Motorola Mobility, Inc. v. Microsoft Corporation Doc. 125 Att. 22

# Exhibit 1105

Dockets.Justia.com

US005974085A

# United States Patent [19]

Smith

[11] Patent Number: 5,974,085

[45] Date of Patent: Oct. 26, 1999

[54] **WIRELESS MODEM AND METHOD THEREFOR FOR ROUTING DATA TO AN APPLICATION OR TO STORAGE**

[75] Inventor: **Dwight Randall Smith**, Grapevine, Tex.

[73] Assignee: **Motorola, Inc.**, Schaumburg, Ill.

[21] Appl. No.: **09/061,645**

[22] Filed: **Apr. 17, 1998**

[51] **Int. Cl.**[6] ..... **H04B 1/38**; H04L 5/16

[52] **U.S. Cl.** ..... **375/222**; 375/219

[58] **Field of Search** ..... 375/222, 219, 375/220; 370/237, 392, 399, 363; 709/242

[56] **References Cited**

U.S. PATENT DOCUMENTS

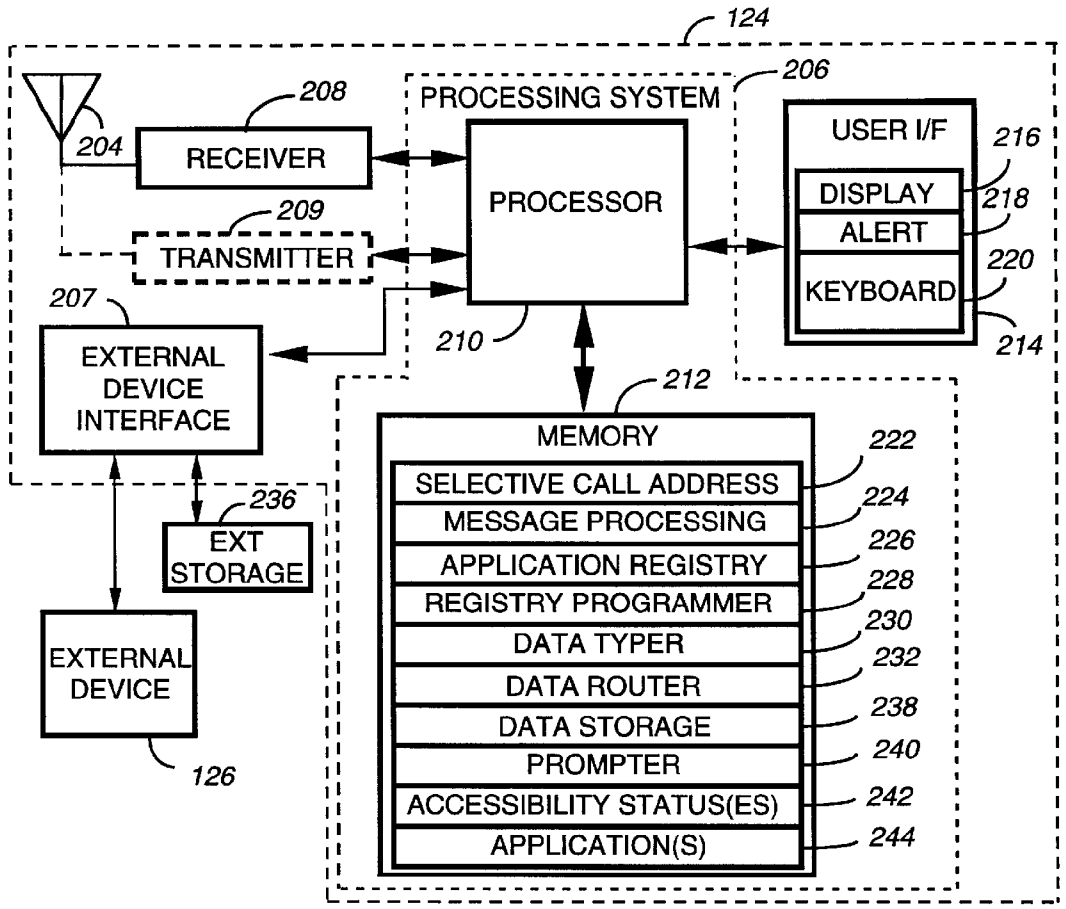
| | | | |
|---|---|---|---|
| 4,761,646 | 8/1988 | Choquet et al. | 340/825.52 |
| 5,153,867 | 10/1992 | Sin | 370/85.1 |
| 5,202,899 | 4/1993 | Walsh | 375/8 |
| 5,610,941 | 3/1997 | Tanaka et al. | 375/222 |

*Primary Examiner*—Stephen Chin
*Assistant Examiner*—Mohammad Ghayour
*Attorney, Agent, or Firm*—R. Louis Breeden

[57] **ABSTRACT**

An application registry **(226)** is programmed **(504)** into a wireless modem **(124)** and includes routing information for routing data, based upon data type, to an application **(244)** or to storage **(238, 236)**. Thereafter, the wireless modem receives **(602)** the data and determines **(604)** the data type. The wireless modem then routes **(614, 628, 624, 618)** the data in accordance with the routing information for the data type and, when the routing information indicates the application is located in an external device, further in accordance with an accessibility status of the external device.

