US 20030224814A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2003/0224814 A1

Qu et al. (43) Pub. Date: Dec. 4, 2003

(54) METHOD AND APPARATUS FOR SENDING A MESSAGE FROM A WIRELESS DEVICE

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(21) Appl. No.: **10/196,490**

(22) Filed: **Jul. 15, 2002**

Related U.S. Application Data

(60) Provisional application No. 60/384,187, filed on May 29, 2002.

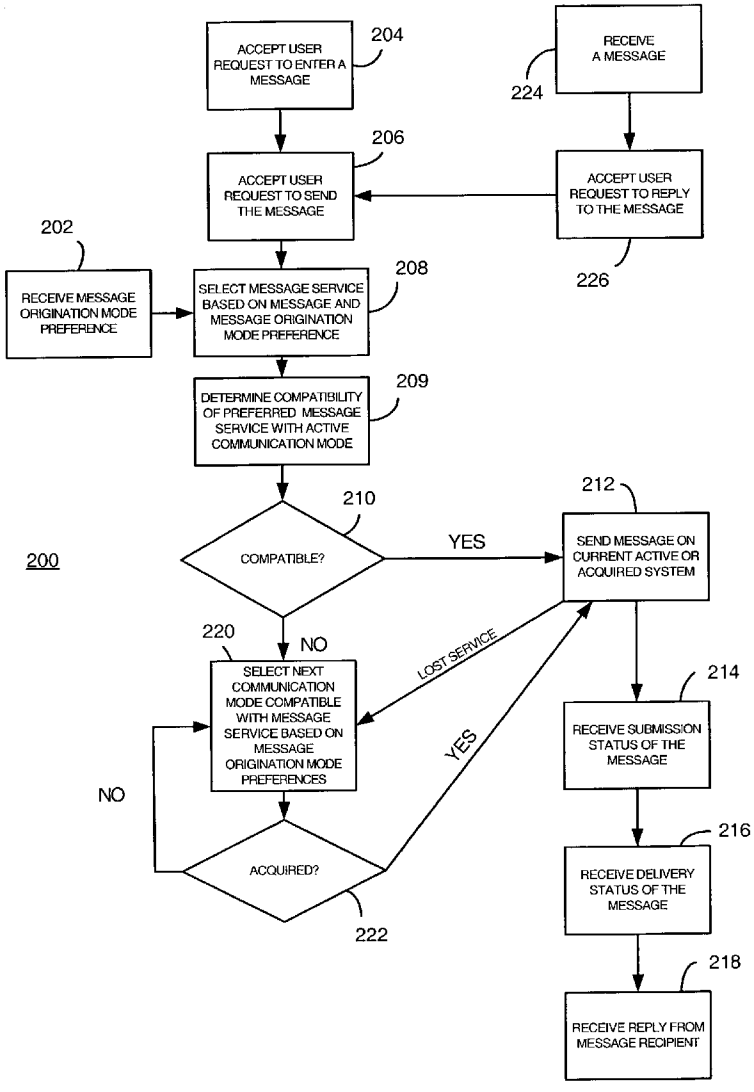
Publication Classification

(51) **Int. Cl.**[7] **H04Q 7/20**

(52) **U.S. Cl.** **455/517**; 455/466

(57) **ABSTRACT**

A method, apparatus, and computer-readable media for sending a message from a multi-mode wireless device in a multiple communication mode environment. A preferred communication mode is selected from a plurality of communication modes supported by the wireless device. A preferred message service is selected based on contents of the message and the preferred communication mode. Then, compatibility of the preferred message service with an active communication mode of the wireless device is determined. If the preferred message service is compatible with the active communication mode, the message is sent by using the preferred service according to the active communication mode.



