

**SHORT MESSAGE GATEWAY, SYSTEM AND METHOD OF
PROVIDING INFORMATION SERVICE FOR MOBILE DEVICES**

Field of Invention

5 This invention relates to a system and method for providing information service for mobile devices, particularly for mobile telephones having short message service capability.

10 Background

 Increasingly, people want to obtain information at all times and places and to enjoy certain information service. Radio paging systems and mobile telephone systems meet such demands to a certain extent, but their
15 functions are still limited.

 Mobile telephones with short message service (SMS) functions have been quite popular. Short message service is a specific function of modern cellular telephone systems. It enables the users of cellular communication
20 network to send messages to other users or receive text messages from other users. Whenever a mobile telephone is logged on the network, the short message service function always tries to transmit messages thereto, even when said mobile telephone has an in progress voice or data call. Mobile telephones having short message service functions can also browse
25 through the whole network and still send and receive messages. Mobile telephones equipped with short message service functions provide the users with the method of receiving, reading, editing, deleting, sending and saving messages.

30 In the prior art, the aforesaid mobile telephones with short message service functions can only exchange short messages between each other, and such exchange of short messages requires the short message service center to participate. The short message service center ensures that messages are not dropped out but ensures the quality of message transmission even if
35 the mobile telephone is not turned on or located out of the service area.

 Although the mobile telephone having short message service functions expands the use of a mobile telephone, people are still unable to make use of such mobile telephone to request complex information services. For
40 example, it is unable to receive/send E-mails, unable to query a database, etc.

SUMMARY OF INVENTION

5 The present invention provides a system and method for providing information services by making use of short messages, so that users of mobile telephones with short message service functions can enjoy certain information services at substantially all times and places.

10 In a first aspect, the invention provides a short message service gateway, comprising: a short message interfacing component for receiving/sending short messages from/to outside of the short message service gateway; a short message service engine, responsive to a request for an information service included in a short message received by the short message interfacing component, for requesting the information
15 service from at least one application server and receiving a result of the information service, and then sending the result of the information service back to the short message interfacing component in the form of a short message.

20 In a second aspect, the invention provides a system for providing an information service for mobile telephones (or other mobile communication devices such as SMS-enabled PDAs), comprising: at least one application server, for receiving requests for at least one information service, and providing results of the information service; at least one short message
25 center, for forwarding short messages from/to the mobile telephones (or other communication devices); characterized by further comprising: a short message service gateway, comprising: a short message center interface for receiving /sending short messages from/to said at least one short message center; a short message service engine, responsive to a request for an
30 information service included in a short message received by the short message center interface, for requesting the information service from said at least one application server and receiving a result of the information service, and then sending the result of the information service back to the short message center interface in the form of a short message.

35 In a third aspect, the invention provides a system for providing information service for mobile telephones (or other communication devices), comprising: at least one application server, for receiving requests for at least one information service, and providing results of
40 the information service; at least one short message apparatus, for forwarding short messages from/to the mobile telephones; characterized by

further comprising: a short message service gateway comprising: a short message daemon, for receiving/sending short messages from/to said at least one short message apparatus; a short message service engine, responsive to a request for an information service included in a short message received by the short message daemon, for requesting the information service from said at least one application server and receiving a result of the information service, and then sending the result of the information service back to the short message daemon in the form of a short message.

In a fourth aspect, the invention provides a method for providing an information service for mobile telephones (or other communication devices), characterized by comprising steps of:

- a) receiving a short message from a mobile telephone;
- b) fetching an information service code from the short message;
- c) according to the information service code, getting results of the information service from at least one application server; and
- d) combining the results of the information service into a short message and sending the short message to the mobile telephone.

According to the system or method of this invention, users of mobile telephones can enjoy information services at substantially all times and places. The system of this invention is compatible with mobile telephones of different short message service centers and different systems, thus meeting the needs of various information services.

Brief Description of Drawings

Preferred embodiments of the present invention will now be described in more detail, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is a block diagram of the system of providing information service for mobile telephones according to this invention;

Fig. 2 is a flowchart showing the short message service gateway in figure 1 receiving a message from the application server;

Fig. 3 is a flowchart of sending a message out of the short message service gateway;

Fig. 4 is a flowchart of receiving a message from out of the short message service gateway;

Fig. 5 is a flowchart showing a short message daemon sending a message;

Fig. 6 is a flowchart showing a work thread sending a short message.