**18 Claims, 4 Drawing Sheets**



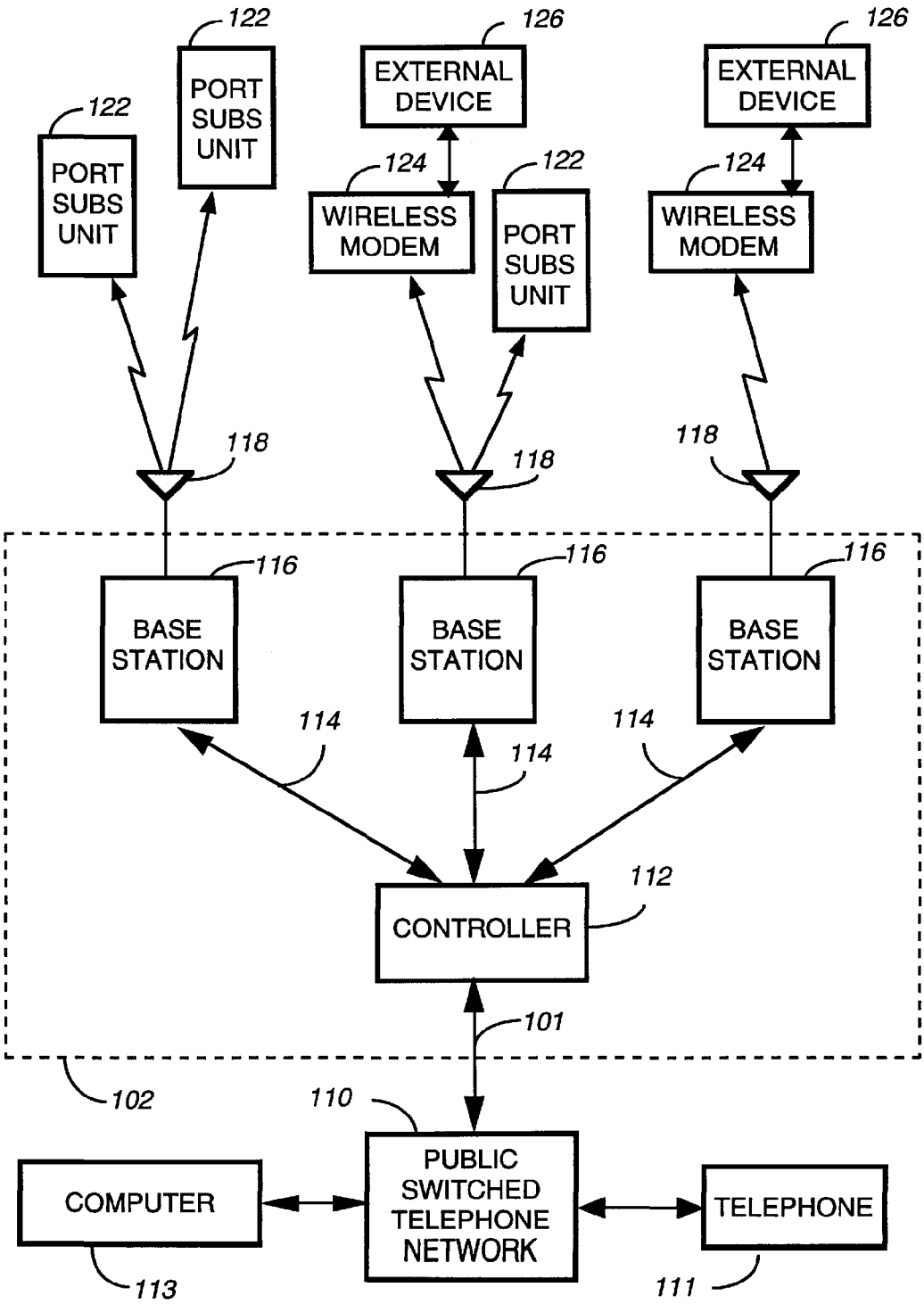

122
PORT SUBS UNIT
122
PORT SUBS UNIT
126
EXTERNAL DEVICE
124
WIRELESS MODEM
122
PORT SUBS UNIT
126
EXTERNAL DEVICE
124
WIRELESS MODEM
118
118
118
116
BASE STATION
116
BASE STATION
116
BASE STATION
114
114
114
112
CONTROLLER
101
102
110
PUBLIC SWITCHED TELEPHONE NETWORK
COMPUTER
TELEPHONE
113
111