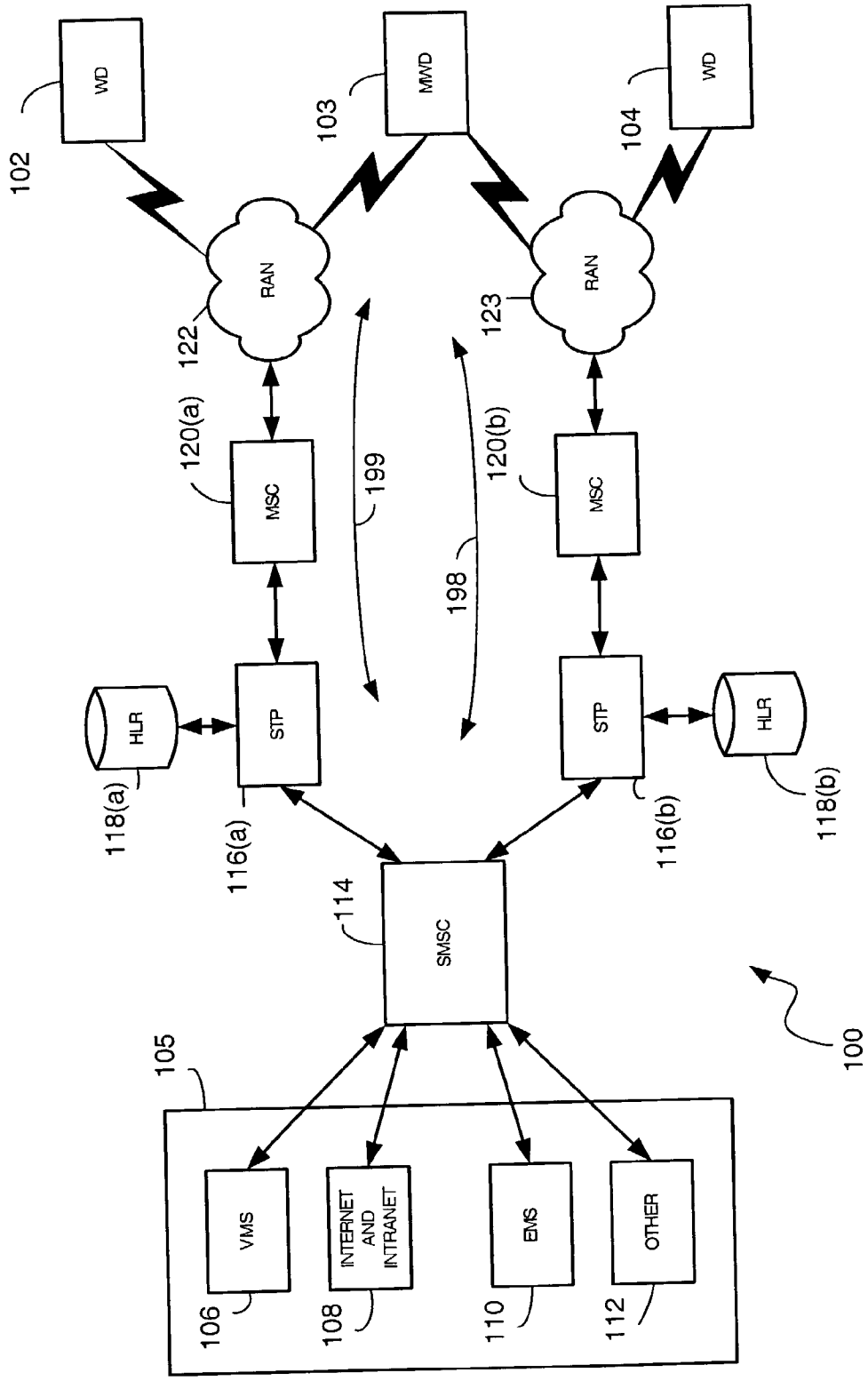

WD
102
MWD
103
WD
104
RAN
122
RAN
123
120(a)
120(b)
MSC
MSC
199
198
HLR
STP
STP
HLR
118(a)
116(a)
116(b)
118(b)
114
SMSC
100
105
VMS
INTERNET AND INTRANET
EMS
OTHER
106
108
110
112

