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Remarks:
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(54) Method and apparatus for dynamically changing the monitoring of a cellular data connection

(57) A method and apparatus for changing monitoring of a cellular data connection at a mobile device, the method checking, using a processor at the mobile device, whether the mobile device is connected to both the cellular data connection and an alternative data connection; and if yes, extending the slot cycle or suspending monitoring of a slot for the cellular data connection at the mobile device.

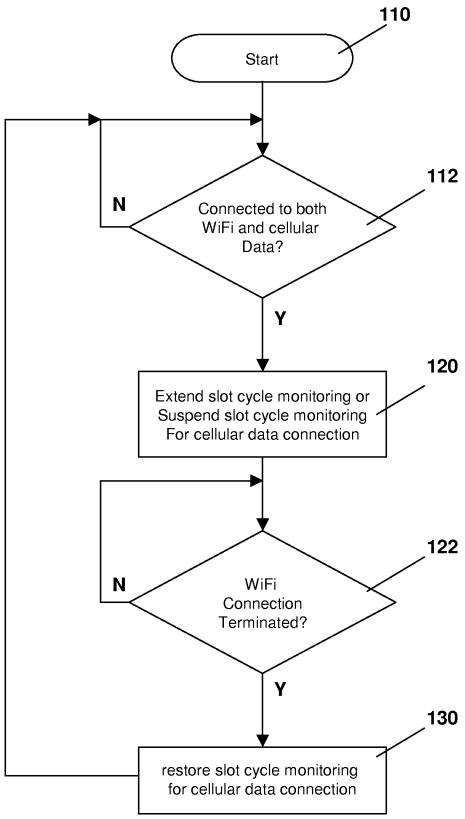


Figure 1

EP 2 288 226 A1

Description

FIELD OF THE APPLICATION

[0001] The present application relates to a mobile device capable of communicating both over a cellular data connection and over an alternative data connection.

BACKGROUND

[0002] Mobile devices are increasingly becoming capable of communicating with various networks. This includes communication over cellular networks or over data networks such as WiFi or WiMAX. Further, some cellular networks include separate voice and data connections.

[0003] For example, the CDMA 1 x/EVDO mobile system is a hybrid system that has evolved from the CDMA2000 system. EVDO stands for Evolution Data Only or Data Optimized and as suggested by this, is a data only system. EVDO systems generally allow a high transfer rate for data. Further, with a 1XEVDO System operating in hybrid mode, it is possible to receive circuit switched services, such as voice calls, even during an active data session in the EVDO System.

[0004] An always-on mobile device typically establishes and maintains a data connection over the cellular system to keep an Internet Protocol (IP) address for the mobile device, thereby permitting receipt of data quickly when data becomes available. In order to maintain the data connection and monitor for data, a frame or paging slot is designated between the network and the mobile device, which the mobile device monitors. The number of slots or frames between monitored slots or frames is the slot cycle.

SUMMARY

[0005] The present disclosure provides a method for changing monitoring of a cellular data connection at a mobile device comprising: checking, using a processor at the mobile device, whether the mobile device is connected to both the cellular data connection and an alternative data connection; and if yes, extending the slot cycle or suspending monitoring of a slot for the cellular data connection at the mobile device.

[0006] The present disclosure further provides a mobile device configured to changing a slot cycle for a cellular data connection comprising: a cellular communications subsystem; an alternative data communications subsystem; and a processor, the processor, cellular communications subsystem and alternative data communications subsystem cooperating to: check whether the mobile device is connected to both the cellular data connection and an alternative data connection; and if yes, extend the slot cycle or suspend monitoring of a slot for the cellular data connection at the mobile device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The present method and apparatus will be better understood with reference to the drawings in which:

FIGURE 1 is a flow diagram showing a method for suspending or extending a slot cycle;
FIGURE 2 is a flow diagram showing an alternative method in which an application or service on the device may require a cellular data connection;
FIGURE 3 is a block diagram showing an exemplary EVDO hybrid network;
and
FIGURE 4 is a block diagram of an exemplary mobile device that can be used in accordance with the present application.

DETAILED DESCRIPTION OF THE DRAWINGS

[0008] The present disclosure is described below with regard to the EVDO data only network. However, this is not meant to be limiting and the present disclosure could be used with any other data only cellular connection. An example of such an alternative connection could, for example, include an EDGE network. The present disclosure could further be used, for example, with a Long Term Evolution (LTE) or Long Term Evolution Advanced (LTE-A) network. Other examples of applicable networks would be known to those skilled in the art.

[0009] A data cellular connection such as EVDO requires the monitoring of a paging channel slot for Always On applications such as email. In EVDO, the monitoring may, for example, occur every 5.12 seconds.

[0010] When a mobile device is capable of connecting to an alternative data network or data source then there may be no need to monitor the EVDO paging channel or the monitoring of the EVDO paging channel could be extended. For example, a device that can connect to both a WiFi access point and to the EVDO network may prefer to use the WiFi connection. The monitoring of the EVDO channel in this case becomes redundant, and the use of the radio to monitor the paging channel unnecessarily uses the battery of the mobile device, and further the use of the paging channel wastes network resources.

[0011] While the alternative data connection above is described herein as a WiFi connection connected through an access point, other alternative data connections are possible. For example, other data connections include, but are not limited to, WiMAX, a tethered connection if the device is connected through a USB port on a computer, a short range communication such as Bluetooth or short range infrared such as an IrDA connection. As will be appreciated by those skilled in the art, if communication occurs over USB, Bluetooth or IrDA, the device will need to register with a network to receive data through the computer connection. The present disclosure is not meant to be limited to any particular alternative data connection.

