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(54) METHOD OF ENABLING THE TRANSMISSION OF DATA IN A WIRELESS COMMUNICATION NETWORK

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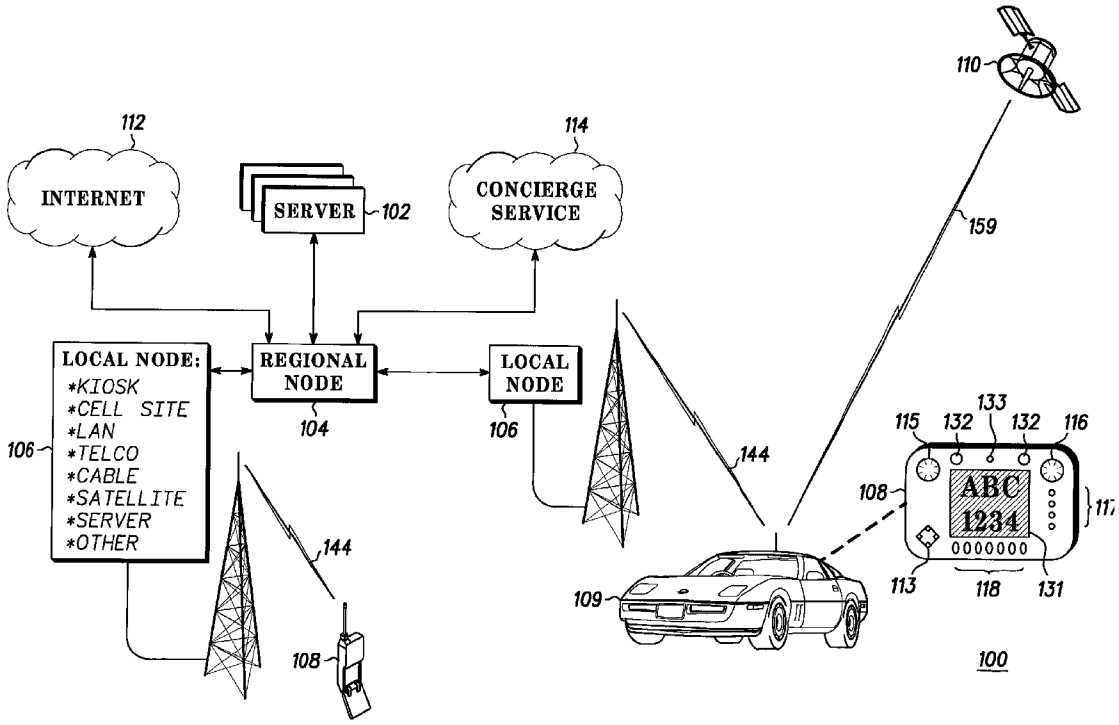
(57) **ABSTRACT**

A method of enabling the transmission of data in a wireless communication network is disclosed. The method comprises the steps of monitoring a plurality of communication interfaces; determining that a communication interface of the plurality of communication interfaces has become available; informing an application that the communication interface has become available; and transmitting data associated with the application on the communication interface.



Samsung v. Four Batons
IPR2025-00494
Exhibit 1007

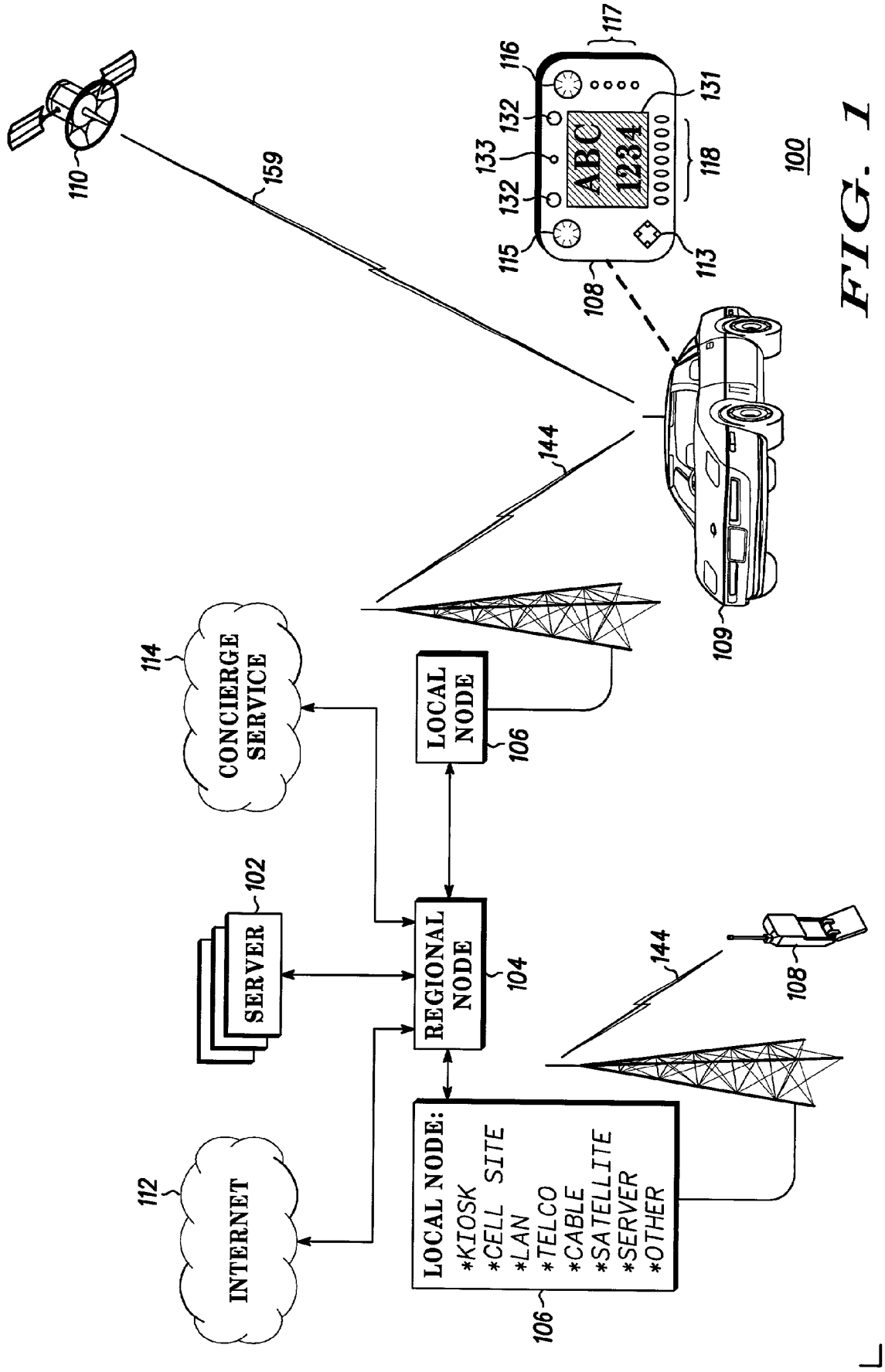

110
159
117
116
132
133
132
115
ABC
1234
131
118
113
108
100
144
109
114
CONCIERGE SERVICE
LOCAL NODE
106
102
SERVER
REGIONAL NODE
104
144
108
112
INTERNET
LOCAL NODE:
*KIOSK
*CELL SITE
*LAN
*TELCO
*CABLE
*SATELLITE
*SERVER
*OTHER
106