PREFERRED EMBODIMENT

Fig. 1 is a block diagram of a system for providing an information service for mobile telephones according to this invention. Label 110 of Fig. 1 shows an application server. In this invention, a plurality of application servers can provide a corresponding information service in response to a received request for an information service. In Fig. 1 only one application server 110 is shown as an example.

Label 120 shows a short message service gateway. As shown in Fig. 1, the short message gateway 120 includes a short message service engine 121. The short message service engine 121, for example, can receive a short message from a mobile telephone 151 through a short message center (as described later). Of course, it can also receive a short message 151 from a mobile telephone through a daemon (described later). An information service code is included in the short message. The short message service engine 121 identifies the information service code in the short message and requests an information service from different application servers (for example the application server 110) according to different information service codes. After receiving the result of information service sent back from the application server 110, the short message service engine 121 packs the result of information service in the short message and sends said short message to the mobile telephone.

The short message sent by the mobile telephone 151 to the short message service engine 120, for example, can be in this format: "sc# request", in which sc is the service code.

For example, if an E-mail of a subject "subject" and body "body" is sent to "somebody@cn.ibm.com", then the short message can be:

10#somebody@cn.ibm.com#subject#body

5 in which the service code is "10", showing a request for E-mail service, and the contents of service is "somebody@cn.ibm.com#subject#body". This format is defined by the application program of E-mail service . When the short message service gateway 120 receives the aforesaid message, it will request to converse "somebody@cn.ibm.com#subject#body" to SMTP according to service code "10", then sends it to the E-mail server. At last, the
10 E-mail server completes the mail delivery.

For another example, to obtain the weather forecast of Beijing area, the short message can be:

15 20#010

20 in which the service code is "20", showing a request for weather forecast, and the contents of service is "010", namely the weather forecast of Beijing area. When the short message service gateway receives the aforesaid short message, it will request to send "010" to the weather information server according to the service code "20". The weather information server sends back the weather status which is transmitted to the mobile telephone by the short message service gateway 120.

25 E-mail service can be provided by default of the short message gateway 120. The short message service gateway 120 can check the electronic mailbox of the mobile telephone user and transmit the contents of the mail to the mobile telephone. The mobile telephone user can also send a short message to answer the E-mail, and even obtain more data
30 contents and make database inquiry.

35 The communication between the application server 110 and the short message engine 121 can utilize various protocols in present technology, for example SMTP, SNPP, PAP and the protocol based on HTTP. To improve the security of data communication, SSL can be utilized.

40 Besides, some service programs can also be run on the short message service gateway 120. These programs provide certain information services for the mobile telephone users. Under this condition, the application server 110 and the short message gateway 120 are physically the same computer.

The application server 110 can not only transmit message to the short message gateway 120, but also obtain message status from the short message gateway 120. When the short message gateway 120 receives a request, it can transmit a message status report to the application server. The message status supported by the short message service gateway 120 can comprise, for example: suspend, transmitted to short message center, transmitted to mobile telephone, transmission error, etc.

The exchange of short messages between the short message service gateway 120 and the mobile telephone 151 can incorporate two methods.

The first method. In the short message service gateway 120 sets up a short message center interface 126, which can communicate with a plurality of existing short message centers 131, 132 etc. Short message can be sent to the mobile telephone 151 through short message centers 131, 132 or received from the mobile telephone 151. Using dedicated line or dial-up network to link the short message center interface 126 and the short message center 131, 132. The communication between them can utilize different communication protocols such as TCP/IP, X2.5, CIMD, EMI, SMPP, etc.

In the case of the first method, a short message center administrating device 125 can be set up in the short message service gateway 120, for administrating a plurality of short message centers 131, 132 supported by the short message gateway 120 according to the short message center profile. By modification of the short message center profile, the support for new short message centers can be augmented.