[0012] In an example, whenever a device is in WiFi coverage and has an IP over WiFi connection resulting in connectivity with a server for an Always On application, the device can then reduce the effect of the battery drain by either not monitoring the EVDO channel at all or extending the EVDO cycle slot to much larger value then the typical 5.12 seconds. For example, the EVDO slots likely can be extended to 40 seconds or more.

[0013] As will be appreciated, if the WiFi connection is terminated or without a WiFi connection and EVDO only, the device will need to monitor the EVDO in regular slot cycles for always on applications as the device may receive incoming packets from the server.

[0014] Reference is now made to **Figure 1, Figure 1** illustrates a flow diagram for a process in accordance with the present disclosure. The process of **Figure 1** starts at block **110** and proceeds to block **112** in which a check is made to determine whether or not the device is connected to both a cellular data connection and an alternative data connection such as WiFi. If not, the process continues to loop to block **112** in which a check is made to determine whether there is both a WiFi and cellular data connection.

[0015] From block **112,** if both a WiFi and cellular data connection exists, the process proceeds to block **120** in which the slot cycle for the cellular data connection is either extended or the monitoring of the slot for the cellular data connection is suspended.

[0016] As will be appreciated by those skilled in the art, the extension of the slot cycle may be accomplished in various ways. In one example, the mobile device may send a request to a network element asking the network element to extend the slot cycle. In this way, the mobile device and the network element are synchronized with regard to communications through slots on the data connection. The request may be sent over either the cellular data connection or the alternative data connection.

[0017] The process then proceeds to block **122** in which a check is made to determine whether the data connection (such as the WiFi connection) has been terminated. If no, the process loops back to block **122** to continue to determine whether or not the WiFi connection has been terminated.

[0018] From block **122,** if the WiFi connection has been terminated, the process proceeds to block **130** in which the cellular data connection slot cycle monitoring is restored.

[0019] From block **130** the process loops to block **112** in which a check is made to determine whether both WiFi and the cellular data connections exist.

[0020] As seen from **Figure 1,** if the WiFi and the EVDO or other cellular data connection is established, the process allows the mobile device to either extend the monitoring of the slot cycle for the cellular data connection or to suspend the monitoring of the paging slot for the cellular data connection until the WiFi connection is dropped.

[0021] While the process of **Figure 1** provides a general solution, in some cases, services may require a connection over the cellular data connection. One such service is VCast™ for Verizon™, which requires connection over a cellular data connection such as EVDO.

[0022] Reference is now made to **Figure 2. Figure 2** shows an alternative embodiment in which an application or service needs a cellular data connection.

[0023] Specifically, the process starts at block **210** and proceeds to block **212** in which a check is made to determine whether or not both the WiFi and the cellular data connections are established. If no, the process loops back to block **212** and waits for both the WiFi and cellular data connections to be established.

[0024] Once both WiFi and cellular data are established, the process proceeds to block **220** in which a check is made to determine whether an application or service on the mobile device needs the cellular data connection. If yes, the process proceeds to block **212** and continues to loop between block **212** and **220** until either one of the WiFi or cellular data connection is dropped or until the application or service no longer needs the cellular data connection.

[0025] As will be appreciated by those skilled in the art, the check of block **220** may involve the use of a linger timer to ensure that an application requiring the cellular data connection is truly finished. This ensures that if an application requests cellular data immediately after indicating it is finished the cellular data transaction, the radio software entity can avoid having to ping pong between a long or suspended state and regular slot cycle monitoring.

[0026] Thus, in block **220,** the linger timer may be utilized in situations where the cellular data slot cycle has not been extended while waiting for an application to finish with the cellular data connection.

[0027] If, in block **220,** it is determined that the application does not need a cellular data connection, the process proceeds to block **222** in which the cellular data connection slot cycle monitoring is either extended or suspended.

[0028] From block **222,** the process proceeds to block **230** in which a check is made to determine whether an application or service needs the cellular data connection. As will be appreciated, in some cases, an application may be started after the slot cycle has either been extended for the cellular data connection or the monitoring of the slot for the data connection has been suspended in block **222.** In this case, block **230** catches the starting of the application or service that needs the cellular data connection.

[0029] If it is determined in block **230** that an application or service needs a cellular data connection, the process proceeds to block **240** and restores the cellular data connection . From block **240,** the process proceeds back to block **212** to determine whether or not the connection exists for both the WiFi and the cellular data connection.

[0030] From block **230,** if an application or service does not need the cellular data connection, the process pro-

ceeds to block **232** in which a check is made to determine whether or not the WiFi connection has been terminated. If no, the process proceeds back to block **230.**

[0031] From block **232,** if the check determines that the WiFi connection has been terminated, the process proceeds to block **240** and the monitoring of the slot cycle is restored for the cellular data connection.

[0032] As indicated above, from block **240,** the process proceeds to block **212** to continue to check whether or not a connection exists to both the WiFi and the cellular data network.