FIG. 1

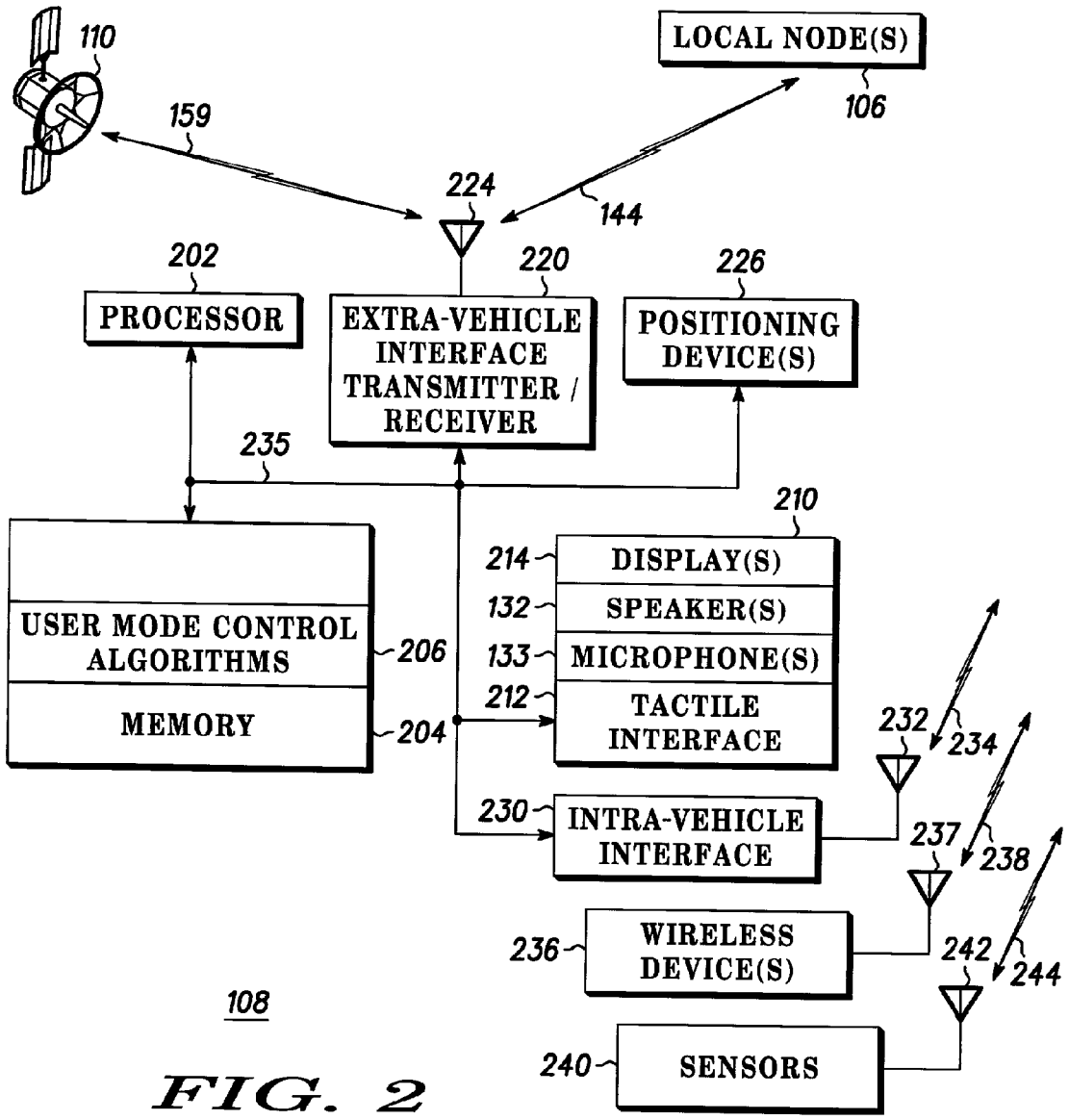

110
159
LOCAL NODE(S)
106
224
144
202
PROCESSOR
220
EXTRA-VEHICLE INTERFACE TRANSMITTER / RECEIVER
226
POSITIONING DEVICE(S)
235
210
USER MODE CONTROL ALGORITHMS
206
MEMORY
204
214
DISPLAY(S)
132
SPEAKER(S)
133
MICROPHONE(S)
212
TACTILE INTERFACE
232
234
230
INTRA-VEHICLE INTERFACE
237
238
236
WIRELESS DEVICE(S)
242
244
108
240
SENSORS

