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(54) **DEVICE, SYSTEM, COMPUTER READABLE MEDIUM AND METHOD FOR PROVIDING STATUS INFORMATION OF DEVICES IN A SHORT DISTANCE WIRELESS NETWORK**

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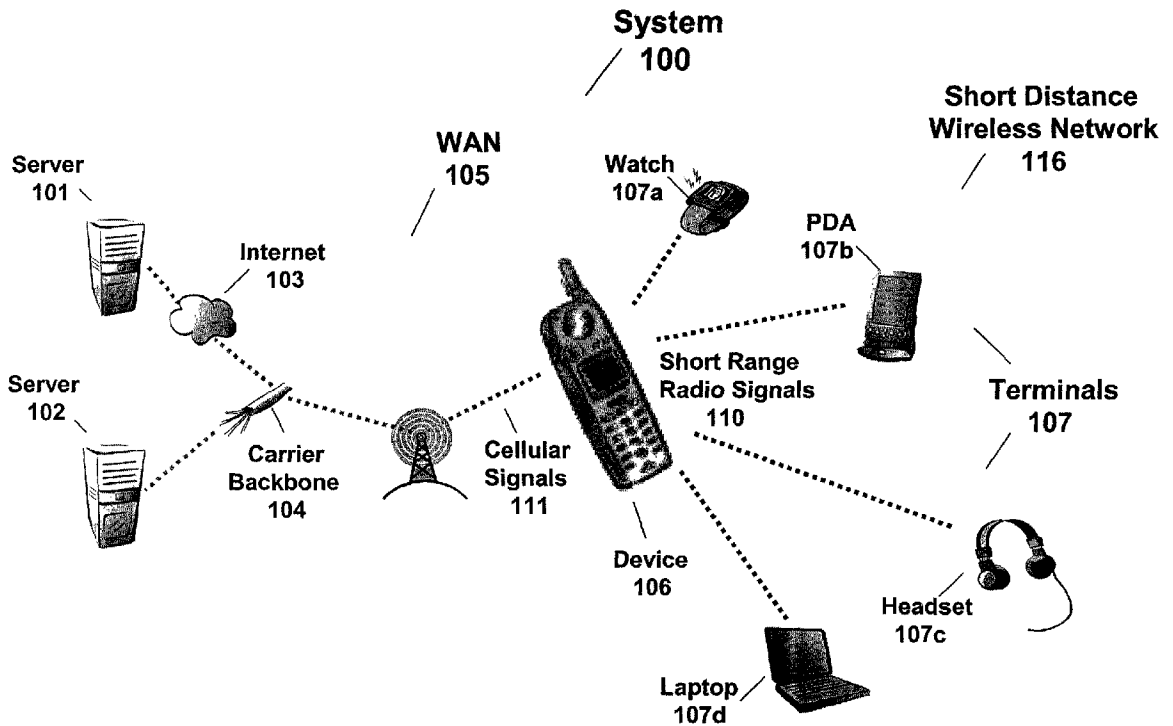
(57)   **ABSTRACT**

A device, a system, a computer readable medium and a method provide status information of a device and/or devices in a short distance wireless network in an embodiment of the present invention. Status information, such as the quality of the received signal and/or available battery power of each device in the short distance wireless network is provided to a device having a display according to an embodiment of the present invention. Status information may be selectively displayed in an easily viewable and preferable type in an embodiment of the present invention.