[0033] The above therefore provides for the extending of a cellular data slot cycle or the suspension of the monitoring of the cellular data slot in the case where an alternative data connection besides a cellular data connection exists. The alternative data connection is described above as WiFi. However this is not limiting and other alternative data connections such as those described above may be utilized. Thus, for example, if the mobile device is capable of receiving data over a Bluetooth connection, the methods of **Figures 1** or **2** could be implemented over Bluetooth rather than WiFi.

[0034] Reference is now made to **Figure 3. Figure 3** is a block diagram of an exemplary wireless data network in accordance with the present disclosure and with which the various embodiments of the method of the instant disclosure may cooperate. **Figure 3** shows a block diagram of a mobile device **310** and exemplary CDMA 1 x network **320,** an exemplary EVDO network **330,** a public switched telephone network (PSTN) **335,** a data network **340,** wireless gateway **342** and e-mail server **344.** The mobile device **310** is typically a two-way communication device having data and voice communication capabilities. Figure 3 further shows an access point **470** for use with an alternative data connection such as a WiFi connection.

[0035] CDMA network **320** is comprised of a base transceiver station (BTS) **322** and a base station controller (BSC) **324.** Base station controller **324** communicates with a mobile switching centre **326** which, as will be appreciated, is a circuit switched only component communicating with PSTN **335.** Base station controller **324** further communicates with a packet data serving node (PDSN) **328** which is a packet switched only component. PDSN **328** further communicates with IP network **340.**

[0036] EVDO network **330** contains an EVDO sector **332** which communicates with access node (AN) **334.** Since the EVDO network **330** is a data only network, access node **334** communicates only with PDSN **328** and not with any circuit switch components.

[0037] An authentication, authorization and accounting node **336** is associated with AN **334,** and a similar node **329** is associated with PDSN **328.**

[0038] Operationally, mobile device **310** communicates wirelessly with CDMA network **320** using BTS **322** and BSC **324** to gain access to the CDMA 1 x network.

[0039] Mobile device **310** sends and receives both data and voice services through CDMA network **320** until an EVDO network connection with established. Base station controller **324** communicates with circuit switched services provided by MSC **326** such as voice and short message service (SMS) via PSTN **335.**

[0040] Prior to an EVDO connection being established, mobile device **310** further communicates wirelessly with BTS **322** and BSC **324** to gain access to packet data services provided by PDSN **328,** such as e-mail, wireless application protocol (WAP) and other data services via data network **340.** Such services are provided through wireless gateway **342** and servers such as e-mail server **344.**

[0041] Once a network connection is established with CDMA 1x network **320** and the mobile device enters CDMA 1 x idle state, wireless device **310** establishes a connection with EVDO network **330.** This is done through EVDO sector **332** and AN **334.** In this way, mobile device **310** gains access to packet data services provided by PDSN **328** using EVDO network **330.** Subsequent to the establishment of an EVDO network connection with mobile device **310,** CDMA network **320** is used to provide circuit switched services such as voice and SMS while EVDO network **330** is used to provide packet data services such as e-mail and WAP.

[0042] As will be appreciated by those skilled in the art, wireless device **310** can include voice communication means such as a headpiece **352** or a user can communicate directly into the wireless device **310.**

[0043] Further, due to high transfer rates associated with EVDO networks, wireless device **310** can be used as a wireless modem and be connected through various means such as a USB or other serial port, or by short range wireless communications with a computer **354.** Computer **354** can then gain access to data network **340** through EVDO network **330** using mobile device 310 as the modem.

[0044] Mobile device **310** may further have capabilities to communicate through access point **470** using, for example, WiFi. Access point **470** connects to a data network **340** and thus access to wireless gateway **342** and email server **344** are possible through access point **470.**

[0045] Reference is now made to **Figure 4. Figure 4** is a block diagram illustrating a mobile device capable of being used with various embodiments of the present disclosure. Mobile device **400** is generally a two-way wireless communication device having at least voice and data communication capabilities. Mobile device **400** may have the capability to communicate with other computer systems on the Internet. Depending on the exact functionality provided, the mobile device may be referred to as a data messaging device, a two-way pager, a wireless e-mail device, a cellular telephone with data messaging capabilities, a wireless Internet appliance, or a data communication device, as examples.

[0046] Where mobile device **400** is enabled for two-way communication, it will generally incorporate a communication subsystem **411,** including both a receiver **412** and a transmitter **414,** as well as associated components

such as one or more, preferably embedded or internal, antenna elements **416** and **418,** local oscillators (LOs) **413,** and a processing module such as a digital signal processor (DSP) **420.** As will be apparent to those skilled in the field of communications, the particular design of the communication subsystem **411** will be dependent upon the communication network in which the device is intended to operate. For example, mobile device **400** may include a communication subsystem **411** designed to operate within the CDMA 1x/EVDO hybrid system.

[0047] Network access requirements will also vary depending upon the type of network **419.** In some CDMA networks network access is associated with a subscriber or user of mobile device **400.** A CDMA mobile device may require a removable user identity module (RUIM) or a subscriber identity module (SIM) card in order to operate on a CDMA network. The SIM/RUIM interface **444** is normally similar to a card-slot into which a SIM/RUIM card can be inserted and ejected like a diskette or PCMCIA card. The SIM/RUIM card can have memory and hold key configuration **451,** and other information **453** such as identification, and subscriber related information.

[0048] When required network registration or activation procedures have been completed, mobile device **400** may send and receive communication signals over the network **419.** As illustrated in **Figure 4,** network **19** can consist of multiple base stations communicating with the mobile device. For example, in a hybrid CDMA 1x EVDO system, a CDMA base station and an EVDO base station communicate with the mobile device and the mobile device is connected to both simultaneously. The EVDO and CDMA 1x base stations use different paging slots to communicate with the mobile device.