FIG. 2

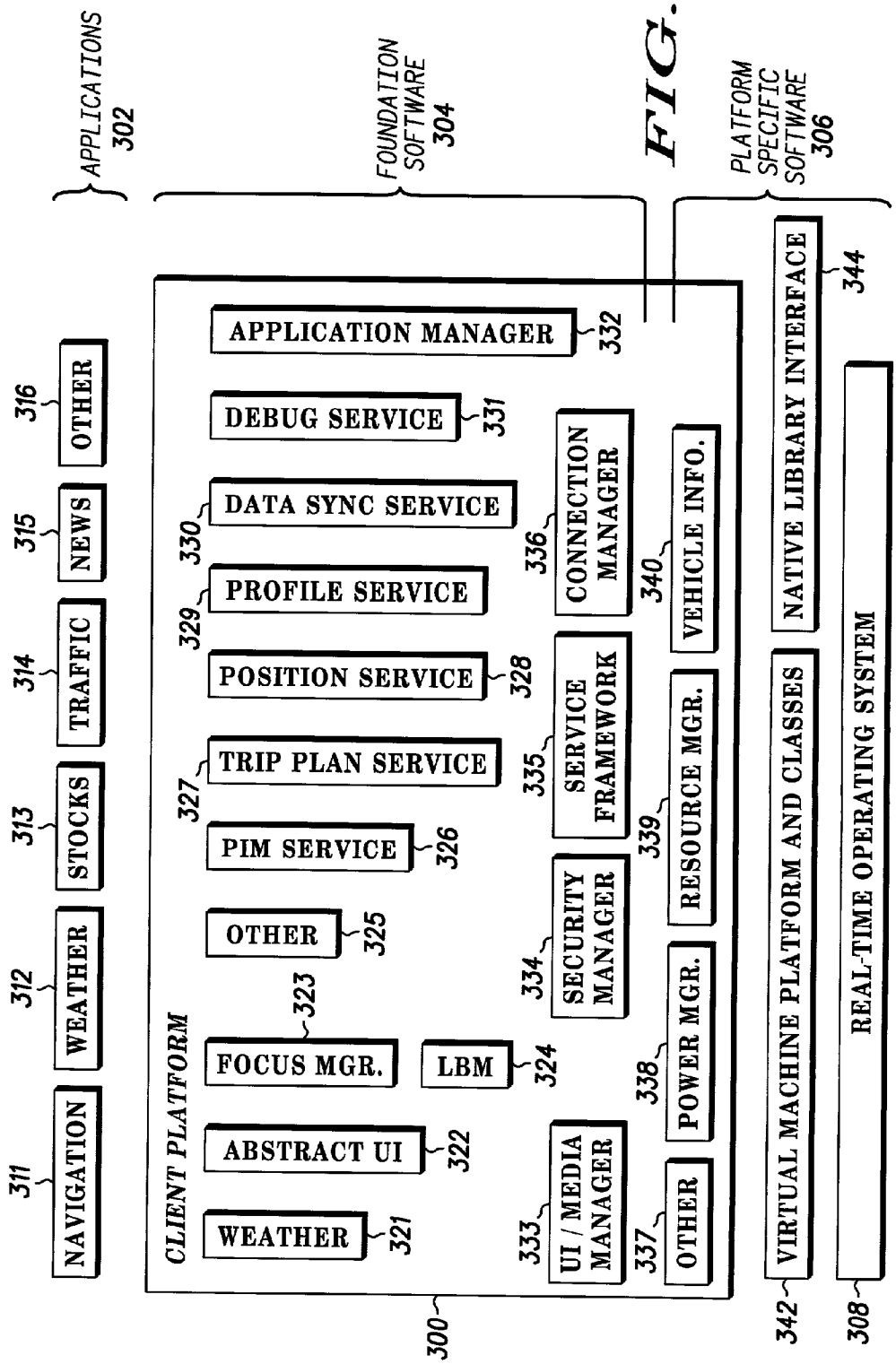

APPLICATIONS
302
FOUNDATION SOFTWARE
304
PLATFORM SPECIFIC SOFTWARE
306
NAVIGATION
311
WEATHER
312
STOCKS
313
TRAFFIC
314
NEWS
315
OTHER
316
CLIENT PLATFORM
300
WEATHER
321
ABSTRACT UI
322
FOCUS MGR.
323
LBM
324
OTHER
325
PIM SERVICE
326
TRIP PLAN SERVICE
327
POSITION SERVICE
328
PROFILE SERVICE
329
DATA SYNC SERVICE
330
DEBUG SERVICE
331
APPLICATION MANAGER
332
UI / MEDIA MANAGER
333
SECURITY MANAGER
334
SERVICE FRAMEWORK
335
CONNECTION MANAGER
336
OTHER
337
POWER MGR.
338
RESOURCE MGR.
339
VEHICLE INFO.
340
VIRTUAL MACHINE PLATFORM AND CLASSES
342
NATIVE LIBRARY INTERFACE
344
REAL-TIME OPERATING SYSTEM
308

FIG. 3

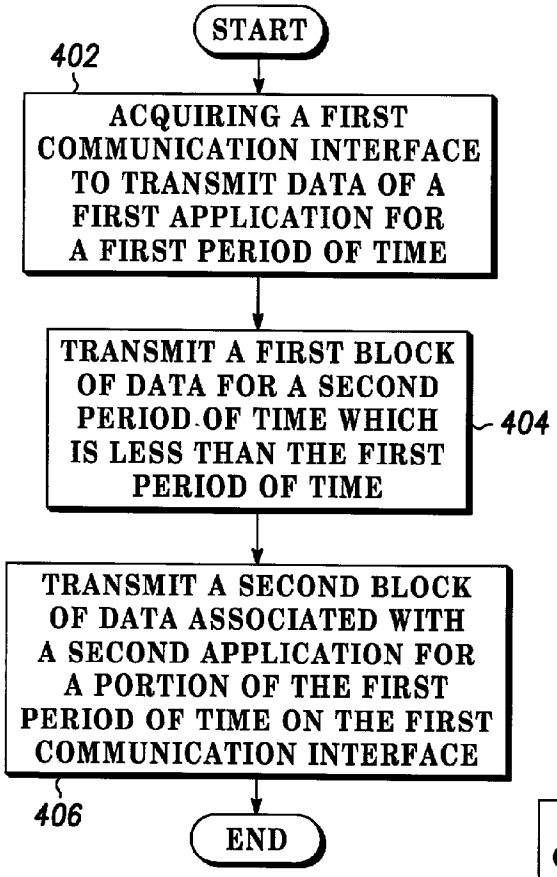

START
402
ACQUIRING A FIRST COMMUNICATION INTERFACE TO TRANSMIT DATA OF A FIRST APPLICATION FOR A FIRST PERIOD OF TIME
TRANSMIT A FIRST BLOCK OF DATA FOR A SECOND PERIOD OF TIME WHICH IS LESS THAN THE FIRST PERIOD OF TIME
404
TRANSMIT A SECOND BLOCK OF DATA ASSOCIATED WITH A SECOND APPLICATION FOR A PORTION OF THE FIRST PERIOD OF TIME ON THE FIRST COMMUNICATION INTERFACE
406
END

FIG. 4

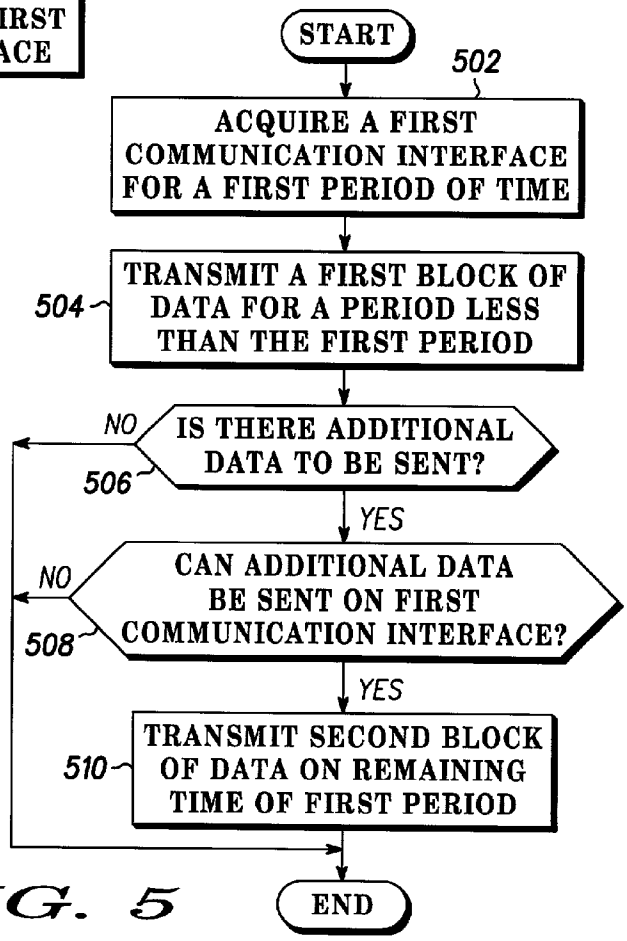

START
502
ACQUIRE A FIRST COMMUNICATION INTERFACE FOR A FIRST PERIOD OF TIME
504
TRANSMIT A FIRST BLOCK OF DATA FOR A PERIOD LESS THAN THE FIRST PERIOD
NO
IS THERE ADDITIONAL DATA TO BE SENT?
506
YES
NO
CAN ADDITIONAL DATA BE SENT ON FIRST COMMUNICATION INTERFACE?
508
YES
510
TRANSMIT SECOND BLOCK OF DATA ON REMAINING TIME OF FIRST PERIOD
END