FIG. 1

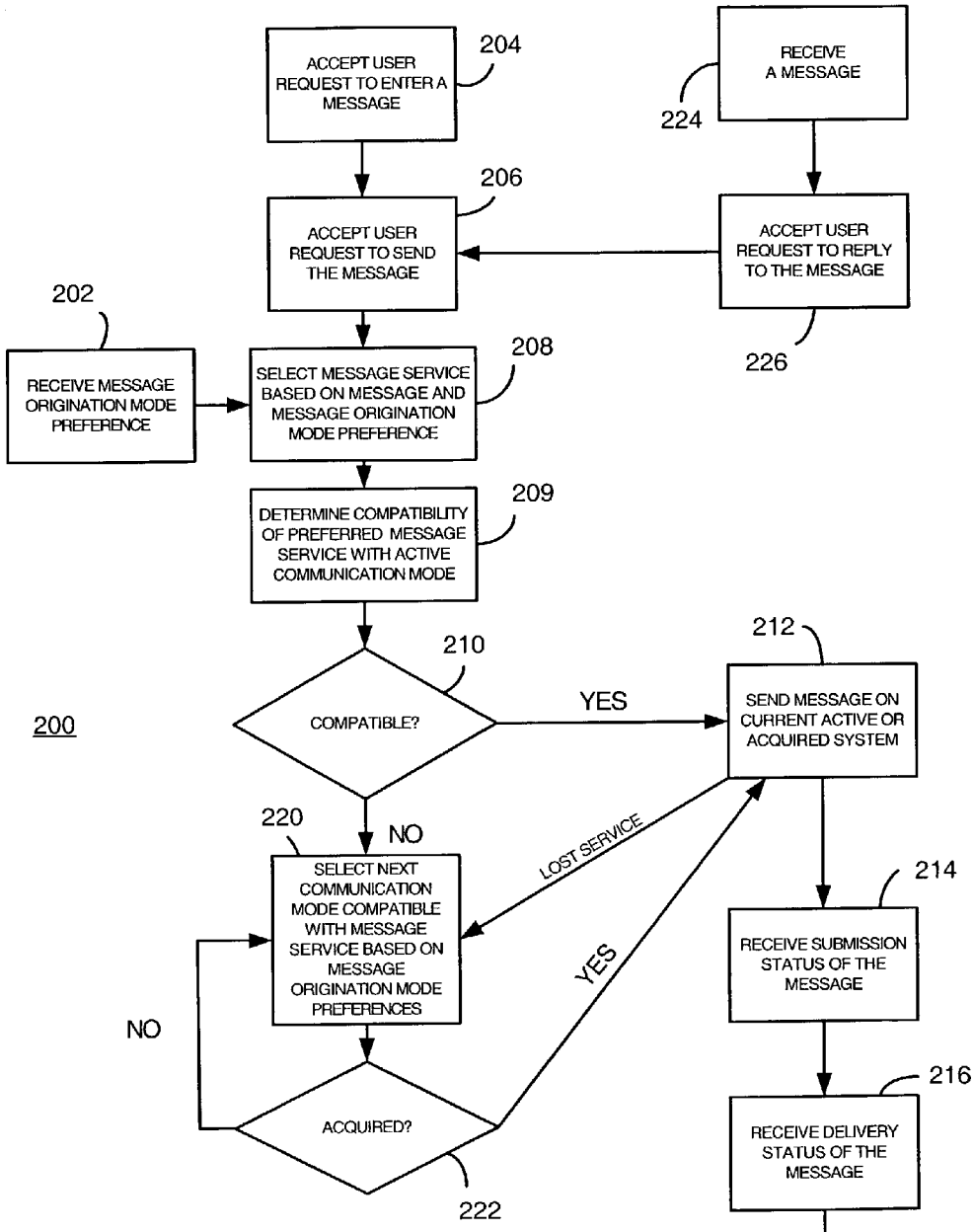

ACCEPT USER REQUEST TO ENTER A MESSAGE
204
RECEIVE A MESSAGE
224
206
ACCEPT USER REQUEST TO SEND THE MESSAGE
ACCEPT USER REQUEST TO REPLY TO THE MESSAGE
226
202
RECEIVE MESSAGE ORIGINATION MODE PREFERENCE
SELECT MESSAGE SERVICE BASED ON MESSAGE AND MESSAGE ORIGINATION MODE PREFERENCE
208
DETERMINE COMPATIBILITY OF PREFERRED MESSAGE SERVICE WITH ACTIVE COMMUNICATION MODE
209
210
212
200
COMPATIBLE?
YES
SEND MESSAGE ON CURRENT ACTIVE OR ACQUIRED SYSTEM
220
NO
LOST SERVICE
SELECT NEXT COMMUNICATION MODE COMPATIBLE WITH MESSAGE SERVICE BASED ON MESSAGE ORIGINATION MODE PREFERENCES
214
RECEIVE SUBMISSION STATUS OF THE MESSAGE
YES
NO
216
ACQUIRED?
RECEIVE DELIVERY STATUS OF THE MESSAGE
222
218
RECEIVE REPLY FROM MESSAGE RECIPIENT