[0049] Signals received by antenna **416** through communication network **419** are input to receiver **412,** which may perform such common receiver functions as signal amplification, frequency down conversion, filtering, channel selection and the like, and in the example system shown in **Figure 3,** analog to digital (A/D) conversion. A/D conversion of a received signal allows more complex communication functions such as demodulation and decoding to be performed in the DSP **420.** In a similar manner, signals to be transmitted are processed, including modulation and encoding for example, by DSP **420** and input to transmitter **414** for digital to analog conversion, frequency up conversion, filtering, amplification and transmission over the communication network **419** via antenna **418.** DSP **420** not only processes communication signals, but also provides for receiver and transmitter control. For example, the gains applied to communication signals in receiver **412** and transmitter **414** may be adaptively controlled through automatic gain control algorithms implemented in DSP **420.**

[0050] Mobile device **400** typically includes a processor or microprocessor **438** which controls the overall operation of the device. Communication functions, including at least data and voice communications, are performed through communication subsystem **411.** Processor or microprocessor **438** also interacts with further device subsystems such as the display **422,** flash memory **424,** random access memory (RAM) **426,** auxiliary input/output (I/O) subsystems **428,** serial port **430,** two or more keyboards or keypads **432,** speaker **434,** microphone **436,** other communication subsystem **440** such as a short-range communications subsystem or WiFi or WiMax communications and any other device subsystems generally designated as **442.** If other communications **440** are WiFi or WiMAX, the communications utilize a communication subsystem such as communication subsystem **411** to communicate with an access point **470.** Processor **438** could execute code to suspend or extend a slot cycle for a cellular data connection.

[0051] Some of the subsystems shown in **Figure 4** perform communication-related functions, whereas other subsystems may provide "resident" or on-device functions. Notably, some subsystems, such as keyboard **432** and display **422,** for example, may be used for both communication-related functions, such as entering a text message for transmission over a communication network, and device-resident functions such as a calculator or task list.

[0052] Operating system software used by the microprocessor **438** may be stored in a persistent store such as flash memory **424,** which may instead be a read-only memory (ROM) or similar storage element (not shown). Those skilled in the art will appreciate that the operating system, specific device applications, or parts thereof, may be temporarily loaded into a volatile memory such as RAM **426.** Received communication signals may also be stored in RAM **426.**

[0053] As shown, flash memory **424** can be segregated into different areas for both computer programs **458** and program data storage **450, 452, 454** and **456.** These different storage types indicate that each program can allocate a portion of flash memory **424** for their own data storage requirements. Microprocessor **438,** in addition to its operating system functions, may enable execution of software applications on the mobile device. A predetermined set of applications that control basic operations, including data and voice communication applications for example, can be installed on mobile device **400** during manufacturing.

[0054] One software application may be a personal information manager (PIM) application having the ability to organize and manage data items relating to the user of the mobile device such as, but not limited to, e-mail, calendar events, voice mails, appointments, and task items. One or more memory stores may be available on the mobile device to facilitate storage of PIM data items. Such PIM application may have the ability to send and receive data items, via the wireless network **419.** In one embodiment, the PIM data items are seamlessly integrated, synchronized and updated, via the wireless network **419** or access point **470,** with the mobile device user's corresponding data items stored or associated with a host computer system. Further applications may also be

loaded onto the mobile device **400** through the network **419** or access point **470,** an auxiliary I/O subsystem **428,** serial port **430,** short-range communications subsystem **440** or any other suitable subsystem **442,** and installed by a user in the RAM **426** or a non-volatile store (not shown) for execution by the microprocessor **438.** Such flexibility in application installation increases the functionality of the device and may provide enhanced on-device functions, communication-related functions, or both. For example, secure communication applications may enable electronic commerce functions and other such financial transactions to be performed using the mobile device **400.**

[0055] In a data communication mode, a received signal such as a text message or web page download is processed by the communication subsystem **411** and input to the microprocessor **438,** which then further processes the received signal for output to the display **422,** or alternatively to an auxiliary I/O device **428.** A user of mobile device **400** may also compose data items such as email messages for example, using the keyboard **432,** may be a complete alphanumeric keyboard or telephone-type keypad, in conjunction with the display **422** and possibly an auxiliary I/O device **428.** Such composed items may then be transmitted over a communication network through the communication subsystem **411.**

[0056] For voice communications, overall operation of mobile device **400** is similar, except that received signals would be generally output to a speaker **434** and signals for transmission would be generated by a microphone **436.** Alternative voice or audio I/O subsystems, such as a voice message recording subsystem, may also be implemented on mobile device **400.** Although voice or audio signal output is usually accomplished primarily through the speaker **434,** display **422** may also be used to provide an indication of the identity of a calling party, the duration of a voice call, or other voice call related information for example.

[0057] Serial port **430** in **Figure 4,** may be implemented in a personal digital assistant (PDA)-type mobile device for which synchronization with a user's desktop computer (not shown). Such a port **430** would enable a user to set preferences through an external device or software application and would extend the capabilities of mobile device **400** by providing for information or software downloads to mobile device **400** other than through a wireless communication network. The alternate download path may for example be used to load an encryption key onto the device through a direct and thus reliable and trusted connection to thereby enable secure device communication. As will be appreciated by those skilled in the art, serial port **430** can further be used to connect the mobile device to a computer to act as a modem. A modem unit **460** interacts with a driver **462** in a computer **464** to allow data transfer through the mobile device. With EVDO networks, a high rate of data transfer can be achieved using the mobile device **400** as the modem.