*FIG. 1*

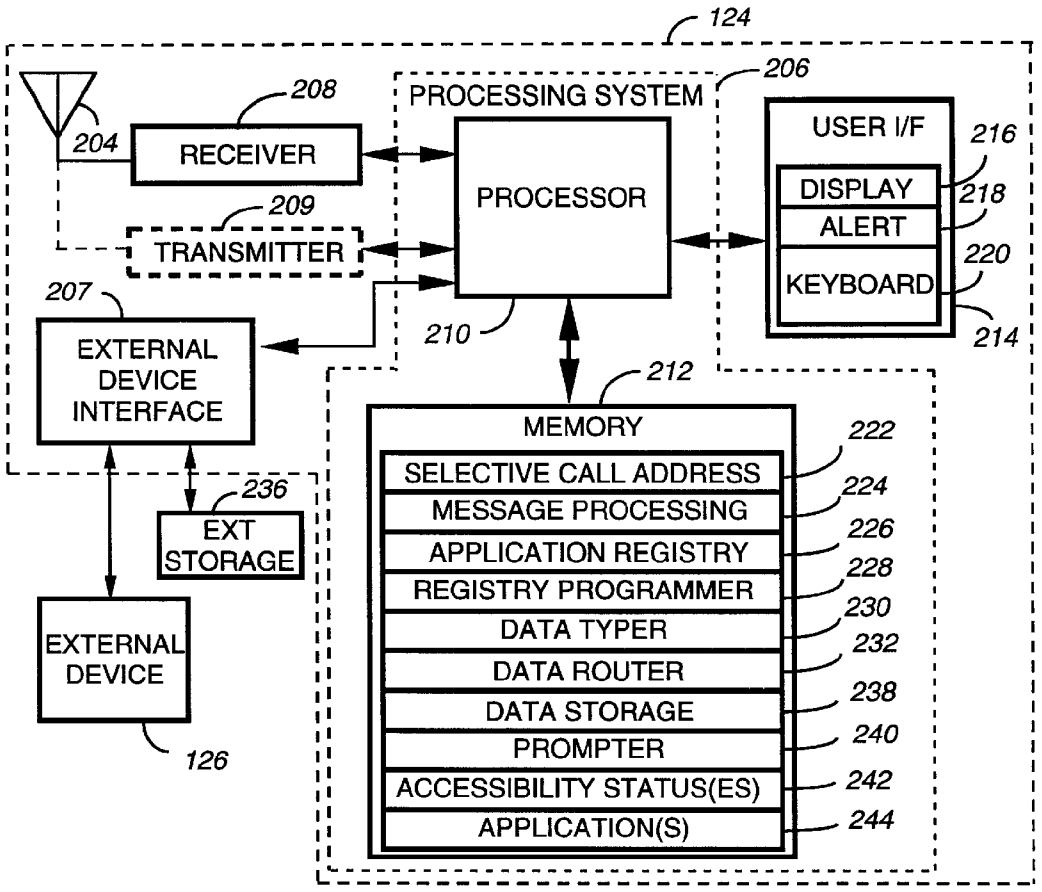


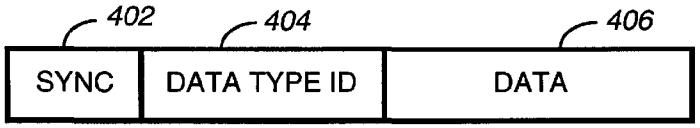

*FIG. 2*

| 302 DATA TYPE | APPLICATION | APPL LOCATION | NOTIFY | ROUTING |
|---|---|---|---|---|
| http | ThinBrowser | EXTERNAL DEV | APPL | FORWARD |
| irc | mIRC | EXTERNAL DEV | APPL | FORWARD |
| irc | PageChat | INTERNAL | APPL | FORWARD |
| vcal | Calendar | INTERNAL | APPL | FORWARD |
| bin/xls | Excel | EXTERNAL DEV | APPL | FORWARD |
| 302 bin/xls | Excel | EXTERNAL DEV | USER | /PC_hold |
| text/* | Msg | INTERNAL | USER | /msg |