FIG. 2

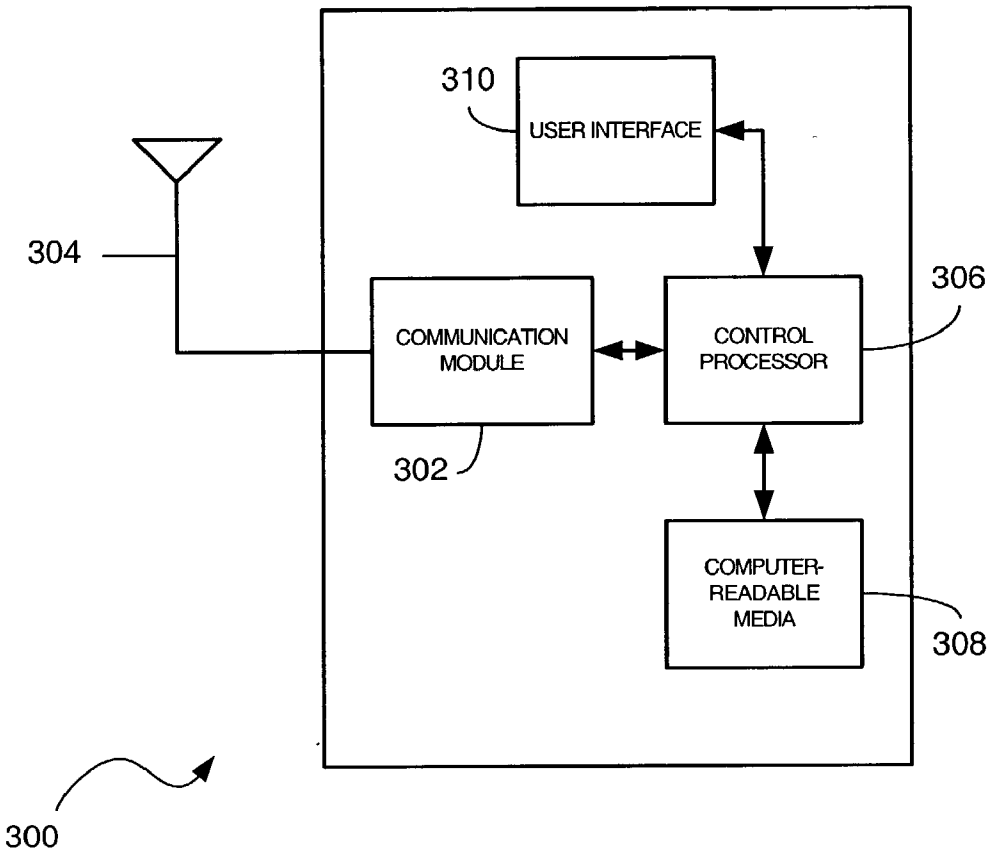

310
USER INTERFACE
304
COMMUNICATION MODULE
CONTROL PROCESSOR
306
302
COMPUTER-READABLE MEDIA
308
300

FIG. 3

METHOD AND APPARATUS FOR SENDING A MESSAGE FROM A WIRELESS DEVICE

CROSS REFERENCE

[0001] This application claims priority of U.S. Provisional Application Serial No. 60/384,187, filed May 29, 2002 entitled "Method and Apparatus for Providing Messaging Services with Multi-Mode Wireless Devices."

BACKGROUND

[0002] 1. Field

[0003] The present invention relates to communication of data, and more particularly, to sending messages from a wireless device in a multiple communication modes environment.

[0004] 2. Background

[0005] Various communication systems operating according to different communication protocols provide for communication of messages. Generally, communication of messages is provided through different message services. One of the message services is the short message service (SMS.) The SMS is a wireless message service for providing a medium for communication of alphanumeric messages of limited size. The communication of SMS messages may be between mobile devices, or a mobile device and a wireless network. The SMS may be used for a variety of communication services such as electronic mail, paging, facsimile, voice mail, or Internet access. The SMS is available in communication systems operating in accordance with the Global System for Mobile Communications (GSM) standard, and code division multiple access (CDMA) standards, such as CDMA1X, CDMA2000, and WCDMA. The standards may include a specific set of protocols for communication of data. Such specific protocols include the General Packet Radio Service (GPRS) and the Universal Mobile Telecommunications Service (UMTS).