[0058] Other communications subsystems **440,** such as a short-range communications subsystem, is a further optional component which may provide for communication between mobile device **400** and different systems or devices, which need not necessarily be similar devices. For example, the subsystem **440** may include an infrared device and associated circuits and components or a Bluetooth™ communication module to provide for communication with similarly enabled systems and devices.

[0059] Thus, mobile device **400** could implement the process of **Figure 1** or **2.** For example, in one embodiment processor **438** could check whether the mobile is connected with a cellular data connection utilizing communications subsystem **411** and could further check whether an alternative data connection exists, for example utilizing other communications block **440,** modem unit **460,** auxiliary I/O **428,** serial port **430** or other device subsystems **442.** The communications subsystem **411** and processor **438** could be used to extend the slot cycle or a receiver of communications subsystem **411** could be turned off to suspend monitoring of the slot if the alternative data connection exists.

[0060] The embodiments described herein are examples of structures, systems or methods having elements corresponding to elements of the techniques of this application. This written description may enable those skilled in the art to make and use embodiments having alternative elements that likewise correspond to the elements of the techniques of this application. The intended scope of the techniques of this application thus includes other structures, systems or methods that do not differ from the techniques of this application as described herein, and further includes other structures, systems or methods with insubstantial differences from the techniques of this application as described herein.

Claims

1. A method for changing monitoring of a cellular data connection at a mobile device comprising:

   checking, using a processor at the mobile device, whether the mobile device is connected to both the cellular data connection and an alternative data connection; and
   if yes, extending the slot cycle or suspending monitoring of a slot for the cellular data connection at the mobile device.

2. The method of claim 1, wherein the extending is performed based on a request to a network element to extend the slot cycle.

3. The method of claim 1, wherein the cellular data connection is an Evolution Data Only connection.

4. The method of claim 1, wherein the alternative data connection is a wireless fidelity or WiMAX connec-

tion.

5. The method of claim 1, further comprising:

monitoring whether the alternative data connection has been terminated, and if yes, restoring the slot cycle or monitoring of the slot for the cellular data connection.

6. The method of claim 1, further comprising, prior to the extending or suspending, determining whether a service or application on the mobile device requires the cellular data connection, and if yes blocking the extending or suspending.

7. The method of claim 6, wherein the determining whether a service or application requires the cellular data connection uses a linger timer to ensure the service or application are finished with the cellular data connection.

8. The method of claim 1, further comprising determining whether a service or application on the mobile device requires the cellular data connection, and if yes restoring the slot cycle or monitoring of the slot for the cellular data connection.

9. A mobile device configured to changing a slot cycle for a cellular data connection comprising:

a cellular communications subsystem;
an alternative data communications subsystem; and
a processor,
the processor, cellular communications subsystem and alternative data communications subsystem cooperating to perform the method of any one of claims 1 to 8.

10. A tangible compute readable medium storing a program code which when executed by a processor of a computing device causes said computing device to perform the method of any one of claims 1 to 8.

Amended claims in accordance with Rule 137(2) EPC.

1. A method for changing monitoring of a paging slot for a cellular data connection at a mobile device (310, 400) comprising:

checking, using a processor (420) at the mobile device (310, 400), whether the mobile device (310,400) is connected to both the cellular data connection and an alternative data connection;
if yes, determining whether a service or application on the mobile device (310, 400) requires the cellular data connection; and
if no service or application requires the cellular data connection, extending a number of slots between monitored slots or suspending monitoring of the paging slot for the cellular data connection at the mobile device (310, 400).

2. The method of claim 1, wherein the extending is performed based on a request to a network element to extend the number of slots between monitored slots.

3. The method of claim 1, wherein the cellular data connection is an Evolution Data Only connection.

4. The method of claim 1, wherein the alternative data connection is a wireless fidelity or WiMAX connection.

5. The method of claim 1, further comprising:

monitoring whether the alternative data connection has been terminated, and if yes, restoring the number of slots between monitored slots or monitoring of the paging slot for the cellular data connection.

6. The method of claim 1, wherein the determining whether a service or application requires the cellular data connection uses a linger timer to ensure the service or application are finished with the cellular data connection.

7. The method of claim 1, further comprising determining whether a service or application on the mobile device requires the cellular data connection, and if yes restoring the number of slots between monitored slots or monitoring of the paging slot for the cellular data connection.

8. A mobile device (310, 400) configured to changing a number of slots between monitored slots for a cellular data connection comprising:

a cellular communications subsystem;
an alternative data communications subsystem; and
a processor (420),
the processor (420), cellular communications subsystem and alternative data communications subsystem cooperating to perform the method of any one of claims 1 to 7.

9. A tangible compute readable medium storing a program code which when executed by a processor (420) of a computing device causes said computing device to perform the method of any one of claims 1 to 7.