FIG. 5

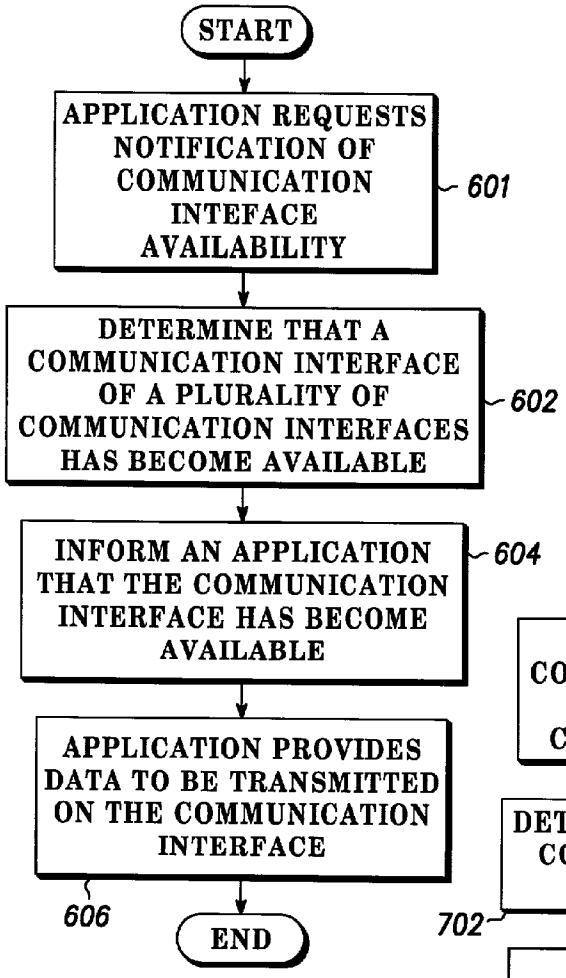

START
APPLICATION REQUESTS NOTIFICATION OF COMMUNICATION INTEFACE AVAILABILITY
601
DETERMINE THAT A COMMUNICATION INTERFACE OF A PLURALITY OF COMMUNICATION INTERFACES HAS BECOME AVAILABLE
602
INFORM AN APPLICATION THAT THE COMMUNICATION INTERFACE HAS BECOME AVAILABLE
604
APPLICATION PROVIDES DATA TO BE TRANSMITTED ON THE COMMUNICATION INTERFACE
606
END

FIG. 6

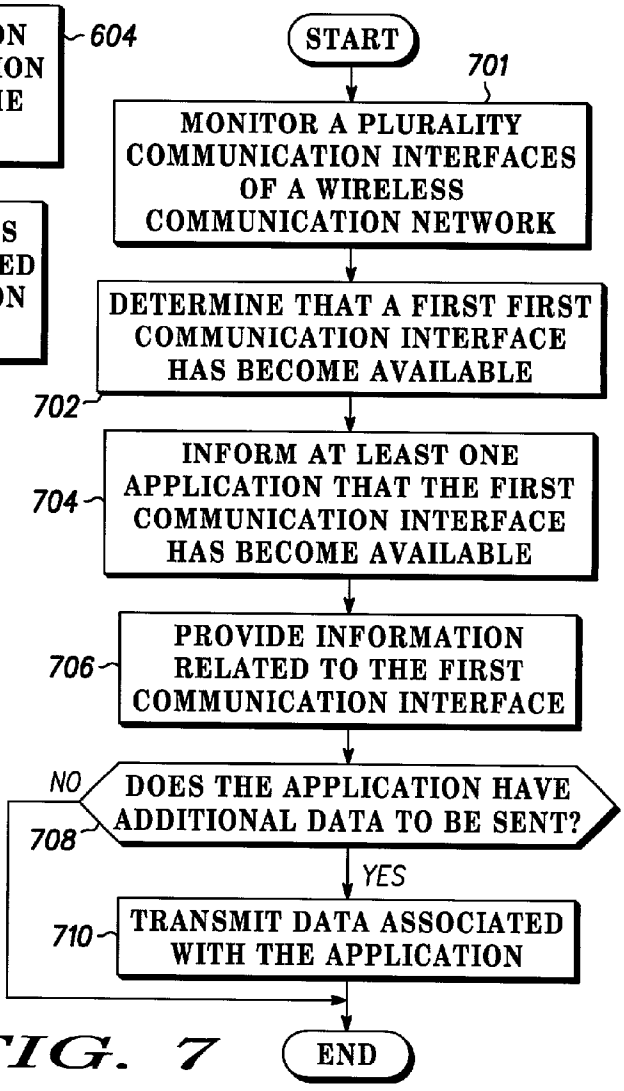

START
701
MONITOR A PLURALITY COMMUNICATION INTERFACES OF A WIRELESS COMMUNICATION NETWORK
DETERMINE THAT A FIRST FIRST COMMUNICATION INTERFACE HAS BECOME AVAILABLE
702
INFORM AT LEAST ONE APPLICATION THAT THE FIRST COMMUNICATION INTERFACE HAS BECOME AVAILABLE
704
PROVIDE INFORMATION RELATED TO THE FIRST COMMUNICATION INTERFACE
706
DOES THE APPLICATION HAVE ADDITIONAL DATA TO BE SENT?
708
NO
YES
TRANSMIT DATA ASSOCIATED WITH THE APPLICATION
710
END

FIG. 7

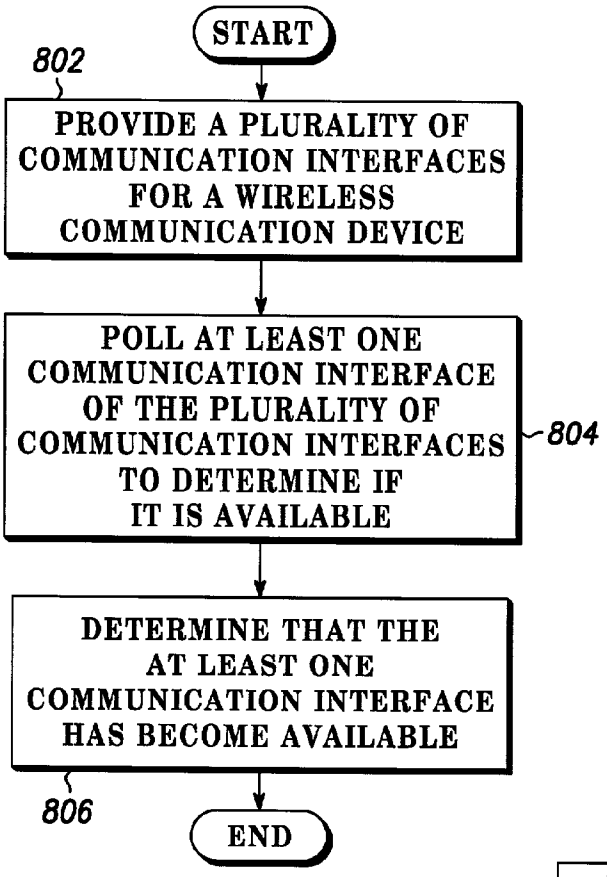

START
802
PROVIDE A PLURALITY OF COMMUNICATION INTERFACES FOR A WIRELESS COMMUNICATION DEVICE
POLL AT LEAST ONE COMMUNICATION INTERFACE OF THE PLURALITY OF COMMUNICATION INTERFACES TO DETERMINE IF IT IS AVAILABLE
804
DETERMINE THAT THE AT LEAST ONE COMMUNICATION INTERFACE HAS BECOME AVAILABLE
806
END