[0006] Another type of message service is known as Enhanced Messaging Service (EMS.) The EMS allows users of EMS-compliant mobile devices to send and receive text, melodies, pictures, and simple sounds and animations, or a combination thereof. The EMS is also supported by a number of communication standards.

[0007] A mobile device having multiple communication modes may support the operations of communicating data in accordance with more than one standard. Therefore, the mobile device may be a multi-mode wireless device (MWD.) The MWD allows a user to send and receive voice and data over multiple wireless networks, each operating in accordance with a communication standard. The communication modes include, without limitation, operations in CDMA or GSM based systems, or GSM-based derivatives such as GPRS or UMTS. Other CDMA-based systems are also included, such as CDMA1X, CDMA2000, etc. The MWDs are generally compatible with the SMS and EMS for sending and receiving messages.

[0008] Most communication modes provide at least one message service. Each message service, however, has distinct formats, interfaces, and protocols for generating, sending, and receiving messages. In the past, mobile service providers required users to choose a single wireless system for their service. Thus, a wireless device had to support only one set of message services.

[0009] The proliferation of MWDs, however, requires the ability to support multiple message services for corresponding multiple communication modes, as well as each message service's unique standards. Currently, a user of an MWD must determine which wireless communication mode or modes is available for use, and must manually select an appropriate corresponding message service. Further, the MWD may employ a different application for each message service, and each application includes a distinct interface and set of procedures for sending a message.

[0010] There is therefore a need in the art for a method and apparatus for sending a message in which a wireless communication mode and a message service can be automatically selected.

SUMMARY

[0011] Embodiments disclosed herein address the above stated needs by providing a novel and improved method, apparatus, and computer-readable medium for sending messages from a wireless device. In accordance with various aspects of the invention, a wireless device supporting more than one wireless communication system executes a method for sending a message. The method includes selecting a preferred communication mode from a plurality of communication modes supported by the wireless device. The method further includes selecting a preferred message service based on contents of the message and the preferred communication mode. The method further includes determining compatibility of the preferred message service with an active communication mode of the wireless device, and if the preferred message service is compatible with the active communication mode, sending the message using the preferred service according to the active communication mode.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] **FIG. 1** illustrates a block diagram of a communication system having multiple wireless networks;

[0013] **FIG. 2** illustrates a flow chart for sending a message in accordance with various embodiments of the invention.

[0014] **FIG. 3** illustrates a block diagram of a multi-modes wireless device for sending a message in accordance with various embodiments of the invention.

DETAILED DESCRIPTION

[0015] **FIG. 1** is an illustration of a wireless communication system **100** capable of operating in accordance with various aspects of the invention. The communications at various block interfaces within the wireless communication system **100** may be compliant in accordance with the Interim Standard-41C, or variants thereof. The wireless communication system **100** may be integrated with other data communication systems. During operation, messages are communicated between wireless devices **102**, **103**, and **104** operated by respective users and one or more external short messaging entities (ESME) **105**. Each wireless device may be any type of wireless communication device. Such devices

may be connected or integrated with other types of devices, such as computers or devices operating like a computer. The wireless devices may also operate from a fixed location, such as a wireless local loop or a meter reading system, or a combination thereof. The wireless device **103** may be configured for operation in accordance with multiple communication standards in communication system **100**. Therefore, the wireless device **103** may be a MWD.

[**0016**] The ESME **105** may include voice mail systems **106**, the Internet or a closed Intranet **108**, electronic mail system **110**, and other systems **112** such as fax machines, pagers, terminals or computers. The system **100** includes a short message service center (SMSC) **114**, also known as a message center. Other message centers may be employed to handle different message services. The SMSC **114** may be a combination of hardware and software for relaying, storing and forwarding messages between the ESME **105** and the wireless devices in communication system **100** via network paths **199** and **198**.