To provide support for a plurality of short message centers, the short message center interfaces are defined as follows:

1. UINT OpenConnection (CONNECTIONPARAMETER cp) /* Open connection */
2. BOOL ServiceLogin (UINT socket, SERVICEINFO si) /* Service login */
3. BOOL User PIN (UINT socket, USERINFO ui) /* Send PIN number */
4. BOOL HoldUntil (UINT socket, TIMEINFO ti) /* Timing service */
5. UINT SendMsg (UINT socket, MESSAGE msg, OPTION opt) /* Send message */
6. UINT CheckNewMsg (UINT socket) /* Check new message */
7. UINT GetNewMsg (UINT socket, USERINFO* ui, MESSAGE* msg, TIMEINFO* ti) /* Get new message */

8. UINT GetMsgStatus (UINT socket, USERINFO ui, UINT msgid) /* Check message status */
9. UINT CheckMsgStatusChanges (UINT socket) /* Check message status changes */
- 5 10. BOOL GetMsgStatusChanges (UINT socket, UserInfo* ui, UINT* msgid, UINT* status)
11. BOOL EndConnection (UINT socket) /* End connection */

10 The aforesaid first method applies to large enterprises and supports large-amount transactions.

15 The second method: running a short message daemon 127 in the short message service gateway 120 for intercepting at least one short message apparatus 141, 142 connected with the short message service gateway 120. The short message apparatus 141, 142, etc. are any apparatus having short message functions in present technology, for example a mobile telephone. The short message daemon 127 incorporates RS-232 serial interface, infrared data transfer interface or any other available interface for data communication with short message apparatus 141, 142, etc. to receive or
20 send short messages. When the short message daemon 127 communicates with a plurality of short message apparatus, it is necessary to balance the load to improve performance. The short message daemon incorporates AT command to control the work mode of the short message apparatus, comprising BLOCK mode, TEXT mode, PDU mode, etc.

25 Besides, to improve the performance of the short message service gateway 120, the short message service gateway 120 can also include the following devices.

30 User administrating device 122 is used for administrating a plurality of users logged in the short message gateway 120 according to the user profile. The user profile stores personal options such as mobile telephone number of the user, model of the mobile telephone, short message center (namely the short message service supplier), personal hobby,
35 personal address book, personal abbreviation, personal subscription list, etc. According to the user profile, the short message service gateway 120 provides the user with personalized service, comprising: personal message abbreviation, message transmission option, personal address book, personal command definition, etc.

Since short message is limited in length and mobile telephones of different models and different trademarks have different features, the short message service gateway 120 provides a function of abbreviating personal message according to user characteristics, for example language transformation, personal message abbreviation, etc. Personal message abbreviation enables the user to input an abbreviated statement to replace a longer key input.

Apparatus administrating device 123 is used for administrating various mobile telephones supported by the short message gateway 120 according to the apparatus profile. The apparatus profile stores relevant information such as a screen size of a radio telephone, a character set, having STK function or not, being able to process multiple languages or not, etc.

Application administrating device 124 is used for administrating various application servers 110 according to the application profile. The application profile can store the service codes and the definition of request format provided by various application servers.

Short message center administrating device 125 is used for administrating various short message centers 131, 132 supported by the short message gateway 120 according to the short message center profile.

All the aforesaid administration work can be accomplished through the World Wide Web supported by the short message service gateway 120.

In addition to the aforesaid mode of providing requested information service, the service request of the user can also be previously stored in the short message service gateway 120, namely to be subscribed. Thus, the short message gateway 120 will provide subscribed information services such as the weather forecast, the current prices of stocks, etc. for the mobile telephone according to the subscribed time.

If the user can remember different service codes, then it is not necessary to make any change in the program of the mobile telephone. Of course, to provide more friendly user interface, the user can also run the menu selection program and select required service items according to the menu.

Besides, STK (SIM toolbox) can also be used to modify the user interface for providing subscribed menu and providing system encryption function.

5 Fig. 2 is a flowchart of the short message service gateway receiving a message from the application server. In step 201, the procedure begins. In step 202, intercept a message from the application server. If in step 10 203 receive a message from the application server, then the flow enters step 204. In step 204, judge whether the received message comes from an valid application server. If the result of judgement of step 204 is "yes", then the flow enters step 205. Otherwise, it enters step 209. In step 205, judge whether the received message is a message of status inquiry. If the result of judgement of step 205 is "yes", then the flow enters step 206. Otherwise, It enters step 208.

15 In step 206, obtain a status information from the status database. In step 207, the obtained status information is sent back to the application server.

20 In step 208, the received message is entered the message queue.

 In step 209, discard the received message.

25 After steps 207, 208 and 209, the flow can return to step 202 and intercept continuously the message from the application server. If the termination condition is met, then the flow turns to step 210. The procedure is terminated.