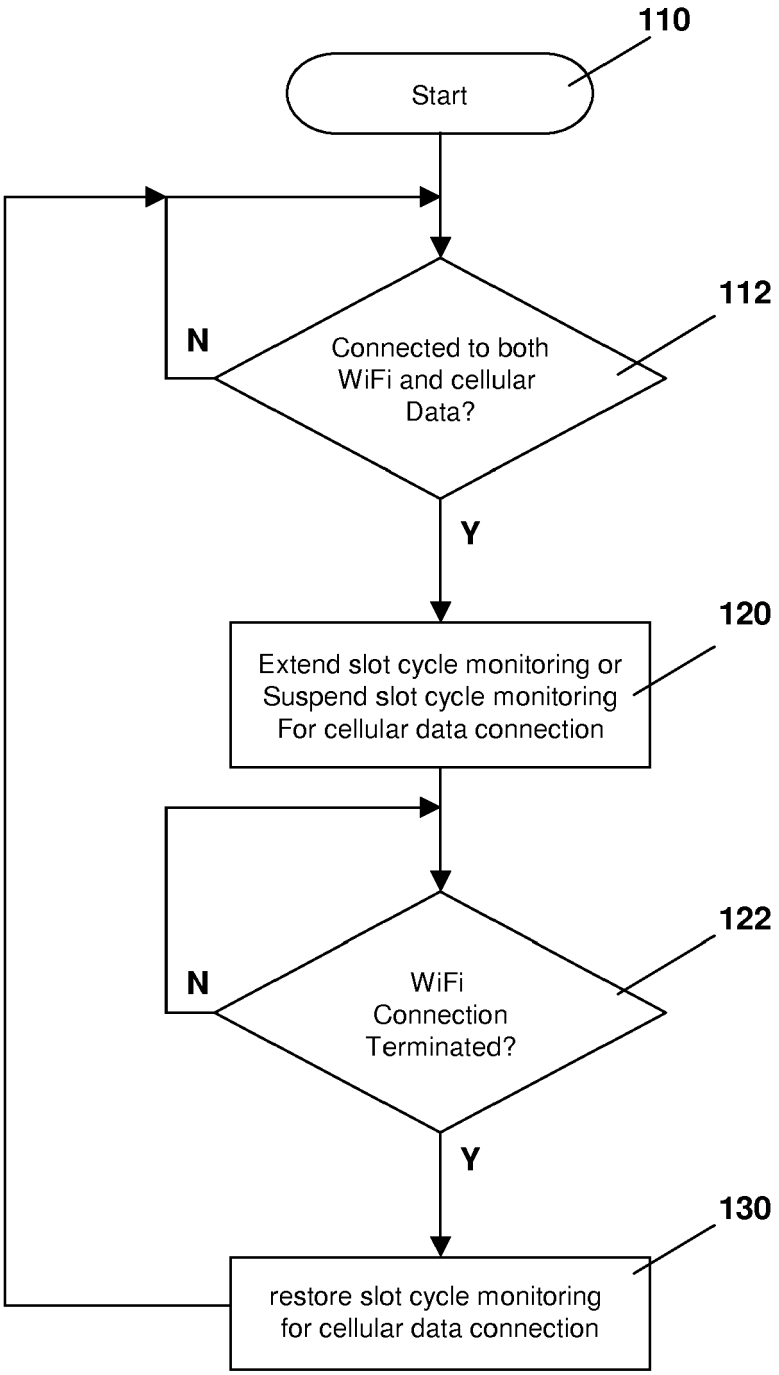

110
Start
112
Connected to both WiFi and cellular Data?
N
Y
120
Extend slot cycle monitoring or Suspend slot cycle monitoring For cellular data connection
122
WiFi Connection Terminated?
N
Y
130
restore slot cycle monitoring for cellular data connection