[**0017**] The network paths **199** and **198** include one or more signal transfer points (STPs) **116**(*a*) and **116**(*b*), also known as gateways. The STPs **116**(*a*) and **116**(*b*) are connected with the SMSC **114** to enable IS-41C interconnections over signaling system 7 (SS7) links or similar channels with multiple network elements. Home location registers (HLR) **118**(*a*) and **118**(*b*) are connected with the STPs **116**(*a*) and **116**(*b*), respectively. Each HLR includes a database containing subscription data and service profiles of users. In response to a request from the SMSC **114**, an HLR **118**(*a*) or **118**(*b*) provides routing information for an indicated user. Further, if a recipient is not available when a message delivery is attempted, the HLR **118** signals the SMSC **114** when the recipient is accessible and when the message is deliverable. Each STP is connected with one or more mobile switching centers (MSC) **120**(*a*) and **120**(*b*). Each MSC performs switching functions and controls message routing to and from respective radio access networks (RANs) **122** and **123**. The wireless communications from RAN **122** and RAN **123** with the mobile devices may be in accordance with different over the air protocols as defined by different standards. For example, RAN **123** may operate in accordance with the GSM standard, and RAN **122** in accordance with the CDMA standard. The MWD **103** is capable to operate in accordance with both standards with RAN **122** and **123** respectively.

[**0018**] For purposes of simplicity, system **100** is shown with SMSC **114** in communication with two network paths **199** and **198**. Each network path may include one signal transfer point (STP), one mobile switching center (MSC) and one radio access network (RAN). However, additional STPs, MSCs and RANs are also possible in each network path. Accordingly, the system **100** may include the ESME **105**, SMSC **114**, and a network path having at least one of each of an STP, MSC and RAN. The system **100** may include one or more SMSCs **114** or similar message centers.

[**0019**] In one example, the wireless device **102** is only compatible with the wireless network including the RAN **122** using a first wireless communication mode. Similarly, the wireless device **104** is only compatible with the wireless network including RAN **123** using a second wireless communication mode. Wireless device **102** could not communicate with the system **100** through the network path associated with RAN **123**, nor could wireless device **104** communicate with the system **100** through the network path associated with the RAN **122**. For example, RAN **122** may operate according to CDMA standard, and RAN **123** operates according to GSM standard. The MWD **103** may operate with both RANs **122** and **123**.

[**0020**] For different communication modes such as CDMA and GSM modes, message services may require different formatting. For example, CDMA SMS messages are formatted differently than GSM SMS messages. The MWD **103**, however, is configured to communicate with wireless networks connected to either RAN **122** or **123**, even where they operate according to different communication modes. Wireless devices **102**, **103** and **104** can receive different types of messages depending on the services to which they are subscribed. In particular, by operating according to more than one communication mode, the MWD **103** can receive messages from various sources operating in accordance with different communication modes, such as CDMA and GSM modes.

[**0021**] According to various aspects of the invention, the MWD **103** automatically selects a message service based on content of a message and on a communication mode used for communicating with an available wireless network. Alternatively, the MWD **103** selects one message service, from one or more message services it supports, based on a message to be communicated and a preferred communication mode.

[**0022**] **FIG. 2** is a flowchart **200** illustrating various steps for sending a message from a MWD in a multiple communication mode environment in accordance with various aspects of the invention. At step **202**, the MWD receives a message origination mode preference. The message origination mode preference is a signal or code that is input into the MWD, and may be provided by a user, manufacturer or service provider for setting a message origination mode.

[**0023**] The message origination mode selects or designates a preferred communication mode or priority scheme of communication modes from among the communication modes supported by the MWD. The preferred communication mode may be used by the MWD to originate (i.e. receive, format, and prepare) and send a message.

[**0024**] The message origination mode includes an automatic mode, in which any communication mode can be used for sending the message. In the CDMA1x-only mode, the message may only be sent to a CDMA1x-compliant network. In GSM/GPRS/UMTS mode, a CDMA1x communication mode cannot be used, and a message may be sent according to a mode consistent with several parameters of the message, such as size, content, etc.

[**0025**] A message can be originated either in response to a user request to enter a message at step **204**, or as a reply to a message received by the MWD from an external sender at steps **224** and **226**, which are explained in greater detail. In response to a user request, the MWD receives message content and forms a message according to a format and protocol required by the message origination mode. At step **206**, the MWD receives a message send request from the user.