System
100

Short Distance
Wireless Network
116

WAN
105

Watch
107a

PDA
107b

Server
101

Internet
103

Server
102

Carrier
Backbone
104

Cellular
Signals
111

Short Range
Radio Signals
110

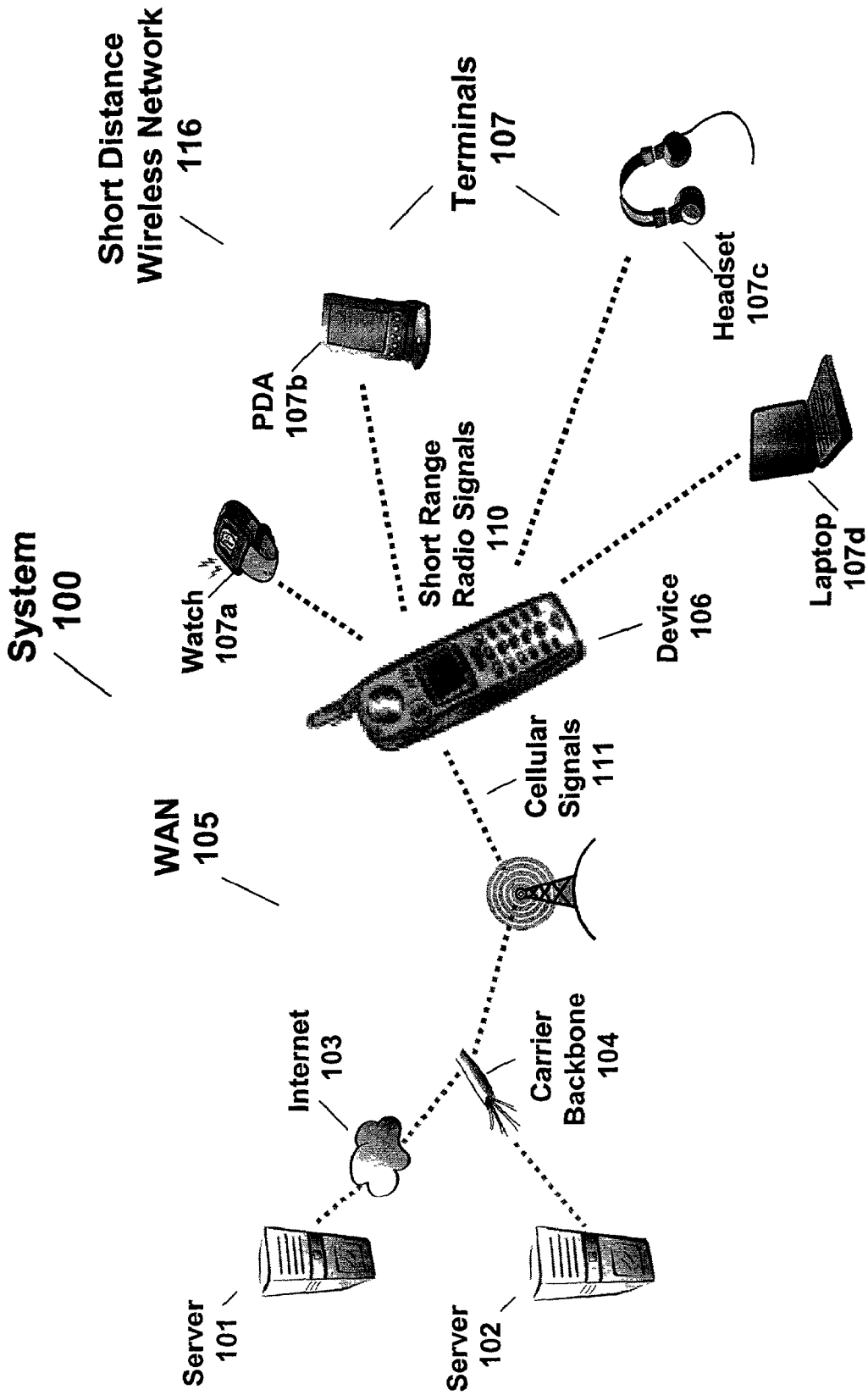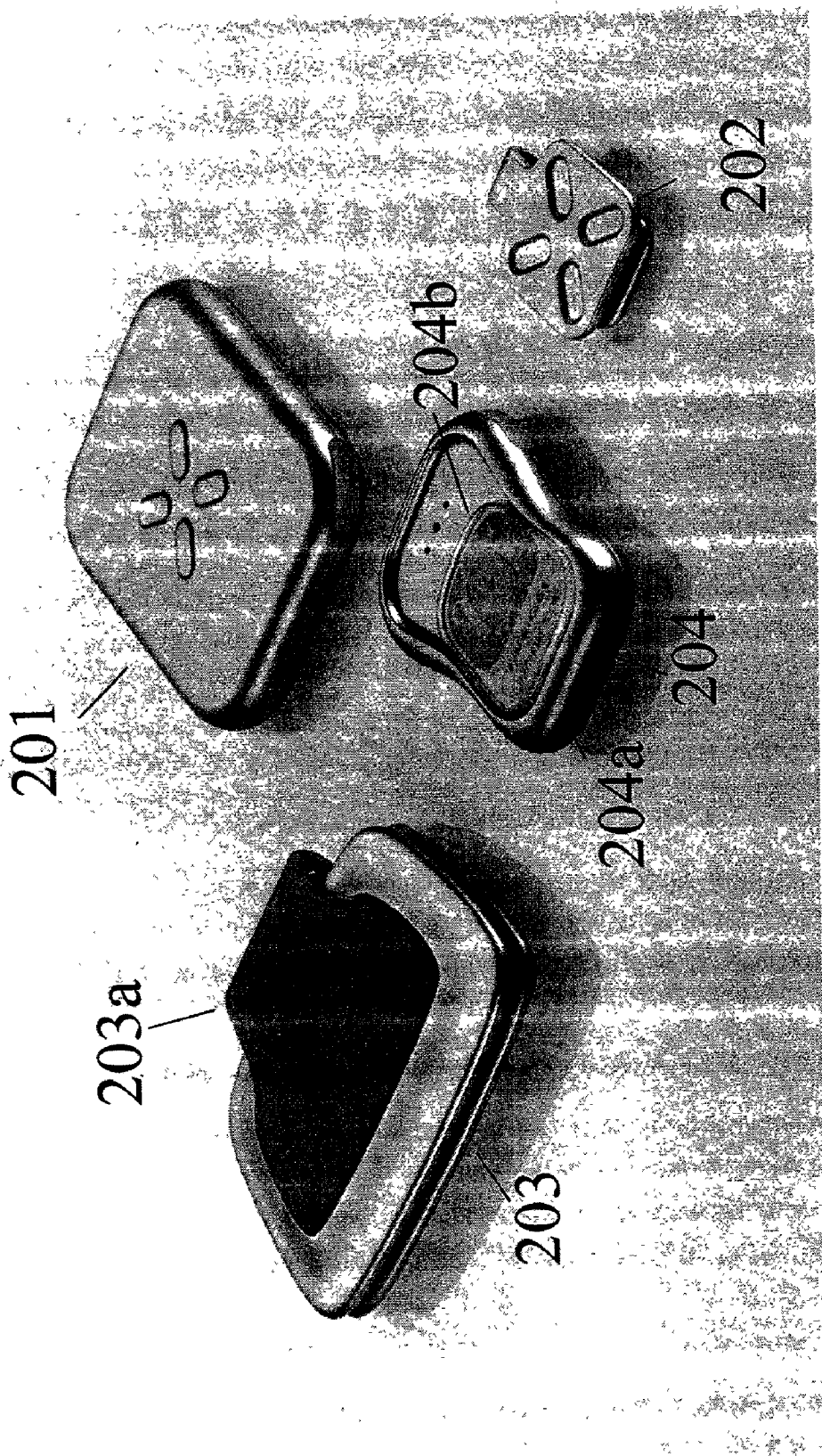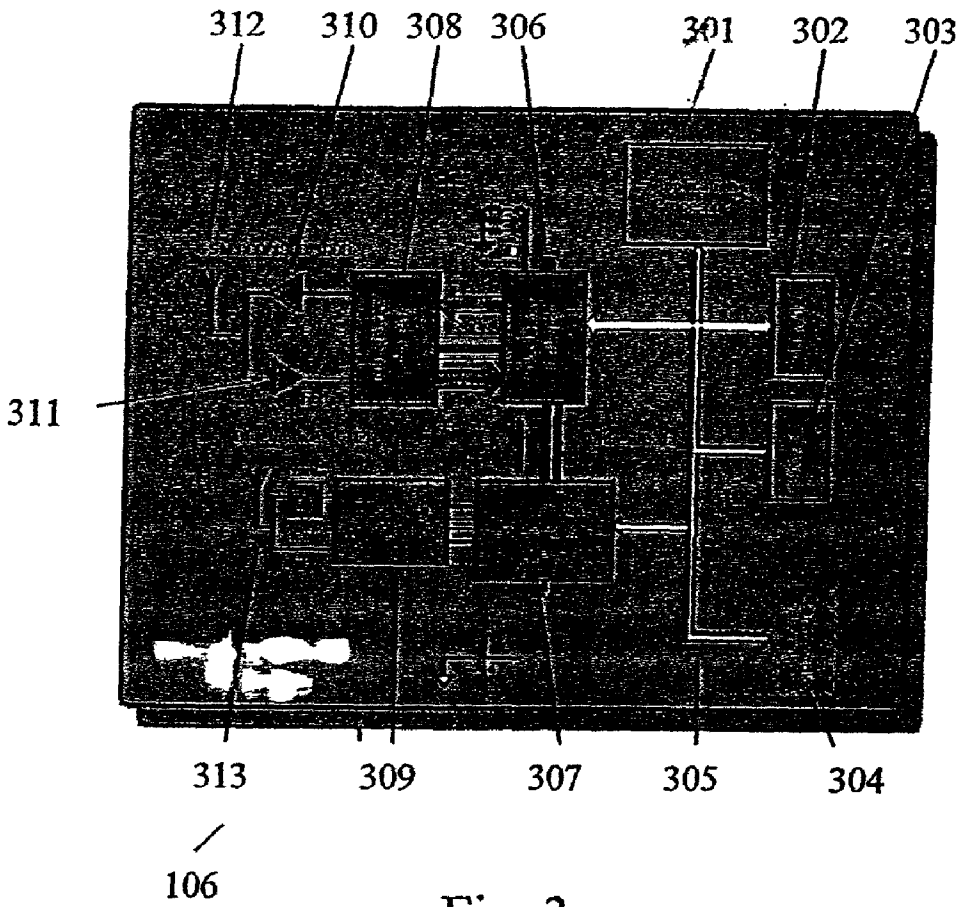**Terminals**
107