FIG. 8

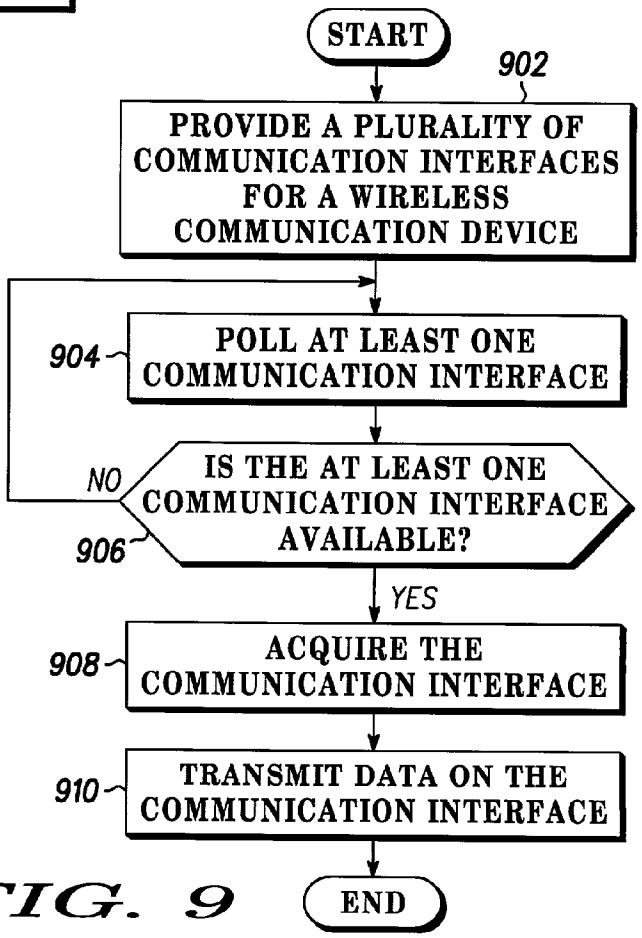

START
902
PROVIDE A PLURALITY OF COMMUNICATION INTERFACES FOR A WIRELESS COMMUNICATION DEVICE
904
POLL AT LEAST ONE COMMUNICATION INTERFACE
NO
IS THE AT LEAST ONE COMMUNICATION INTERFACE AVAILABLE?
906
YES
908
ACQUIRE THE COMMUNICATION INTERFACE
910
TRANSMIT DATA ON THE COMMUNICATION INTERFACE
END

FIG. 9

METHOD OF ENABLING THE TRANSMISSION OF DATA IN A WIRELESS COMMUNICATION NETWORK

RELATED INVENTIONS

[0001] This invention is related to the following inventions which have at least one common inventor, which are assigned to the same assignee as the present invention, and which were filed on the same date:

[0002] U.S. patent application Ser. No. _____ entitled "METHOD OF OPTIMIZING THE TRANSMISSION OF DATA IN A WIRELESS COMMUNICATION NETWORK" (TC00122), and U.S. patent application Ser. No. _____ entitled "METHOD OF SELECTING A COMMUNICATION INTERFACE TO TRANSMIT DATA IN A WIRELESS COMMUNICATION NETWORK" (TC00152).

FIELD OF THE INVENTION

[0003] This invention relates generally to communication systems, and in particular, to a method of enabling the transmission of data in a wireless communication network.

BACKGROUND OF THE INVENTION

[0004] There is an ever increasing demand for wireless communications. Wireless subscribers desire to have access to information at any time and at any place. One of the fastest growing markets for providing wireless services is known as "telematics" and entails delivering a wide spectrum of information via wireless links to vehicle-based subscribers. The information can originate from multiple sources, such as the Internet and other public, private, and/or government computer-based networks; wireless telecommunications such as cellular, Personal Communication Service (PCS), satellite, land-mobile, and the like; terrestrial and satellite direct broadcasts including traditional AM/FM bands, broadband, television, video, geolocation and navigation via a global position system (GPS), and the like; concierge services providing roadside assistance, emergency calling, remote-door unlocking, accident reporting, travel conditions, vehicle security, stolen vehicle recovery, remote vehicle diagnostics, and the like; advertising services identifying names and locations of businesses such as gas stations, restaurants, hotels, stores, and offices, and the like; tourist services such as points of interest, directions, hours of access, and the like; and many other sources that can provide information of any type. Many of the above services are not universally available, but rather they are transient in both the time and geoposition domains.

[0005] Information can be communicated to telematics devices over relatively long wireless links, such as from a satellite or terrestrial node, or from relatively short wireless or wired links, such as from in-vehicle equipment or from hand-held devices like PDAs, portable computers, cellular phones, and the like.

[0006] The services provided by telematics systems are not restricted to vehicle-based subscribers, and they can also be provided to subscribers at home, at work, or elsewhere.

[0007] As telematics communication systems continue to evolve, a telematics communication unit of a vehicle will have a greater number of communication interfaces. As more applications are developed for the transmission of data from a telematics communication unit of a vehicle, the applications enable an increasing amount of data to be transmitted. However, as more applications are vying for communication interfaces to transmit data, it would be useful to inform applications of the availability of a communication interface in the event that the application could use the communication interface to transmit data. Accordingly, there is a need for a method of informing an application that a communication interface is available to enable the transmission of data in a wireless communication device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] **FIG. 1** is a block diagram showing an exemplary information appliance system according to the present invention;

[0009] **FIG. 2** is a block diagram showing a user node of an exemplary information appliance system according to the present invention;

[0010] **FIG. 3** is a block diagram showing the major functional software blocks of a client platform according to the present invention;

[0011] **FIG. 4** is a flow chart showing a method for optimizing the transmission of data in a wireless communication network according to the present invention;

[0012] **FIG. 5** is a flow chart showing a method for optimizing the transmission of data in a wireless communication network according to an alternate embodiment of the present invention;

[0013] **FIG. 6** is a flow chart showing a method for enabling the transmission of data in a wireless communication network according to the present invention;

[0014] **FIG. 7** is a flow chart showing a method for enabling the transmission of data in a wireless communication network according to an alternate embodiment of the present invention;

[0015] **FIG. 8** is a flow chart showing a method of selecting a communication interface to transmit data in a wireless communication network according to the present invention; and

[0016] **FIG. 9** is a flow chart showing a method for selecting a communication interface to transmit data in a wireless communication network according to an alternate embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0017] Turning first to **FIG. 1**, an exemplary information appliance system **100**, according to one embodiment of the invention, is shown. Shown in **FIG. 1** are examples of components of the information appliance system **100**, which comprises a plurality of servers **102** coupled to a regional node **104**, and a plurality of local nodes **106** coupled to the regional node **104**. There can be any number of servers **102**, regional nodes **104**, and local nodes **106** within the information appliance system **100**. The regional node **104** can be coupled to a network, such as the Internet **114**, and to any number of concierge services **112**.

[0018] Servers **102**, while illustrated as coupled to regional node **104**, could be implemented at any hierarchical level(s) within information appliance system **100**. For example, servers **102** could also be implemented within one or more local nodes **106**, concierge service **112**, and Internet **114**. Without limitation, local node **106** can be a kiosk, cell site, local area network (LAN), telephone company, cable company, satellite, or any other information service, structure, or entity that can transmit, receive, and/or communicate information. An information service can be any desired service including, but not limited to, telecommunications, broadband communications, entertainment, television, radio, recorded music, movies, computer-based games, Internet, and other types of public, private, personal, commercial, government, and military communications.