[**0026**] At step **208**, the MWD selects a preferred wireless service from among the wireless services supported by the

MWD. The selection is based on parameters of the message, and the message origination mode, if registered by the MWD. For example, if the message is an SMS message, and the text payload exceeds 140 bytes, then the message may be sent over a CDMA traffic channel, using service option 6 (SO6, rate set 1 of 9.6 kbps) or service option 14 (SO14, rate set 2 of 14.4 kbps). In another example, if CDMA is selected and the message exceeds the size limit of about 70 bytes for being sent on a CDMA access channel, the MWD will select either SO6 or SO14 and set up a call on the CDMA traffic channel. If the selected service option fails, the MWD will try another service option. If both service options fail, the MWD may try another mode such as WCDMA.

[0027] At step **209**, the MWD compares the selected preferred message service with a currently-used, active communication mode of the device, if any, to determine whether they are compatible. If the preferred message service is compatible with the active communication mode, shown at decision step **210**, the MWD sends the message using the preferred message service to a wireless network associated with the active communication mode at step **212**.

[0028] If the preferred message service is not compatible with the current active communication mode, or if a network connection is lost before transmission of the message is completed, the MWD will select another communication mode as shown at step **220**. The MWD selects a next communication mode based on compatibility with the preferred message service, and in accordance with preferences registered by the message origination mode preference, if any. If a network connection can be acquired using the next suitable communication mode as set forth at decision step **222**, the MWD sends the message to a wireless network associated with the next suitable communication mode at step **212**. If a network connection cannot be acquired, the MWD selects a next suitable communication mode at step **220**.

[0029] To acquire a network connection using the next suitable communication mode, the MWD stops the protocol stack for the current active mode, and starts the protocol stack for the newly selected mode which causes a hardware and firmware change in order to tune into the newly acquired wireless network. Alternatively, the MWD may run multiple stacks concurrently. The MWD may listen to protocol information from the newly acquired wireless network, and establishes dialogues with the network (i.e. GSM location update, CDMA registration, etc.).

[0030] If the message is sent successfully over the network, the MWD may receive a message submission status (CDMA transport layer Acknowledgement Message, GSM/UMTS Submit Report message, etc.) from the SMSC **114**, as indicated at step **214**. The message submission status is preferably received within the time period that is specified by the standards of the wireless system used. If the submission status indicates that the SMSC **114** accepted the message, and the user requested a message delivery status (CDMA Delivery Acknowledgement Message, GSM/UMTS Status Report message, etc.), the MWD may receive a message delivery status from the SMSC at step **216**. If the user requested a reply to the sent message (CDMA User Acknowledgement, GSM Reply Path, etc.), the MWD may receive the requested reply at step **218**.

[0031] Returning now to step **224**, the MWD is able to receive a message from multiple available wireless networks according to multiple wireless communication modes. If the sender of such a message requests a reply, the MWD user generates the reply without having to know on which system or network the original message is received. Accordingly, at step **226**, the MWD receives a user request to reply to the received message, and once the reply data is received and a reply message is formed, the MWD receives the user message send request at step **206**. When replying to a received message, the MWD may select a communication mode used by the network when the received message is arrived. The flow of various steps then proceeds as set forth. Those with skill in the art would recognize that the steps in **FIG. 2**, representing steps for sending a message by a multi-mode wireless device, may be interchanged or reordered without departing from the main scope of the invention.

[0032] **FIG. 3** is a block diagram **300** of a MWD **103** for sending a message in accordance with various aspects of the invention. The MWD **103** includes a communication module **302** that enables communication with a wireless network using different communication modes. The communication module **302** sends and receives control and traffic signals via antenna **304** while in communication with RAN **122** and **123** in accordance with corresponding protocols defined in relevant standards. The MWD **103** also includes a control processor **306** and computer-readable media **308**. The computer-readable media **308** stores one or more software modules for execution by the control processor **306**. The MWD **103** also includes a user interface **310** for receiving commands, requests, instructions, and data from a user, and for providing information to the user via, for example, a display in MWD. Various steps defined and explained in relation to flowchart **200** depicted in **FIG. 2** may be formed via software code or hardware or a combination of both, and incorporated in MWD **103** via computer-readable media **308** and control processor **306**. Therefore, MWD **103** may operate in accordance with various aspects of the invention.