30 Fig. 3 is a flowchart of sending a message to outside of the short message service gateway. In step 301, the procedure begins. In step 302, obtain a request for sending a message. If in step 303 get a message, then the flow enters step 304. In step 304 get the message center profile. Afterwards, in step 305, judge whether there exists a user profile. If the result of judgement of step 305 is "yes", then obtain the user profile and 35 the apparatus profile in step 306 and step 307 respectively. If the result of judgement of step 305 is "no", then obtain the default user profile and the default apparatus profile in step 308 and step 309 respectively.

40 Afterwards, in step 310, format the message. In step 311, transform the message according to various profiles. In step 312, abbreviate the message.

Afterwards, in step 313, judge whether the aforesaid processed message can be sent in a short message center. If the result of judgement of step 313 is "no", then turn to step 314 for decollating the message to be sent into several shorter messages. Otherwise, in step 315, send the short message back to the short message center or the daemon. After that, the procedure returns to step 302, waiting for the next request for sending. If the termination condition is met, in step 316 the procedure is terminated.

Fig. 4 is a flowchart of receiving a message from outside of the short message service gateway. In step 401, the procedure begins. In step 402, intercept a short message from the short message center or the daemon. If in step 403 receive a short message, then the procedure enters step 404. In step 404, judge whether the received short message is a message of update status. If the result of judgement of step 404 is "yes", then turn to step 409. Otherwise, proceed to step 405.

In step 405, judge whether said message comes from an valid user. If the result of judgement of step 405 is "no", then turn to step 410. Otherwise, proceed to step 406.

In step 406, get the user profile. In step 407, get the service codes included in the short message. Afterwards, in step 408, judge whether said user has the right to use the requested service. If the result of judgement of step 408 is "yes", then turn to step 411. Otherwise, turn to step 410.

In step 409, update the message status. Then turn to step 413.

In step 411, get the application profile. In step 412, send the request to the application server. Afterwards, proceed to step 413.

In step 410, reject the request. Afterwards, proceed to step 413.

In step 413, the procedure is terminated. If not wishing to terminate the procedure, return to step 402, waiting for the next short message.

Fig. 5 is a flowchart of the short message daemon sending a message. In step 501, the daemon begins. In step 502, initiate all the short

message apparatus. In step 503, set up a work thread for each short message apparatus. In step 504, intercept the short message. If in step 505 receive a short message, then in step 506 check the status of all the short message apparatus. Afterwards, in step 507, judge whether there exists an idle short message apparatus. If the result of judgement of step 507 is "no", then turn to step 508. In step 508, wait for an idle short message apparatus. If the result of judgement of step 507 is "yes", then proceed to step 509. In step 509, request the work thread of the idle short message apparatus to send the short message. After that, if the termination condition is met, then proceed to step 510, the daemon is terminated. Otherwise, return to step 504, intercepting the next short message.

Fig. 6 is a flowchart of the work thread sending a short message. In step 601, the thread begins. In step 602, wait for a request. If in step 603 obtain a request, then proceed to step 604. In step 604, update the thread status to busy. Afterwards, in step 605, format the message to GSM short message service (SMS) standard. Afterwards, in step 606, send the short message by AT command. In the following step 607, update the message status. In step 608, update the thread status to idle. In step 609, notify the other waiting threads. At this time, if not requiring the thread to terminate, then the thread returns to step 602, waiting for the next short message. If requiring the termination of the thread, then proceed to step 610. The thread is terminated.

CLAIMS

1. A short message service gateway (120), comprising:

5 a short message interfacing component (126,127) for receiving/sending short messages from/to outside of the short message service gateway (120);

10 a short message service engine (121), responsive to a request for an information service included in a short message received by the short message interfacing component, for requesting the information service from at least one application server (110) and receiving a result of the information service, and then sending the result of the information service back to the short message interfacing component in the form of a short message.

15 2. The short message service gateway according to claim 1, characterized in that the short message interfacing component (126,127) is a short message daemon (127) for communicating with at least one short message apparatus (141, 142).

20 3. The short message service gateway according to claim 1, characterized in that the short message interfacing component (126,127) is a short message center interface (126) communicating with at least one short message center (131,132).

25 4. The short message service gateway according to claim 1, characterized by further comprising:

30 a short message center administrating component (125), for administrating a plurality of short message centers based on a short message center profile.