[0019] Local node **106** is coupled to any number of user nodes **108** via wireline or wireless interface means. In the embodiment depicted in **FIG. 1**, user nodes **108** can transmit and receive information using wireless communications means. User nodes **108** without limitation can include a wireless unit such as a cellular or Personal Communication Service (PCS) telephone, a pager, a hand-held computing device such as a personal digital assistant (PDA) or Web appliance, or any other type of communications and/or computing device. Without limitation, one or more user nodes **108** can be contained within, and optionally form an integral part of a vehicle, such as a car **109**, truck, bus, train, aircraft, boat, etc. As indicated above, a user node **108** can also be implemented in a device that can be carried by the user of the information appliance system **100**.

[0020] In one embodiment, a user node **108** comprises an in-vehicle information appliance comprising various human interface (H/I) elements such as a display **131**, a multi-position controller **113**, one or more control knobs **115** and **116**, one or more indicators **117** such as bulbs or light emitting diodes (LEDs), one or more control buttons **118**, one or more speakers **132**, a microphone **133**, and any other H/I elements required by the particular applications to be utilized in conjunction with the information appliance. User nodes **108** can also transmit and/or receive data to and from devices and services other than local node **106**. For example, user nodes **108** can transmit and receive data to and from a satellite **110**.

[0021] The information appliance system **100** including the user nodes **108** is preferably capable of utilizing audio data in any number of encoding methods from any number of sources that include, but are not limited to, ADPCM (adaptive differential pulse-code modulation); CD-DA (compact disc-digital audio) digital audio specification; and ITU (International Telecommunications Union) Standards G.711,G.722,G.723 & G.728. The information appliance system **100** including the user nodes **108** is also preferably capable of utilizing video data in any number of encoding methods from any number of sources that include, but are not limited to, ITU Standards H.261 & H.263; Motion JPEG (Joint Photographic Experts Group); and MPEG-1, MPEG-2 and MPEG-4 (Motion Picture Experts Group) standards. Finally, the information appliance system **100** is preferably capable of utilizing audio and video data in any number of formats and using any type of transport technology that include, but are not limited to, USB (Universal Serial Bus); IEEE (Institute of Electrical and Electronics Engineers) Standards 1394-1995; and IEEE 802.11; and using protocols such as HTTP (hypertext transfer protocol); TCP/IP (transmission control protocol/Internet protocol); and UDP/IP (user datagram protocol/Internet protocol).

[0022] **FIG. 2** depicts an exemplary user node **108** of the information appliance system **100**. As indicated above, user node **108** can without limitation be located within or be an integral part of any vehicle. As shown in **FIG. 2**, the user node **108** comprises a processor **202** with associated user node memory **204**. User node memory **204** can include, but is not limited to, random access memory (RAM), read only memory (ROM), flash memory, and other memory such as a hard disk, floppy disk, and/or other appropriate type of memory. User node memory **204** also preferably comprises user node control algorithms **206**. User node **108** can initiate and perform communications with other nodes shown in **FIG. 1** in accordance with suitable computer programs, such as user node control algorithms **206**, stored in user node memory **204**.

[0023] User node **108** also comprises a user interface device **210** that can include without limitation a tactile interface **212**, microphone **133**, speakers **132**, any number of displays **214**, and the like. Extra-vehicle interface **220**, typically implemented as a communication interface having a transmitter/receiver for transmitting and receiving communications via a wireless link **144** among the various nodes depicted in **FIG. 1**, also facilitates communications among other devices via wireless link **159**, for example, satellite **110**, and the like. Communications are transmitted and received through one or more antennas **224** of any type, which can include any one or combination of a fixed, steerable, omni-directional, or phased array antenna. Steerable antenna can include, but is not limited to, an electronically steerable antenna, physically steerable antenna, and the like. User node **108** can also include positioning devices **226** of any type, for example, global positioning system (GPS), gyroscope, compass, accelerometer, altimeter, rate sensors, and other positioning devices that can define the position, attitude, and/or motion vector of the user node **108**.

[0024] User node **108** can also comprise an intra-vehicle interface **230**, which can include antenna **232**. Intra-vehicle interface **230** also acts as a communication interface and can include multiple types of transceivers (not shown) and antennas **232** to implement different short-range wireless protocols, such as Bluetooth™, IEEE wireless local area network (LAN) standard 802.11, and infrared via wireless link **234**. Intra-vehicle interface **230** is capable of short-range wireless communications with other wireless devices **236** and sensors **240** of any type, for example, wireless telephones, computers, pagers, PDA's, entertainment devices, printers, fax machines, wireless local networks such as Bluetooth™, vehicle sensors, vehicle actuators, vehicle displays, and the like. It should be noted that the wireless devices **236** also provide communication interfaces. In addition, intra-vehicle interface **230** can be used to communicate with wireless devices that are physically outside the vehicle but close to the vehicle, such as a service station kiosk. One or more wireless devices **236** can comprise one or more antennas such as antenna **237** and communicate via wireless link **238**. One or more sensors **240** can comprise one or more antennas such as antenna **242** and communicate via wireless link **244**. In one embodiment, the various components and systems in **FIG. 2** can communicate with each other via a wireline link **235**, for example, a power/data/control bus,

and the like. In another embodiment, some of the various components and systems in **FIG. 2** could communicate via a wireless link.

[**0025**] Turning now to **FIG. 3** major functional software blocks of a client platform **300** in accordance with one embodiment of the invention are shown. Architecturally, the user node **108** comprises a software-based client platform **300** that supports a wide range of applications and services. This provides great flexibility and allows the user platform's feature set to be readily expanded or updated after the user node **108** has been deployed into its intended market.

[**0026**] These software blocks are computer program modules comprising computer instructions, such as user node control algorithms **206**, that are stored in a computer-readable medium such as user node memory **204**. These software modules are merely representative of one embodiment of the invention. In other embodiments, additional modules could be provided as needed, and/or unneeded modules could be deleted.

[**0027**] The software blocks include the following modules, each of which is briefly summarized below according to its reference numeral in **FIG. 3**. The client platform software comprises three general layers: applications **302**, foundation software **304** upon which the applications **302** are supported, and platform-specific software **306**. In one embodiment, the upper two layers are implemented in the Java™ programming language, available from various suppliers, including Sun Microsystems, Inc., Palo Alto, Calif. One advantage of the Java™ programming language is the support of code distribution in a platform-independent manner.

[**0028**] The lowest layer, i.e. the platform-specific software **306**, comprises a real-time operating system **308**, a virtual machine platform (such as the Java™ 2 Virtual Machine, available from Sun Microsystems, Inc.) and associated classes **342**, and a native library interface **344**.

[**0029**] Referring to **FIG. 3**, applications **302** can comprise an extremely wide variety of informational, safety, query, communications, entertainment, and other applications, for example navigation **311**, weather **312**, stocks **313**, traffic **314**, news **315**, and others **316** of any type. As used herein, an "application" is defined as any computer program that provides one or more functions that are of interest to a user of the information appliance system **100**.

[**0030**] Foundation software **304**, in one embodiment, comprises the following modules, each of which will now be discussed.

[**0031**] Selector module **321** launches and controls applications selected by the user. It is user-configurable.

