect numerous modifications thereto and changes may be made without departing from the scope and spirit of the invention in its aspects.
CLAIMS

We claim:

A method for determining presence of a client application on a communication device, comprising:

- generating a message by a communication server and transmitting said generated message to a messaging network element;

- rendering said generated message to said communication device by said messaging network element;

- transmitting a confirmation message to said communication server by said messaging network element on rendering said generated message to said communication device, wherein said confirmation message indicates availability of said communication device;

- awaiting an acknowledgement message from said client application on receipt of said confirmation message by said communication server; and

- determining said presence of said client application on said communication device by said communication server on receipt of said acknowledgement message from said client application via said messaging network element.

2. The method of claim 1, wherein said messaging network element receives said acknowledgement message from said client application and renders said acknowledgement message to said communication server.

3. The method of claim 1, further comprising determining absence of said client application on said communication device by said communication server on receipt of said confirmation message and non-receipt of said awaited acknowledgement message from said client application within a predefined period of time.
4. The method of claim 1, further comprising determining unavailability of said communication device by said communication server on non-receipt of said confirmation message from said messaging network element within a predefined period of time.

5. The method of claim 1, further comprising generating said acknowledgement message by said client application on receipt of said message generated by said communication server from said messaging network element.

6. The method of claim 1, further comprising configuring timeout parameters on said communication server that enable determination of receipt of said confirmation message from said messaging network element and receipt of said acknowledgement message from said client application.

7. The method of claim 1, wherein said client application is implemented on one or more of a plurality of operating systems, development platforms, and runtime environments.

8. A system for determining presence of a client application on a communication device, comprising:

   a communication server comprising:

   a messaging module that generates a message and transmits said generated message to a messaging network element;

   a message waiting module that awaits an acknowledgement message from said client application on said communication device via said messaging network element;

   a presence determination module that determines presence of said client application on said communication device on receipt of said acknowledgement message from said client application via said messaging network element;

   said messaging network element that performs:
rendering said generated message from said communication server to said communication device;

transmitting a confirmation message to said communication server on rendering said generated message to said communication device; and

receiving said acknowledgement message from said client application and rendering said received acknowledgement message to said communication server.

9. The system of claim 8, wherein said client application comprises a message processing engine that generates said acknowledgement message.

10. The system of claim 8, wherein said message waiting module awaits said confirmation message from said messaging network element, wherein said confirmation message indicates availability of said communication device.

11. The system of claim 10, wherein said message waiting module awaits said acknowledgement message from said client application on said communication device on receipt of said confirmation message from said messaging network element.

12. The system of claim 8, wherein said communication server further comprises an availability determination module that determines availability of said communication device on receipt of said confirmation message from said messaging network element within a predefined period of time.

13. The system of claim 12, wherein said availability determination module determines unavailability of said communication device on non-receipt of said confirmation message from said messaging network element within said predefined period of time.

14. The system of claim 8, wherein said presence determination module determines presence of said client application on said communication device on receipt of said confirmation message and receipt of said awaited acknowledgement message within said predefined period of time.
15. The system of claim 8, wherein said presence determination module determines absence of said client application on said communication device on receipt of said confirmation message and non-receipt of said awaited acknowledgement message within said predefined period of time.

16. The system of claim 8, wherein said communication server further comprises a timer module for configuring timeout parameters that enable determination of receipt of said confirmation message from said messaging network element and receipt of said acknowledgement message from said client application.

17. A computer program product comprising computer executable instructions embodied in a computer readable storage medium, wherein said computer program product comprises:

   a first computer parsable program code for generating a message by a communication server, wherein said communication server transmits said generated message to a messaging network element;

   a second computer parsable program code for receiving a confirmation message from said messaging network element on rendering said generated message to a communication device;

   a third computer parsable program code for determining availability of said communication device based on receipt of said confirmation message;

   a fourth computer parsable program code for awaiting an acknowledgement message from a client application via said messaging network element on said receipt of said confirmation message by said communication server; and

   a fifth computer parsable program code for determining presence of said client application on said communication device on receipt of said acknowledgement message.