Figure 1

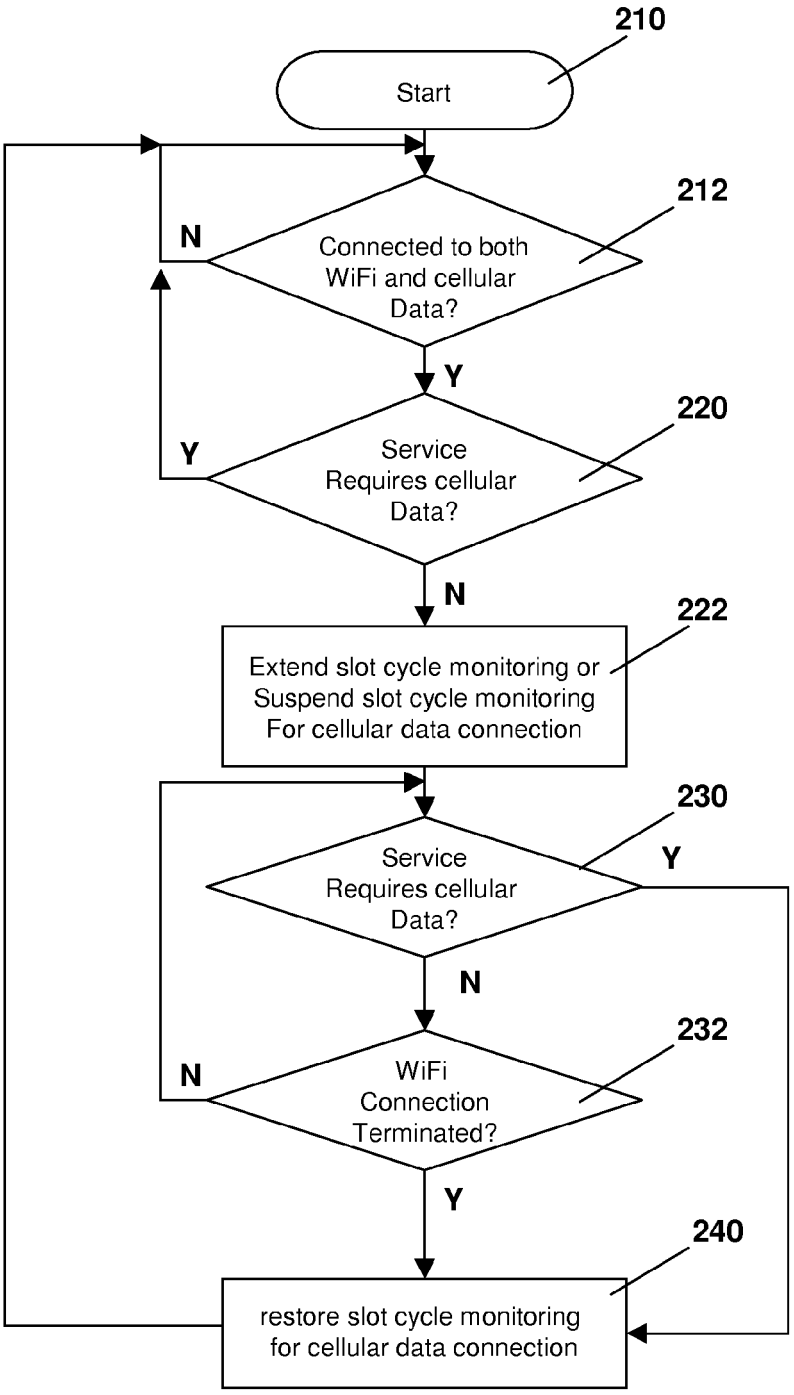

210
Start
212
Connected to both WiFi and cellular Data?
N
Y
220
Service Requires cellular Data?
Y
N
222
Extend slot cycle monitoring or Suspend slot cycle monitoring For cellular data connection
230
Service Requires cellular Data?
Y
N
232
WiFi Connection Terminated?
N
Y
240
restore slot cycle monitoring for cellular data connection