Device
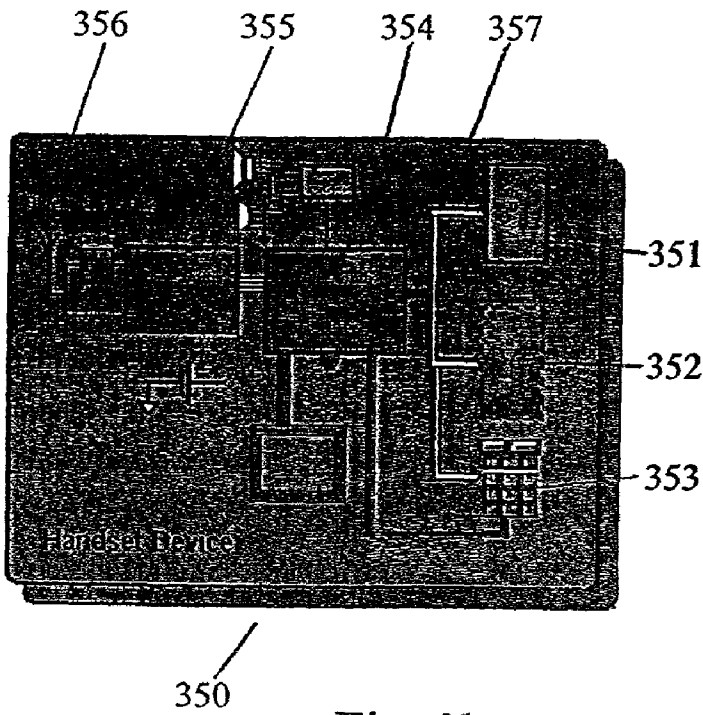**106**

Headset
107c

Laptop
107d

Fig. 1

Fig. 2

Fig. 3a

Fig. 3b

Fig. 4

Fig. 5b

Fig. 5a

Fig. 6b

Fig. 6a

710
711

Remaining Operation Time
Alert

:22
Laptop

106

515

711
712

516

Fig. 7b

Remaining Operation Time

85:09 7:03   :22   4:26
Watch PDA Laptop Hdst

710

713

714

Fig. 7a

Fig. 8a

800

806

807

808

809

810

A

Prompt
User for Notify Preference
Value?