18. The computer program product of claim 17, further comprising a sixth computer parsable program code for determining absence of said client application on said communication
device on receipt of said confirmation message and non-receipt of said awaited acknowledgement message from said client application within a predefined period of time.

19. The computer program product of claim 17, further comprising a seventh computer parsable program code for determining unavailability of said communication device on non-receipt of said confirmation message from said messaging network element within a predefined period of time.

20. The computer program product of claim 17, further comprising an eighth computer parsable program code for configuring timeout parameters on said communication server, wherein said timeout parameters enable determination of receipt of said confirmation message from said messaging network element and receipt of said acknowledgement message from said client application.
A COMMUNICATION SERVER GENERATES A MESSAGE

TRANSMIT THE GENERATED MESSAGE TO A MESSAGING NETWORK ELEMENT

THE MESSAGING NETWORK ELEMENT RENDERS THE GENERATED MESSAGE TO A COMMUNICATION DEVICE

THE MESSAGING NETWORK ELEMENT TRANSMITS A CONFIRMATION MESSAGE TO THE COMMUNICATION SERVER

THE COMMUNICATION SERVER AWAITS AN ACKNOWLEDGEMENT MESSAGE FROM A CLIENT APPLICATION

THE COMMUNICATION SERVER DETERMINES PRESENCE OF THE CLIENT APPLICATION ON THE COMMUNICATION DEVICE ON RECEIPT OF THE ACKNOWLEDGEMENT MESSAGE FROM THE CLIENT APPLICATION VIA THE MESSAGING NETWORK ELEMENT

FIG. 1
FIG. 3
A COMMUNICATION SERVER GENERATES A MESSAGE

TRANSMIT THE GENERATED MESSAGE TO A Messaging NETWORK ELEMENT

IS COMMUNICATION DEVICE AVAILABLE?

RENDER THE GENERATED MESSAGE TO THE COMMUNICATION DEVICE

DISCARD THE GENERATED MESSAGE AFTER A PREDEFINED PERIOD OF TIME

THE COMMUNICATION SERVER DETERMINES UNAVAILABILITY OF THE COMMUNICATION DEVICE

TRANSMIT A CONFIRMATION MESSAGE TO THE COMMUNICATION SERVER

FIG. 4A
THE COMMUNICATION SERVER DETERMINES AVAILABILITY OF THE COMMUNICATION DEVICE

THE COMMUNICATION SERVER AWAITS AN ACKNOWLEDGEMENT MESSAGE FROM A CLIENT APPLICATION

IS THE CLIENT APPLICATION PRESENT ON THE COMMUNICATION DEVICE?

THE CLIENT APPLICATION GENERATES AN ACKNOWLEDGEMENT MESSAGE

TRANSMIT THE ACKNOWLEDGEMENT MESSAGE TO THE COMMUNICATION SERVER VIA THE MESSAGING NETWORK ELEMENT

DETERMINE PRESENCE OF THE CLIENT APPLICATION

DETERMINE ABSENCE OF THE CLIENT APPLICATION AFTER A PREDEFINED PERIOD OF TIME

FIG. 4B
A CLASSIFICATION OF SUBJECT MATTER
IPC®: H04L 29/08 (2006.01); H04W 88/18 (2009.01)
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®: H04L H04W H04M H04Q G06F

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPODOC, WPI, X-FULL

C DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
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<td>A</td>
<td>US 2008/1 19204 A1 (HINES ET AL.) 22 May 2008 (22.05.2008)</td>
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<td>fig 2; page 2, paragraphs [0027] - [0030].</td>
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<td>figs 5-8; page 5, paragraph [0029] - page 6, paragraph [0032]; claim 56.</td>
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Date of the actual completion of the international search 7 July 2010 (07.07.2010)
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