304 304

**226**

*FIG. 3*




400 FIG. 4

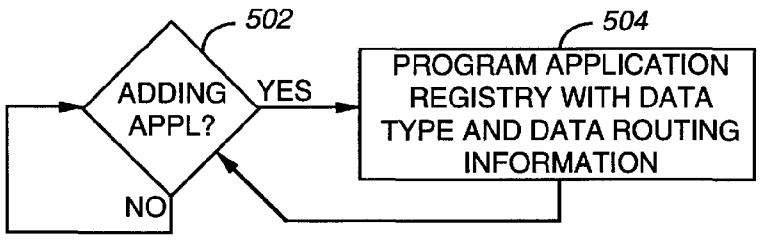



FIG. 5

500

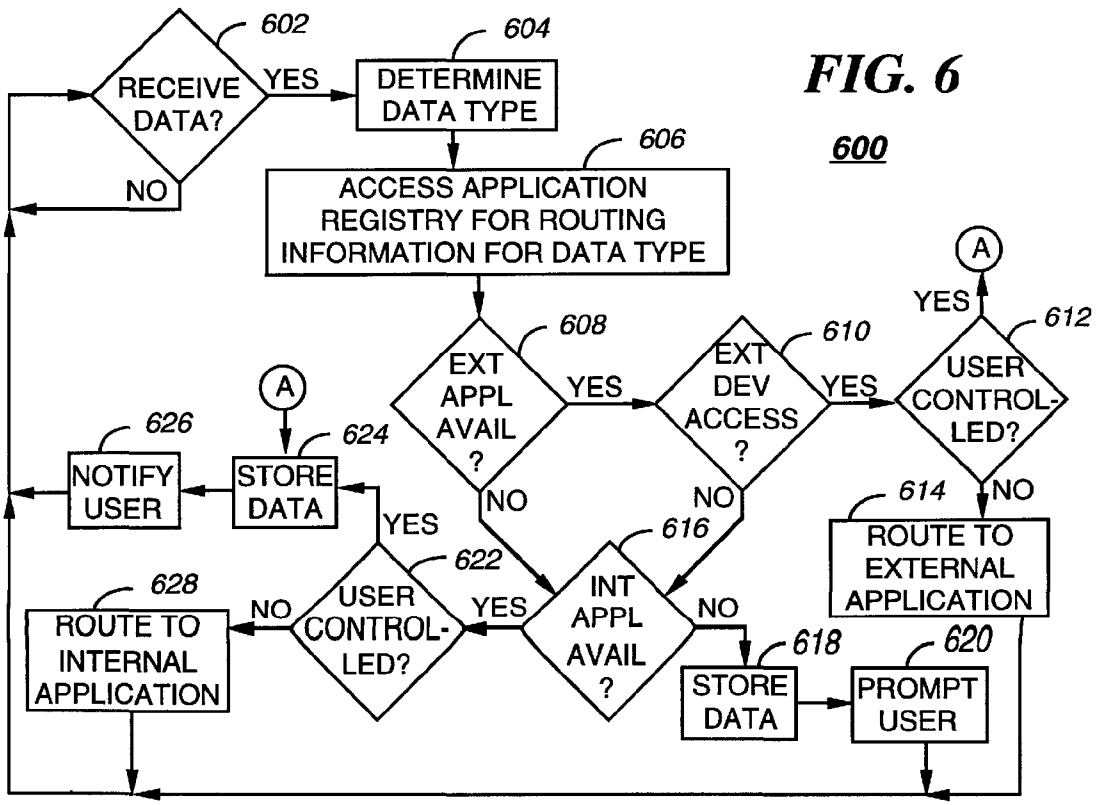
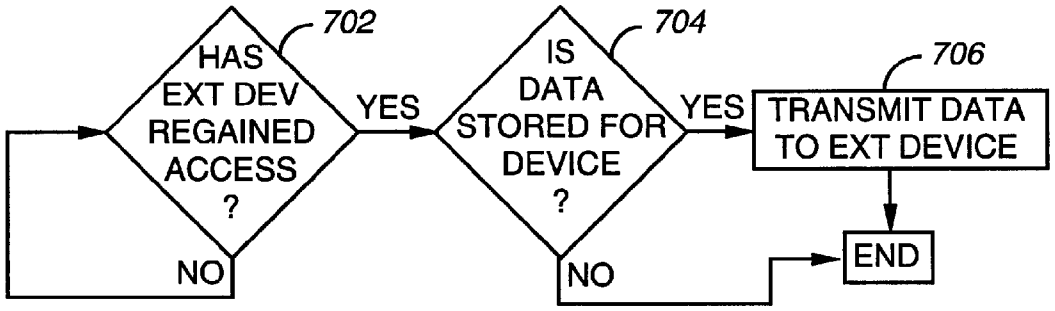



FIG. 6

600




700

FIG. 7

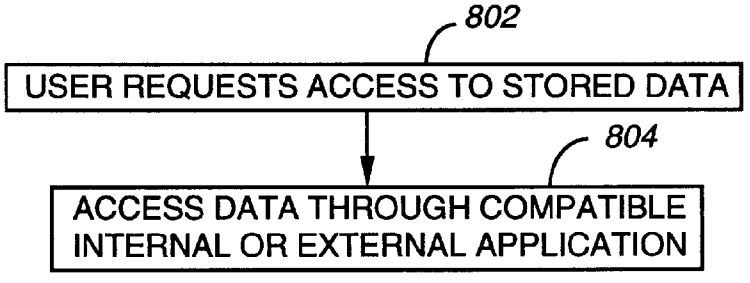



FIG. 8

800

# WIRELESS MODEM AND METHOD THEREFOR FOR ROUTING DATA TO AN APPLICATION OR TO STORAGE

## FIELD OF THE INVENTION

This invention relates in general to wireless communication systems, and more specifically to a wireless modem and method therefor for routing data to an application or to storage.