[**0032**] Abstract user interface (UI) **322** supports a wide variety of input/output (I/O) functions that enable the user to interact with the user device.

[**0033**] Focus manager **323** enforces priority-based access to UI and media resources. Focus manager **323** also controls interactions between synchronous applications and asynchronous notifications and alerts.

[**0034**] Logical button manager (LBM) **324** allows an application to map logical buttons to actual physical buttons on a user device. It allows physical buttons to be referenced by logical names. It manages different sets of buttons, such as preset buttons, application buttons, and so on.

[**0035**] Personal information manager (PIM) service **326** supports functions to enhance user productivity, such as an address book, a calendar, a memo management capability, and so forth. The address book can comprise information that is up-loaded from a PDA, entered by voice or by keys from the user, downloaded from the Internet, and so forth.

[**0036**] Trip plan service **327** provides a variety of trip-planning functions, such as route and map retrieval, route-planning, determination of route distance, etc.

[**0037**] Position service **328** provides abstract positioning application programming interfaces (API) to support a variety of position-determining mechanisms, such as GPS, differential GPS, in-road transmitters, cellular base stations, etc.

[**0038**] Profile service **329** provides server-based profiles for users, devices, vehicles, etc. It assists in the application configuration. It can also ensure that user profiles are portable from one user vehicle to another.

[**0039**] Data sync service **330** synchronizes one or more databases on client platform **200** with counterpart databases on a server platform.

[**0040**] Debug service **331** provides debug functions to isolate, examine, and correct errors in the operation of the software residing on the client platform **200**.

[**0041**] Application manager **332** controls the installation and updating of applications, including security attributes of the applications.

[**0042**] User interface manager/media manager **333** manages the user interface, e.g. what entities can access what portions of a display screen (in the case of the user interface manager), and manages all aspects of audio and video functions, e.g. radio, voice-recognition, sound clips, etc. (in the case of the media manager).

[**0043**] Security manager **334** provides permission and policy restraints within the client platform **300**.

[**0044**] Service framework **335**, to which the current invention pertains, is responsible for locating, connecting, and controlling services required by applications **302** and other services. Additional description of the service framework **335** is provided elsewhere herein.

[**0045**] Other modules **325** can also be provided within the foundation software **304** of the client platform **300**, depending upon the functional requirements of the client platform **300**.

[**0046**] Platform specific software **306**, in one embodiment, comprises the following modules, each of which will now be discussed.

[**0047**] Power manager **338** provides power status change events to applications, such as "power on", "power off", "sleep/accessory mode", etc. It can enforce a low-power mode in emergency situations, reserving power to the highest priority functions. It can also monitor power consumption to identify elements that may be consuming unreasonable amounts of power.

[0048] Resource manager **339** manages priority-based access to system resources, such as a processor, threads being processed, memory elements, and persistent storage. The resource manager **339** can ensure the required resources to support an emergency call by halting or suspending lower priority applications.

[0049] Vehicle information **340** provides information to support primarily mission-critical vehicular functions. It comprises information to control certain in-vehicle functions, such as remote door unlock. It comprises status information from the in-vehicle system, e.g. vehicular speed. It also can comprise information derived from integrated vehicle components, such as global positioning information from an in-vehicle GPS system.

[0050] Other modules **337** can also be provided within the platform specific software **306** of the client platform **300**, depending upon the functional requirements of the client platform **300**. Additional information regarding client platform **300** as well as a service platform can be found in co-pending U.S. application Ser. No. 09/662,441, (TC00033) entitled "Service Framework with Hidden Services", filed on Sep. 15, 2000 and having a common inventor as the inventor of the present application, which application is incorporated in its entirety by reference.

[0051] Finally, connection manager **336** manages connection(s) of the client platform **300** to one or more networks, such as geographically distributed cellular and server networks. It ensures continuity of sessions across physical and/or logical network interfaces. It can require security (e.g. authentication, encryption, etc.) as a precondition to a connection. It can ensure that low bandwidth connections are used efficiently. More specifically, the connection manager manages multiple interfaces and reports concurrent use of more than one interface, either by the same or different applications. The connection manager also enables an interface to be used for both streams and datagrams at the same time. In particular, the transport layer enables the flow of data between two hosts for an application. Streams are transmitted by the connection oriented transmission control protocol (TCP) which enables the reliable flow between two hosts by dividing data into blocks and receiving acknowledgments when the data is received. In contrast, datagrams are transmitted by the less reliable user datagram protocol (UDP), which is also well known in the art.

[0052] Turning now to **FIG. 4, a** flow chart shows a method of optimizing the transmission of data in a wireless communication network according to the present invention. In particular, a first communication interface to transmit data of a first application is acquired for a first period of time at a step **402**. The first communication interface could be any wireless communication interface, such as a cellular, satellite, land mobile, paging, or other wireless communication device provided by extra-vehicular interface transmitter/receiver **220** or intra-vehicle interface **230** of **FIG. 2**. The user node **108** of the vehicle could acquire the first communication interface for a predetermined time, such as a predetermined number of minutes. The user node **108** of the vehicle then transmits a first block of data for a second period of time which is less than the first period of time at a step **404**. That is, the user node **108** transmits data associated with a first application on the first communication interface for a period of time which is less than the first period of time for which it acquired the communication interface. The wireless communication device of the vehicle then transmits a second block of data associated with a second application for a portion of a first period of time on the first communication interface at a step **406**. Accordingly, the remaining portion of the first period of time which is not used for transmitting data related to a first application can be used to transmit data related to a second application.

[0053] Turning now to **FIG. 5, a** flow chart shows a method for optimizing the transmission of data in a wireless communication network according to an alternate embodiment of the present invention. A first communication interface is acquired for a first period of time at a step **502**. The first communication interface could be provided by any wireless communication interface associated with the user node **108** described in reference to **FIG. 2**. For example, the communication interface could enable wireless communications on any cellular, paging, satellite or other wireless communication network. A first block of data associated with a first application is transmitted on the first communication interface for a period of time less than the first period of time at a step **504**. It is then determined whether additional data associated with a second application is available to be sent at a step **506**. If there is additional data associated with a second application to be sent, it is then determined whether the additional data can be sent on the first communication interface at a step **508**. That is, assuming that the user node **108** is within range of the wireless communication network associated with the communication interfaces, it is determined whether the available bandwidth, latency, bit rate, error rate, cost or other channel parameters are acceptable to transmit data associated with the second application. If the additional data can be sent, a block of data is associated with the second application transmitted on the remaining time of the first period of time at a step **510**.

[0054] The method of **FIGS. 4 and 5** finds particular application when capacity on a wireless communication is sold in a block of time, such as a predetermined number of minutes. Because the user has already been charged for the entire first period of time, any use of the remaining portion of time is financially beneficial to the subscriber of the telematics communication services having the user node **108**. Although the cost of transmitting data on the first communication interface may be greater than the desired cost associated with the second application, it is still financially beneficial to utilize the remaining portion of the first period of time on the first communication interface to transmit data for the second application. Preferably, the transmission of data on the second application would be "billed" or allocated to the second application at the normal or desired rate for the second application, which may be less than the normal rate for the first communication interface.