[0033] Those of skill would further appreciate that the various illustrative logical blocks, modules, functional blocks, and algorithm steps described in connection with the embodiments disclosed herein may be implemented as electronic hardware, computer software stored on computer-readable media, or combinations thereof. To clearly illustrate this interchangeability of hardware and software, various illustrative components, blocks, modules, circuits, and steps have been described above generally in terms of their functionality. Furthermore, the various illustrative logical blocks, modules, and circuits described in connection with the embodiments disclosed herein may be implemented or performed with a general purpose processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A general-purpose processor may be a microprocessor, but in the alternative, the processor may be any conventional processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices, e.g., a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

[0034] The steps of a method or algorithm described in connection with the embodiments disclosed herein may be embodied directly in hardware, in a software module executed by a processor, or in a combination of the two. A software module may reside in RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary storage medium is coupled to the processor such the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. The ASIC may reside in a wireless device. In the alternative, the processor and the storage medium may reside as discrete components in a user terminal connected with the wireless device.

What is claimed is:

1. A method for sending a message from a wireless device in a multiple communication modes environment, comprising:

selecting a preferred communication mode from a plurality of communication modes supported by the wireless device;

selecting a preferred message service based on contents of the message and the preferred communication mode;

determining compatibility of the preferred message service with an active communication mode of the wireless device; and

if the preferred message service is compatible with the active communication mode, sending the message using the preferred service according to the active communication mode.

2. The method as set forth in claim, **1** further comprising:

receiving a message origination mode preference for setting a message origination mode including the preferred communication mode; and

wherein selecting the preferred message service is further based on the message origination mode.

3. The method as set forth in claim 1, further comprising formatting said message according to the preferred message service.

4. The method as set forth in claim 1, further comprising, if the preferred message service is not compatible with the active communication mode, resetting the active communication mode to a next communication mode that is compatible with the preferred message service and the preferred communication mode.

5. The method as set forth in claim 4, further comprising, if the preferred message service is compatible with the next communication mode, sending the message using the preferred message service according to the next communication mode.

6. The method as set forth in claim 1, further comprising receiving a request to send the message as a reply to a received message.

7. The method as set forth in claim 1, further comprising receiving a request to send the message in response to receiving the content from a user.

8. An apparatus for sending a message from a wireless device in a multiple communication mode environment, comprising:

a control processor configured for selecting a preferred communication mode from a plurality of communication modes supported by the wireless device, selecting a preferred message service based on contents of the message and the preferred communication mode, and determining compatibility of the preferred message service with an active communication mode of the wireless device; and

a communication module configured for sending the message using the preferred service according to the active communication mode if the preferred message service is compatible with the active communication mode.

9. The apparatus as set forth in claim, **8** further comprising:

a user interface for receiving a message origination mode preference from a user, the message origination mode preference being configured to set a message origination mode including the preferred communication mode from one or more communication modes supported by the wireless device; and wherein the selecting the preferred message service is further based on the message origination mode.

10. The apparatus as set forth in claim 8, wherein the control processor is further configured to format said message according to the message service.

11. The apparatus as set forth in claim 8, wherein the control processor is configured to select a next communication mode compatible with the preferred message service if the preferred message service is incompatible with the active communication mode.

12. A apparatus for sending a message from a wireless device in a multiple communication mode environment, comprising:

a control processor; and

computer readable media including code for instructing the control processor, wherein the code comprises:

code for selecting a preferred communication mode from a plurality of communication modes supported by the wireless device;

code for selecting a preferred message service based on contents of the message and the preferred communication mode;

code for determining compatibility of the preferred message service with an active communication mode of the wireless device; and

code for, if the preferred message service is compatible with the active communication mode, sending the message using the preferred service according to the active communication mode.

13. The apparatus as set forth in claim, **12** further comprising:

code for receiving a message origination mode preference for setting a message origination mode including the preferred communication mode; and

code for wherein selecting the preferred message service is further based on the message origination mode.

14. The apparatus as set forth in claim 12, further comprising code for formatting said message according to the preferred message service.

15. The apparatus as set forth in claim 12, further comprising, if the preferred message service is not compatible with the active communication mode, code for resetting the active communication mode to a next communication mode that is compatible with the preferred message service and the preferred communication mode.

16. The apparatus as set forth in claim 15, further comprising, if the preferred message service is compatible with the next communication mode, code for sending the message using the preferred message service according to the next communication mode.

17. The apparatus as set forth in claim 12, further comprising code for receiving a request to send the message as a reply to a received message.

18. The apparatus as set forth in claim 12, further comprising code for receiving a request to send the message in response to receiving the content from a user.

* * * * *