## BACKGROUND OF THE INVENTION

Prior-art selective call receivers have comprised user applications which have provided messaging services directly to the user. These applications have received data delivered using explicit messaging vectors, such as numeric, alphanumeric, and binary vectors. Each of the user applications has utilized the information in the vector of a received message to format the data for presentation to the user. Selective call receivers utilized as wireless modems for external devices also have employed vector-based routing techniques.

As the industry moves toward new applications that are not directly linked to the prior-art vector-based schemes, a need arises for handling and delivering new data formats. Particularly for wireless modems, it will be inappropriate to add new vector types of each type of data that is desired. Proliferation of vectors could quickly consume the available vectors, making it difficult to extend the basic delivery approach. Furthermore, as new applications become available, the new vectors would have to be made available in the encoding portions of the infrastructure, requiring massive efforts to stay compatible.

Thus, what is needed is a method and apparatus in a wireless modem for routing data to an appropriate application for processing the data without requiring an explicit messaging vector. Preferably the method and apparatus will support applications that reside both inside and outside the wireless modem.

## SUMMARY OF THE INVENTION

An aspect of the present invention is a method in a wireless modem for routing data to an application or to storage. The method comprises the steps of programming an application registry in the wireless modem, the application registry including routing information for routing the data, based upon data type, to the application or to storage; and thereafter, receiving the data and determining the data type. The method further comprises the step of routing the data in accordance with the routing information for the data type and, when the routing information indicates the application is located in an external device, further in accordance with an accessibility status of the external device.

Another aspect of the present invention is a wireless modem for routing data to an application. The wireless modem comprises a receiver for receiving the data, and a processing system coupled to the receiver for processing the data. The processing system comprises a memory for storing an application registry including routing information for routing the data, based upon data type, to the application or to storage in the memory. The wireless modem also includes



an external device interface coupled to the processing system for interfacing with an external device. The processing system is arranged to program the application registry with the routing information, and thereafter, to receive the data and determine the data type. The processing system is also arranged to route the data in accordance with the routing information for the data type and, when the routing information indicates the application is located in the external device, further in accordance with an accessibility status of the external device.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an electrical block diagram of an exemplary wireless messaging system in accordance with the present invention.

FIG. **2** is an electrical block diagram of an exemplary wireless modem in accordance with the present invention coupled to an external device and an external storage element.

FIG. **3** is an exemplary detailed view of an application registry in accordance with the present invention.

FIG. **4** is an exemplary protocol diagram in accordance with the present invention.

FIGS. **5–8** are flow diagrams depicting operation of the wireless modem in accordance with the present invention.

## DETAILED DESCRIPTION OF THE DRAWINGS

FIG. **1** is an electrical block diagram of an exemplary wireless messaging system in accordance with the present invention, comprising a fixed portion **102** including a controller **112** and a plurality of base stations **116**, the messaging system also including a plurality of portable subscriber units **122**. The base stations **116** preferably communicate with the subscriber units **122** utilizing conventional radio frequency (RF) techniques, and are coupled by communication links **114** to the controller **112**, which controls the base stations **116**. In addition to the portable subscriber units **122**, the base stations **116** communicate with wireless modems **124** in accordance with the present invention. The wireless modems **124** are preferably coupled to at least one external device **126**, such as a conventional personal computer (PC) or personal digital assistant (PDA).

The hardware of the controller **112** is preferably a combination of the Wireless Messaging Gateway (WMG™) Administrator! paging terminal, and the RF-Conductor!™ message distributor manufactured by Motorola, Inc., and includes software modified in accordance with the present invention. The hardware of the base stations **116** is preferably the RF-Orchestra! transmitter and can include, in two-way messaging systems, the RF-Audience!™ receiver manufactured by Motorola, Inc. The subscriber units **122** are conventional selective call receivers. The wireless modems **124** preferably are similar to the CreataLink™ wireless modem manufactured by Motorola, Inc., and have software modified in accordance with the present invention. It will be appreciated that other similar hardware can be utilized as well for the controller **112**, the base stations **116**, the wireless modems **124**, and the portable subscriber units **122**.

Each of the base stations **116** transmits RF signals to the portable subscriber units **122** and wireless modems **124** via

an antenna **118**. The RF signals transmitted by the base stations **116** (outbound messages) preferably comprise selective call addresses identifying the portable subscriber units **122** and the wireless modems **124**, and data messages originated by callers and computer systems, as well as commands originated by the controller **112** for adjusting operating parameters of the radio communication system.

The controller **112** preferably is coupled by telephone links **101** to a public switched telephone network (PSTN) **110** for receiving selective call message originations therefrom. Selective call originations comprising voice and data messages from the PSTN **110** can be generated, for example, from a conventional telephone **111** or a conventional computer **113** coupled to the PSTN **110**. It will be appreciated that, alternatively, other types of communication networks, e.g., packet switched networks, the Internet, and local area networks, can be utilized as well for transporting originated messages to the controller **112**.