35 5. The short message service gateway according to claim 1, characterized by further comprising:

a user administrating component (122), for administrating a plurality of users based on a user profile.

40 6. The short message service gateway according to claim 1, characterized by further comprising:

an apparatus administrating component (123), for administrating a plurality types of mobile communication devices based on an apparatus profile.

5 7. The short message service gateway according to claim 1, characterized by further comprising:

an application administrating component (124), for administrating a plurality of application servers based on an application profile.

10 8. The short message service gateway according to claim 1, characterized in that:

15 the short message service engine (121), based on items of information service for which a user has subscribed, requests the information service from at least one application server (110) and receives the result of the information service, and then sends the result of the information service back to the short message interfacing component in the form of a short message.

20 9. A system for providing an information service for mobile communication devices (151), comprising:

25 at least one application server (110), for receiving requests for at least one information service, and providing results of the information service;

30 at least one short message center (131, 132), for forwarding short messages from/to the mobile communication devices (151);

characterized by further comprising:

a short message service gateway (120) comprising:

35 a short message center interface (126) for receiving /sending short messages from/to at least one short message center (131, 132);

40 a short message service engine (121), responsive to a request for information service included in a short message received by the short message center interface, for requesting the information service from said at least one application server (110) and receiving a result of the

information service, and then sending the result of the information service back to the short message center interface in the form of a short message.

5 10. The system according to claim 9, characterized in that the short message service gateway (120) further comprises:

10 a short message center administrating component (125), for administrating a plurality of short message centers based on a short message center profile.

11. The system according to claim 9, characterized in that the short message service gateway (120) further comprises:

15 a user administrating component (122), for administrating a plurality of users based on a user profile.

20 12. The system according to claim 9, characterized in that the short message service gateway (120) further comprises:

an apparatus administrating component (123), for administrating a plurality types of mobile communication devices based on an apparatus profile.

25 13. The system according to claim 9, characterized in that the short message service gateway (120) further comprises:

30 an application administrating component (124), for administrating a plurality of application servers based on an application profile.

14. The system according to claim 9, characterized in that:

35 the short message service engine (121), based on items of information service for which a user has subscribed, requests the information service from said at least one application server (110) and receives the result of the information service, and then sends the result of the information service back to the short message center interface in the form of a short message.

40 15. A system for providing an information service for mobile communication devices (151), comprising:

at least one application server (110), for receiving requests for at least one information service, and providing results of the information service;

at least one short message apparatus (141, 142), for forwarding short messages from/to the mobile communication devices (151);

characterized by further comprising:

a short message service gateway (120) comprising:

a short message daemon (127), for receiving/sending short messages from/to said at least one short message apparatus (141, 142);

a short message service engine (121), responsive to a request for an information service included in a short message received by the short message daemon, for requesting the information service from said at least one application server (110) and receiving result of the information service, and then sending the result of the information service back to the short message daemon in the form of a short message.

16. The system according to claim 15, characterized in that the short message service gateway (120) further comprises:

a user administrating component (122), for administrating a plurality of users based on a user profile.

17. The system according to claim 15, characterized in that the short message service gateway (120) further comprises:

an apparatus administrating component (123), for administrating a plurality types of mobile communication devices based on an apparatus profile.

18. The system according to claim 15, characterized in that the short message service gateway (120) further comprises:

an application administrating component (124), for administrating a plurality of application servers based on an application profile.

19. The system according to claim 15, characterized in that:

the short message service engine (121), based on items of information service for which a user has subscribed, requests the information service from said at least one application server (110) and receives the result of the information service; and then sends the result of the information service back to the short message daemon in the form of a short message.

20. A method for providing an information service for mobile communication devices, characterized by comprising steps of:

a) receiving a short message from a mobile communication device;

b) extracting an information service code from the short message;

c) based on the information service code, retrieving results of the information service from at least one application server (110); and

d) combining the results of the information service into a short message and sending the short message to the mobile communication device.

21. The method according to claim 20, characterized in that said steps a) and d) are performed by a short message apparatus (141,142).

22. The method according to claim 20, characterized in that said steps a) and d) are performed by a short message center (131,132).

23. The method according to claim 20, characterized by further comprising a step of obtaining the information service code based on items of the information service for which a user has subscribed, without performing said steps a) and b).