[0055] Turning now to **FIG. 6, a** flow chart shows a method of enabling transmission of data in a wireless communication network according to the present invention. In particular, an application, such as one of the applications described in reference to **FIG. 3**, requests notification of the availability of a communication interface at a step **601**. For example, an application of **FIG. 3** could request that the connection manager **336** notify it when a communication interface meeting certain criteria becomes available. The communication interface could be any communication interface described in reference to **FIG. 2**. It should be noted that

the applications may have varying requirements which could be met by different interfaces, while a number of different communication interfaces may be acceptable for a given application.

[0056] It is determined that a communication interface of a plurality of communication interfaces has become available at a step **602**. An application is then informed that a desirable communication interface has become available at a step **604**. The application then provides data to be transmitted on the communication interface at a step **606**. Accordingly, an application is informed of the availability of a communication interface and can determine whether it desires to make data available for transmission when a particular communication interface is available.

[0057] Turning now to **FIG. 7, a** method for enabling the transmission of data in a wireless communication network according to an alternate embodiment of the present invention is shown. A plurality of communication interfaces of a wireless communication device are monitored at a step **701**. It is then determined whether a first communication interface has become available at a step **702**. At least one application is then informed, for example, by the connection manager **336**, that the first communication interface has become available at a step **704**. Information related to the first communication interface is then provided to the application at a step **706**. For example, information related to the characteristics of the communication interface are provided to the application to enable the application to determine whether the communication interface is acceptable for transmitting data. Alternatively, the application could be informed that a particular communication interface is available only if the communication interface is known to be acceptable for the application.

[0058] It is then determined whether an application has data to be sent at a step **708**. If the application has additional data to be sent and the first communication interface is appropriate for the application, the application provides the data to be transmitted by the communication interface at a step **710**. Accordingly, by informing the application that a particular communication interface is available, an application can determine whether it is desirable to transmit data on the available communication interface.

[0059] Turning now to **FIG. 8, a** flow chart shows a method of selecting a communication interface to transmit data in a wireless communication network according to the present invention. In particular, a plurality of communication interfaces, such as the communication interface related to user node **108** and described in reference to **FIG. 2**, are provided for a wireless communication device, such as user node **108**, at a step **802**. At least one communication interface of the plurality of communication interfaces is polled by an application, such as an application described in reference to **FIG. 3**, to determine if it is available at a step **804**. It is then determined that the at least one communication interface has become available at a step **806**. By enabling the application to poll the communication interfaces, the application can acquire a desirable communication interface to transmit data according to the present invention.

[0060] Turning now to **FIG. 9, a** flow chart shows a method for selecting a communication interface to transmit data in a wireless communication network according to an alternate embodiment of the present invention. In particular, a plurality of communication interfaces, such as the communication interfaces related to user node **108** and described in reference to **FIG. 2**, are provided for a wireless communication device, such as user node **108**, at a step **902**. At least one communication interface is then polled by an application, such as an application described in reference to **FIG. 3**, at a step **904**. It is then determined whether the at least one communication interface is available at a step **906**. For example, assuming that the wireless communication device is within range of the communication network associated with an acceptable communication interface, it is determined whether the communication interface is already in use by another application. If the at least one communication interface is available, the at least one communication interface is acquired at a step **908** and data is transmitted on the communication interface at a step **910**.

[0061] It can therefore be appreciated that a new and novel method of enalbing the transmission of data in a wireless communication network has been described. It will be appreciated by those skilled in the art that, given the teaching herein, numerous alternatives and equivalent will be seen to exist which incorporate the disclosed invention. As a result, the invention is not to be limited by the foregoing exemplary embodiments, but only by the following claims.

We claim:

1. A method of enabling the transmission of data in a wireless communication network, said method comprising the steps of:

monitoring a plurality of communication interfaces;

determining that a communication interface of said plurality of communication interfaces has become available;

informing an application that said communication interface has become available; and

transmitting data associated with said application on said communication interface.

2. The method of claim 1 wherein said step of monitoring a plurality of communication interfaces comprises monitoring a plurality of communication interfaces of a telematics communication device.

3. The method of claim 1 wherein said step of determining that a communication interface of said plurality of communication interfaces has become available comprises determining that said communication interface is not transmitting data for a second application.

4. The method of claim 1 further comprising a step of determining that said communication interface meets criteria set by said application.

5. The method of claim 1 further comprising a step of providing information related to said communication interface to said application.

6. The method of claim 5 wherein said step of providing information related to said communication interface comprises providing operating characteristics of said communication interface.

7. The method of claim 1 further comprising a step of receiving a query from a second application.

8. The method of claim 7 wherein said step of receiving a query from a second application comprises receiving a request to transmit data on a second communication interface.

9. The method of claim 8 further comprising a step of concurrently transmitting data associated with said second application on said second communication interface.

10. A method of enabling the transmission of data in a wireless communication network, said method comprising the steps of:

monitoring a plurality of communication interfaces of a wireless communication device associated with a vehicle;

detecting that a communication interface of said plurality of communication interfaces has become available;

determining that said communication interface meets criteria set by an application;

informing said application that said communication interface has become available; and

transmitting data associated with said application on said communication interface.

11. A method of enabling the transmission of data in a wireless communication network, said method comprising the steps of:

detecting that a communication interface of said plurality of communication interfaces has become available;

determining that said communication interface meets criteria set by an application;

informing said application that said communication interface has become available; and

transmitting data associated with said application on said communication interface.

12. The method of claim 11 further comprising a step of monitoring said plurality of communication interfaces of a telematics communication device.

13. The method of claim 11 wherein said step of detecting that a communication interface of said plurality of communication interfaces has become available comprises determining that said communication interface is not transmitting data for a second application.

14. The method of claim 11 wherein said step of determining that said communication interface meets criteria set by said application comprises determining that said communication interface meets cost criteria.

15. The method of claim 11 further comprising a step of providing information related to said communication interface to said application.

16. The method of claim 15 wherein said step of providing information related to said communication interface comprises providing operating characteristics of said communication interface.

17. The method of claim 11 further comprising a step of receiving a query from a second application.

18. The method of claim 17 wherein said step of receiving a query comprises receiving a request to transmit data on a second communication interface.

19. The method of claim 18 further comprising a step of concurrently transmitting data associated with said second application on said second communication interface.

20. A method of enabling the transmission of data in a wireless communication network, said method comprising the steps of:

detecting that a communication interface of said plurality of communication interfaces of a telematics communication unit has become available;

determining that said communication interface meets criteria set by said application;

informing an application that said communication interface has become available;

providing operating characteristics related to said communication interface; and

transmitting data associated with said application on a first communication.

21. A method of enabling the transmission of data in a wireless communication network, said method comprising the steps of:

monitoring a plurality of communication interfaces in a wireless communication device associated with a vehicle;

detecting that a communication interface of said plurality of communication interfaces has become available;

determining that said communication interface meets criteria set by an application;

informing said application that said communication interface has become available;

providing information related to said communication interface to said application;

transmitting data associated with said application on said first communication interface; and

concurrently transmitting data associated with a second application on said second communication interface.

22. The method of claim 21 wherein said step of determining comprises determining that said communication interface is not transmitting data associated with a second application.

23. The method of claim 21 wherein said step of providing information related to said communication interface comprises providing operating characteristics of said communication interface.

24. The method of claim 21 further comprising a step of receiving a query from a second application.

25. The method of claim 24 wherein said step of receiving a query comprises receiving a request to transmit data on a second communication interface.

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