The over-the-air protocol utilized for outbound and inbound messages is preferably selected from Motorola's well-known FLEX™ family of digital selective call signaling protocols. These protocols utilize well-known error detection and error correction techniques and are therefore tolerant to bit errors occurring during transmission, provided that the bit errors are not too numerous. It will be appreciated that other suitable protocols can be used as well. It will be further appreciated that, while the depicted embodiment for practicing the present invention is a one-way messaging system, the present invention is applicable also to a two-way messaging system.

FIG. **2** is an electrical block diagram of an exemplary wireless modem **124** in accordance with the present invention, coupled to the at least one external device **126** and to an external storage element **236**. The wireless modem **124** comprises an antenna **204** for intercepting an outbound message and (optionally) for transmitting an inbound message to a base receiver (not shown). The antenna **204** is coupled to a conventional receiver **208** for receiving the outbound message and, optionally, is coupled to a conventional transmitter **209** for transmitting the inbound message. The receiver **208** and the (optional) transmitter **209** are coupled to a processing system **206** for processing the outbound messages and for controlling the wireless modem **124** in accordance with the present invention. A user interface **214** preferably is also coupled to the processing system **206** for interfacing with a user. The user interface **214** preferably comprises a conventional display **216** for displaying the messages, a conventional alert element **218** for alerting the user when a message arrives, and a conventional keyboard **220** for controlling the wireless modem **124**. A conventional external device interface **207** is also coupled to the processing system **206** for communicating with at least one external device **126** through well-known techniques. The external device interface **207** preferably is also coupled to the external storage element **236** for augmenting the storage capacity of the processing system **206**. The external storage element **236** is preferably a conventional removable memory card, such as a Personal Computer Memory Card International Association (PCMCIA) memory card. It will be appreciated that, alternatively, other types of memory devices, e.g., magnetic disk memory, can be utilized as well fro the external storage element **236**.

The processing system **206** comprises a conventional processor **210** and a conventional memory **212**. The memory **212** stores software elements and other variables for programming the processing system **206** in accordance with the present invention. The memory **212** preferably includes a selective call address **222** to which the wireless modem **124** is responsive. In addition, the memory **212** includes a message processing element **224** for programming the processing system **206** to process messages through well-known techniques. The memory **212** further comprises an application registry **226** including routing information for routing received data, based upon data type, to an application or to storage, e.g., in the memory **212** or the external storage element **236**, in accordance with the present invention. The memory **212** also includes a registry programmer **228** for programming the processing system to program the application registry **226**. The programming of the application registry **226** preferably occurs as a part of the install process, using well-known techniques, for applications loaded into the wireless modem **124**. Applications on the external device **126** that require the routing of data from the wireless modem **124** preferably would register themselves during a negotiation between the wireless modem **124** and the external device **126**, using well known initialization techniques. It will be appreciated that, alternatively, the programming of the application registry **226** can take place during manufacture of the wireless modem **124**, or as a download from the controller **112** through conventional over-the-air programming methods.

In addition, the memory **212** includes a data typer **230** for programming the processing system **206** to determine the data type, preferably from a data type identifier **404** (FIG. **4**) transmitted with the data and supplied by the messaging system infrastructure, e.g., the controller **112**. It will be appreciated that, alternatively, the data typer **230** can determine the data type by analyzing the first few bytes of the data, and looking therein for key code values and delimiters. The memory **212** also includes a data router **232** for programming the processing system **206** for routing the data in accordance with the routing information (in the application registry) for the data type and, when the routing information indicates the application is located in the external device **126**, further in accordance with an accessibility status **242** of the external device **126**. The memory **212** further comprises data storage **238** for storing the received data when the data cannot be immediately routed to an application. The memory also includes a prompter **240** for programming the processing system **206** to generate prompts and notifications to the user through the user interface when required. In addition, the memory **212** includes at least one accessibility status **242** corresponding to the external device **126** for indicating whether the external device **126** has been determined to be coupled to the external device interface **207** and is accessible to the wireless modem **124**, e.g., powered up and operable. The processing system **206** preferably updates the accessibility status **242** of each external device periodically by, for example, "pinging" the external device **126** through well-known techniques to see whether the external device **126** responds appropriately. The memory **212** also preferably includes at least one application **244** for processing the received data.

FIG. **3** is a detailed view of an exemplary application registry **226** in accordance with the present invention. The application registry **226** includes a row **302** of information for each entry corresponding to a data type. The columns of the registry **226** list the data type, the application name, the application location, who to notify when data is present, and the routing for the entry. Note that some data types, e.g., the "irc" data type, have more than one entry. When a data type has more than one entry, the top entry is preferred, but a lower level entry may be used when the top entry cannot be used for the routing. For example, the "irc" data type is preferably forwarded to the application "mIRC" in the external device **126** when the external device is accessible. However, when the external device **126** is not accessible, the "irc" data type is forwarded to the "PageChat" application in the wireless modem **124**. In addition, certain data types, e.g., the "text/*" data type, have "user controlled" processing. That is, the data is stored in the data storage **238**, e.g., in a file called "/msg", and the user is notified that the data has arrived, but the data is not sent to the application until the user accesses the data through either the wireless modem **124** or the external device **126**.