No

Yes

Store User Status
Information Notify Preference Value

Obtain Status Information
From Devices in LAN

Calculate Status Information

Notify Status Information

End
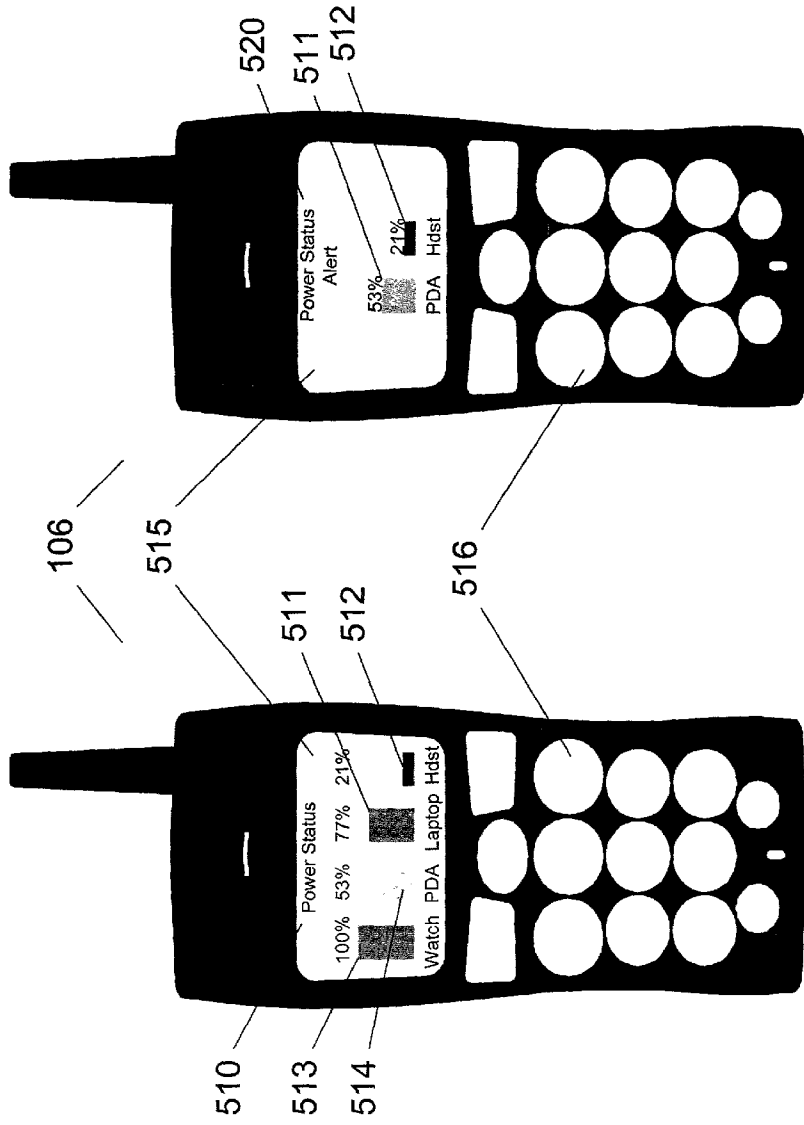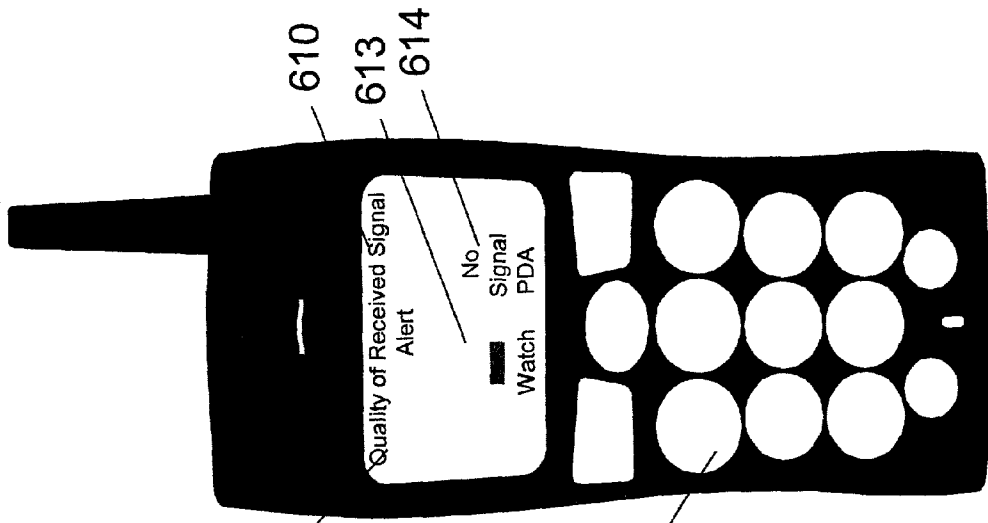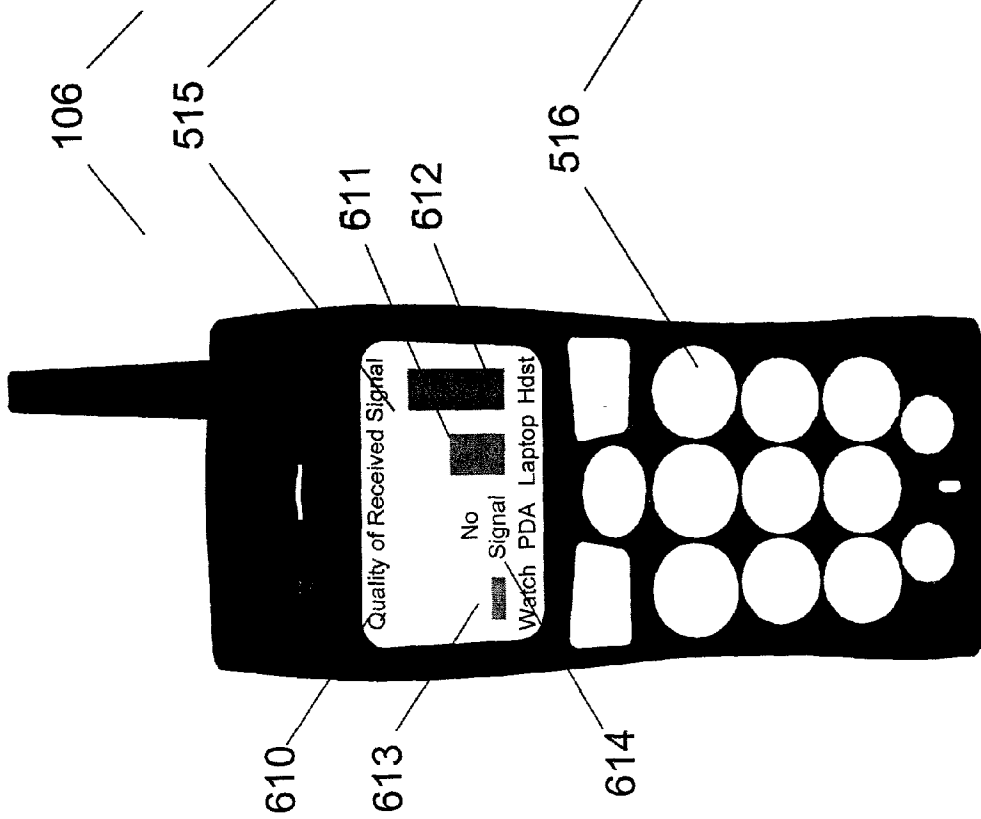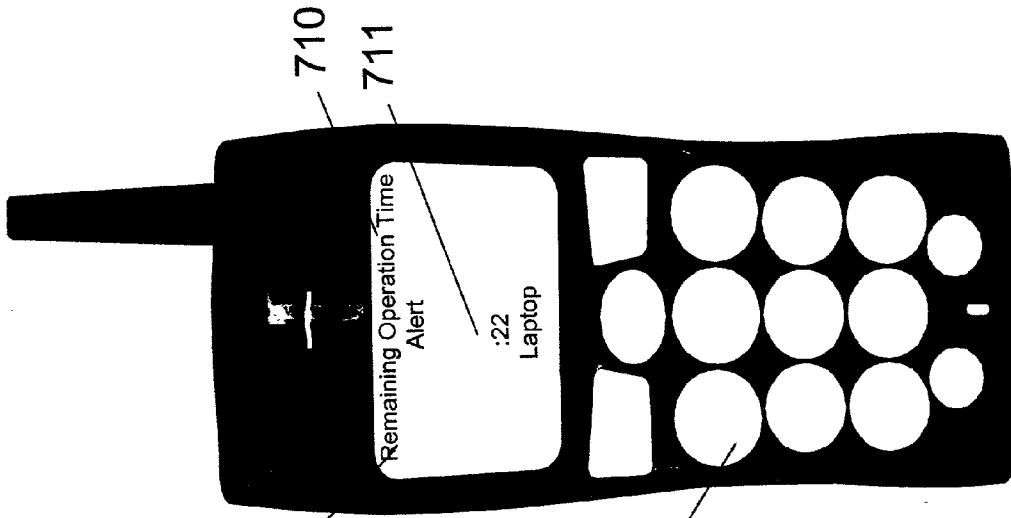
Fig. 8b