Figure 2

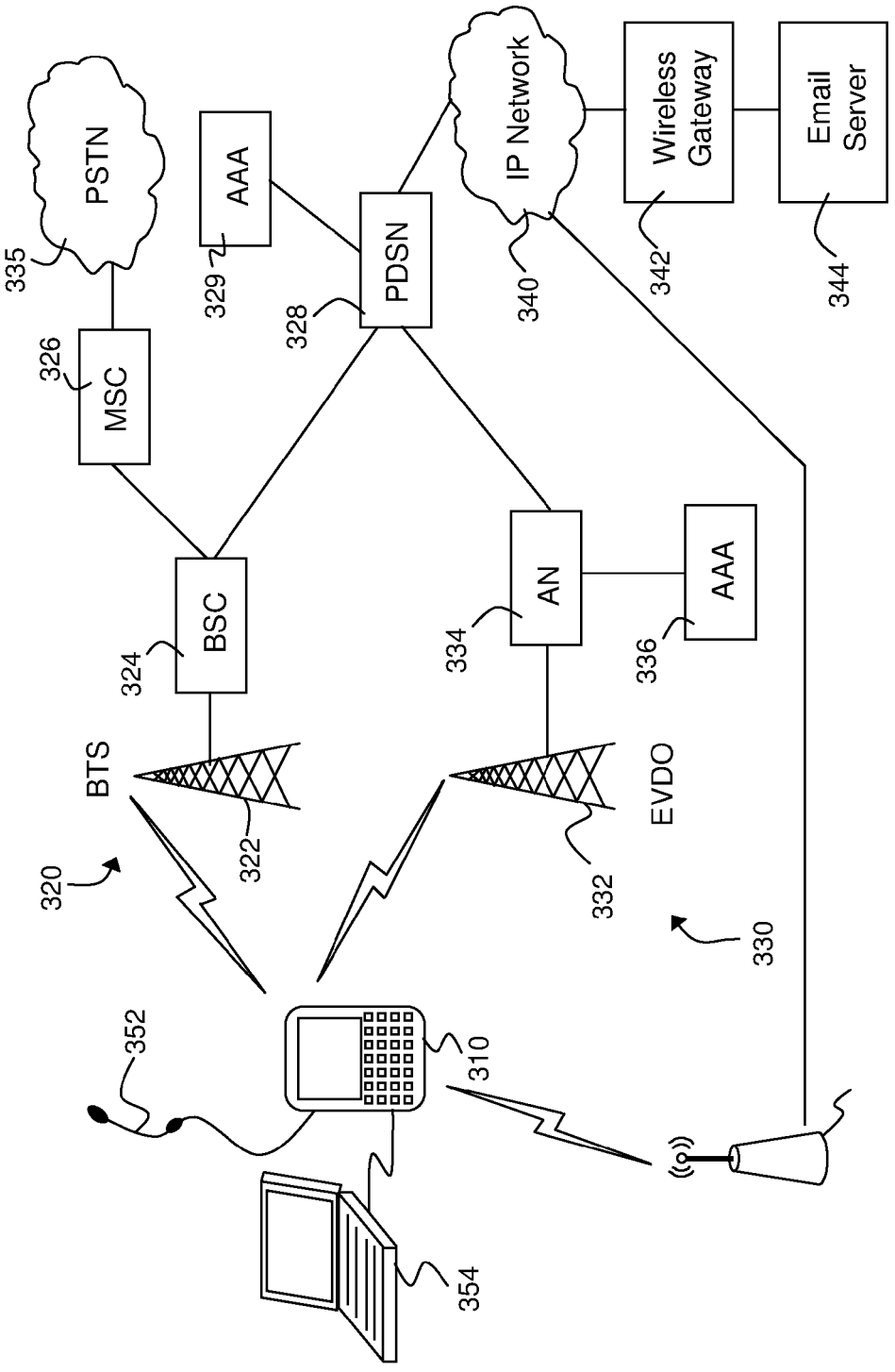
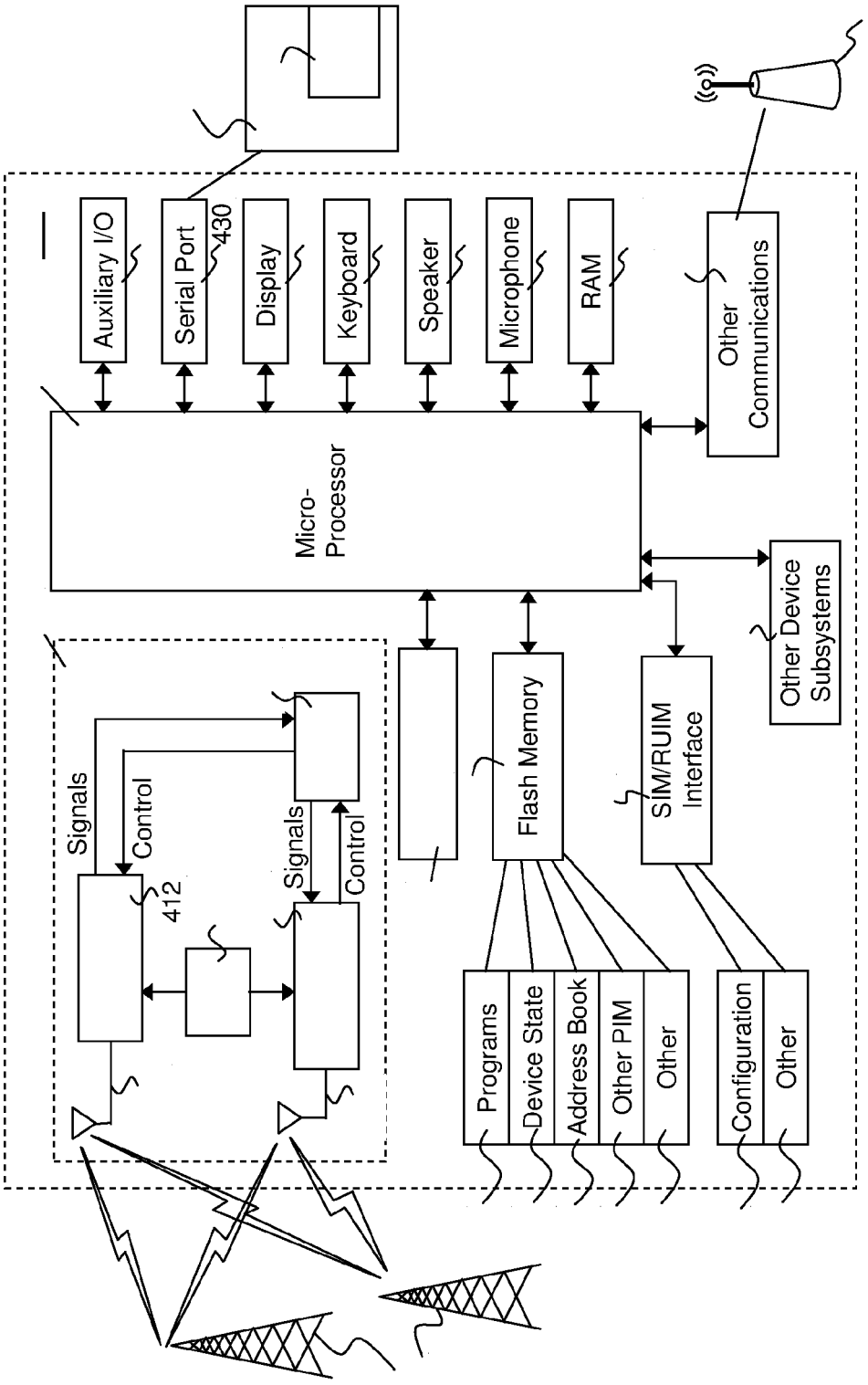

PSTN
335
AAA
329
PDSN
328
IP Network
340
Wireless Gateway
342
Email Server
344
MSC
326
BSC
324
AN
334
AAA
336
BTS
322
EVDO
332
320
330
352
310
354

FIG. 3


Auxiliary I/O
Serial Port
430
Display
Keyboard
Speaker
Microphone
RAM
Other Communications
Micro-Processor
Other Device Subsystems
Flash Memory
SIM/RUIM Interface
Signals
Control
412
Signals
Control
Programs
Device State
Address Book
Other PIM
Other
Configuration
Other

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Application Number
EP 10 15 9760

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

H04W

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	21 July 2010	Zembery, Peter

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		WO 2008063993 A1	29-05-2008
US 2009059826 A1	05-03-2009	NONE	

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