FIG. **4** is a simplified exemplary protocol diagram **400** for communication between the base stations **116** and the wireless modems **124** in accordance with the present invention. The diagram **400** includes a sync portion **402** for synchronizing the receiver **208** with transmissions of the base stations **116**, through well-known techniques. The diagram **400** also includes the data type identifier **404** for identifying the data type. In addition, the diagram **400** includes the data to be processed.

FIGS. **5**–**8** are flow diagrams depicting operation of the wireless modem **124** in accordance with the present invention. Referring to the flow diagram **500** of FIG. **5**, periodically the processing system checks **502** whether an application is being added to the wireless modem **124**. If so, the registry programmer **228** cooperates with the application during installation to program **504** the application registry **226** with the data type and data routing information as depicted in the exemplary application registry **226** of FIG. **3**.

Referring to the flow diagram **600** of FIG. **6**, operation of the wireless modem **124** in response to receiving data is depicted. Flow begins with the processing system **206** waiting **602** to receive the data. When the data is received, the processing system **206** accesses the data typer **230** to determine **604** the data type through well-known techniques. The processing system **206** then accesses **606** the application registry **226** to obtain the routing information for the data type. The processing system **206** then checks **608** whether the routing information indicates that an external application is available in the external device **126**, e.g., a PC. If so, the processing system **206** checks **610** the accessibility status **242** corresponding to the external device **126** to determine whether the external device **126** is accessible, i.e., coupled and operable. If so, the processing system **206** checks **612** whether the processing of the data type is user controlled, i.e., normally sent to storage before processing in response to a user command. If so, the processing system **206** stores **624** the data, preferably in the data storage **238** of the processing system **206**, or, alternatively, in the external storage element **236**. The processing system **206** then notifies **626** the user, e.g., with an alert from the alert element **218**, that the data is in storage, so that the user can then control the wireless modem **124** or the external device **126** to access the data through a compatible application. Flow then returns to step **602** to await new data.

If, on the other hand, at step **612** the processing system **206** determines that the processing of the data type is not user controlled, i.e., the data is to be routed automatically to the application, then the processing system **206** routes **614** the data to the external application, and the flow returns to step **602** to await new data. Also, if at step **610** the processing system **206** determines that the external device is not accessible, then flow moves to step **616**, where the processing system **206** again accesses the application registry **226** to determine whether a compatible internal application is available for the data type. If so, the processing system **206** checks **622** whether the processing of the data type is user controlled. If so, the processing system **206** stores **624** the data, preferably in the data storage **238** of the processing system **206**, or, alternatively, in the external storage element **236**. The processing system **206** then notifies **626** the user, e.g., with an alert from the alert element **218**, that the data is in storage, so that the user can then control the wireless modem **124** or the external device **126** to access the data through a compatible application. Flow then returns to step **602** to await new data.

If, on the other hand, at step **622** the processing system **206** determines that the processing of the data type is not user controlled, then the processing system **206** routes **628** the data to the internal application, and the flow returns to step **602** to await new data. Also, if at step **616** the processing system **206** determines that the internal application is not available, then the processing system **206** stores **618** the data, and prompts **620** the user of the wireless modem **124** to couple the wireless modem **124** to the external device **126**, so that the data can be processed. It will be appreciated that some data has little or no meaning unless processed immediately, e.g., data type "http" for displaying an object on an existing view of a web page. For such data, instead of storing the data when no application is available, the processing system **206** can, alternatively, ignore the data and take no further action.

If, on the other hand, at step **608** the processing system **206** determines that no external application is available, then the flow moves to step **616**, where the processing system **206** checks whether an internal application is available, as described herein above. Whenever the data has been stored in either step **624** or step **618**, the routines described in FIGS. **7** or **8** can be used to further process the data.

Referring to the flow diagram **700** of FIG. **7**, the processing system **206** periodically checks **702** the accessibility status **242** of each external device **126** to determine whether a previously inaccessible external device **126** has become accessible to the wireless modem **124**. If so, the processing system **206** also checks **704** the data storage **238** and (if available) the external storage element **236** to determine whether any data is stored for an application in the external device. If so, the processing system **206** transmits **706** the stored data to the appropriate application in the external device, as determined from the routing information of the application registry **226**, and the process ends. If not, the process ends.

Referring to the flow diagram **800** of FIG. **8**, operation of the wireless modem **124** in response to a user request is depicted. At step **802** the user requests access to stored data. For example, the user can request the display of a message received and stored earlier. In response, the processing system **206** accesses the requested data through a compatible internal or external application, as determined from the routing information of the application registry **226**.

Thus, it should be clear from the preceding disclosure that the present invention provides a method and apparatus in a wireless modem for routing data to an appropriate application for processing the data without requiring an explicit messaging vector, thereby beneficially preventing a burdensome and expensive proliferation of vectors as new data types emerge. Also advantageously, the method and apparatus supports applications that reside both inside and outside the wireless modem. Many modifications and variations of the present invention are possible in light of the above teachings. Thus, it is to be understood that, within the scope of the appended claims, the invention can be practiced other than as described herein above.

What is claimed is:

**1**. A method in a wireless modem for routing data to an application or to storage, the method comprising the steps of:

programming an application registry in the wireless modem, the application registry including routing information for routing the data, based upon data type, to the application or to storage;

thereafter, receiving the data and determining the data type; and

routing the data in accordance with the routing information for the data type and, when the routing information indicates the application is located in an external device, further in accordance with an accessibility status of the external device.

**2**. The method of claim **1**, wherein the routing step comprises the step of routing the data to the application in the external device, when the routing information indicates the application is located in the external device, and the accessibility status indicates that the external device is accessible to the wireless modem.

**3**. The method of claim **1**, wherein the routing step comprises the step of routing the data to an available compatible application in the wireless modem, when the routing information indicates the application is located in the external device, and the accessibility status indicates that the external device is not accessible to the wireless modem.

**4**. The method of claim **1**, further comprising the step of

storing the data in the wireless modem, when the routing information indicates the application is located in the external device and that no compatible application is available internal to the wireless modem, and the accessibility status indicates that the external device is not accessible to the wireless modem.

**5**. The method of claim **1**, further comprising the step of

storing the data in an external storage element coupled to the wireless modem, when the routing information indicates the application is located in the external device and that no compatible application is available internal to the wireless modem, and the accessibility status indicates that the external device is not accessible to the wireless modem.

**6**. The method of claim **1**, further comprising the step of

prompting a user of the wireless modem to couple the wireless modem to the external device, when the routing information indicates the application is located in the external device and that no compatible application is available internal to the wireless modem, and the accessibility status indicates that the external device is not accessible to the wireless modem.

**7**. The method of claim **1**, further comprising the step of

transmitting the data to the external device in response to the accessibility status indicating that a previously inaccessible external device for which the data has been stored has become accessible to the wireless modem.

**8**. The method of claim **1**, further comprising the step of

storing the data in one of the wireless modem and an external storage element, when the routing information indicates user control is required for accessing the data by the application.

**9**. The method of claim **1**, further comprising the step of

notifying a user of the wireless modem when the data has been routed to storage, so that the user can then control at least one of the wireless modem and the external device to access the data through a compatible application.

**10**. A wireless modem for routing data to an application, comprising:

a receiver for receiving the data;

a processing system coupled to the receiver for processing the data, the processing system comprising

a memory for storing an application registry including routing information for routing the data, based upon data type, to the application or to storage in the memory; and

an external device interface coupled to the processing system for interfacing with an external device,

wherein the processing system is arranged to:

program the application registry with the routing information;

thereafter, receive the data and determine the data type; and

route the data in accordance with the routing information for the data type and, when the routing information indicates the application is located in the external device, further in accordance with an accessibility status of the external device.

**11**. The wireless modem of claim **10**, wherein the processing system is further arranged to route the data to the application in the external device, when the routing information indicates the application is located in the external device, and the accessibility status indicates that the external device is accessible to the wireless modem.

**12**. The wireless modem of claim **10**, wherein the processing system is further arranged to route the data to an available compatible application in the wireless modem, when the routing information indicates the application is located in the external device, and the accessibility status indicates that the external device is not accessible to the wireless modem.

**13**. The wireless modem of claim **10**, wherein the processing system is further arranged to

store the data in the memory, when the routing information indicates the application is located in the external device and that no compatible application is available internal to the wireless modem, and the accessibility

status indicates that the external device is not accessible to the wireless modem.

**14**. The wireless modem of claim **10**, wherein the processing system is further coupled to an external storage element, and wherein the processing system is further arranged to

store the data in the external storage element, when the routing information indicates the application is located in the external device and that no compatible application is available internal to the wireless modem, and the accessibility status indicates that the external device is not accessible to the wireless modem.

**15**. The wireless modem of claim **10**, wherein the processing system is further arranged to

prompt a user of the wireless modem to couple the wireless modem to the external device, when the routing information indicates the application is located in the external device and that no compatible application is available internal to the wireless modem, and the accessibility status indicates that the external device is not accessible to the wireless modem.

**16**. The wireless modem of claim **10**, wherein the processing system is further arranged to

transmit the data to the external device in response to the accessibility status indicating that a previously inaccessible external device for which the data has been stored has become accessible to the wireless modem.

**17**. The wireless modem of claim **10**, wherein the processing system is further arranged to

store the data in one of the memory and an external storage element, when the routing information indicates user control is required for accessing the data by the application.

**18**. The wireless modem of claim **10**, further comprising

a user interface coupled to the processing system for interfacing with a user of the wireless modem, and

wherein the processing system is further arranged to notify the user through the user interface when the data has been routed to storage, so that the user can then control at least one of the wireless modem and the external device to access the data through a compatible application.

* * * * *