DEVICE, SYSTEM, COMPUTER READABLE MEDIUM AND METHOD FOR PROVIDING STATUS INFORMATION OF DEVICES IN A SHORT DISTANCE WIRELESS NETWORK

FIELD OF THE INVENTION

[0001] This invention relates generally to obtaining information in a network.

BACKGROUND OF THE INVENTION

[0002] Users are interested in obtaining status information on devices in a network, such as a wide area network ("WAN"), local area network ("LAN") or short distance wireless network.

[0003] A wireless communication device, such as a cellular telephone, is typically a node of a WAN or communication network. The cellular telephone ma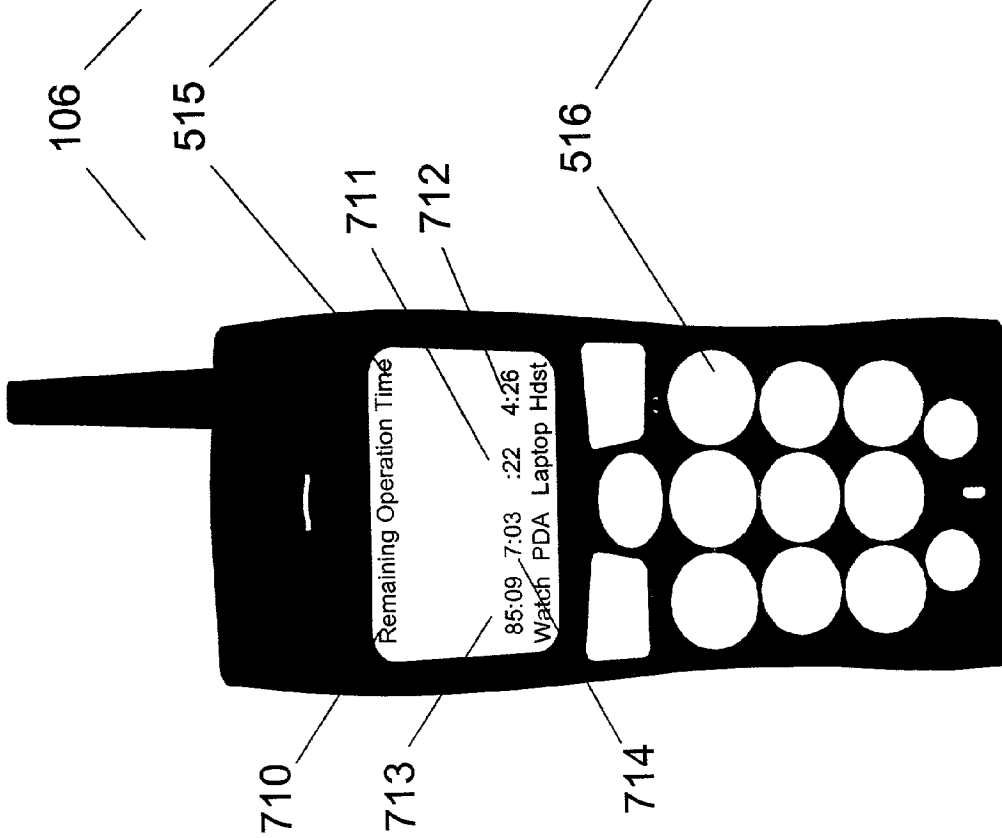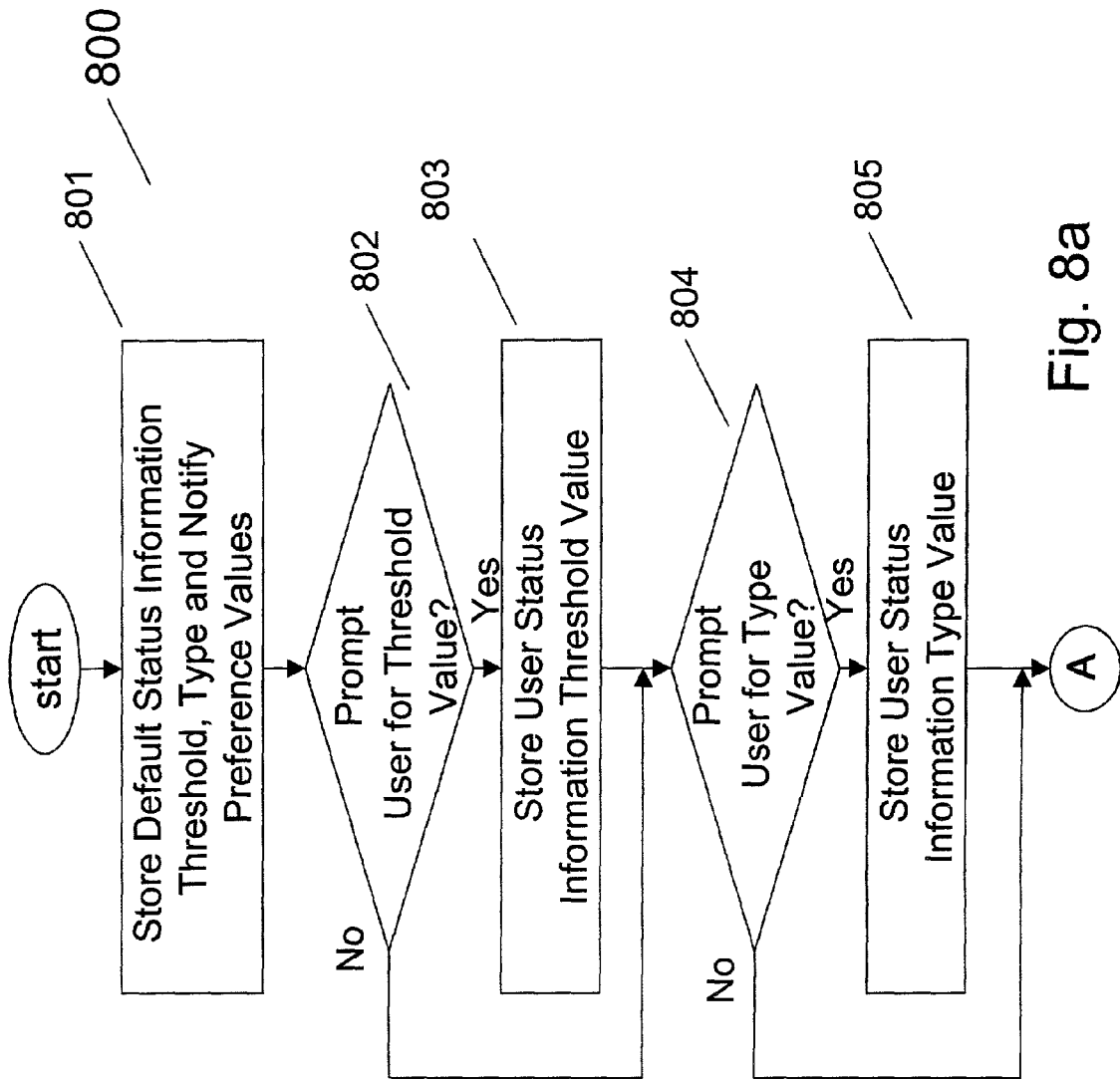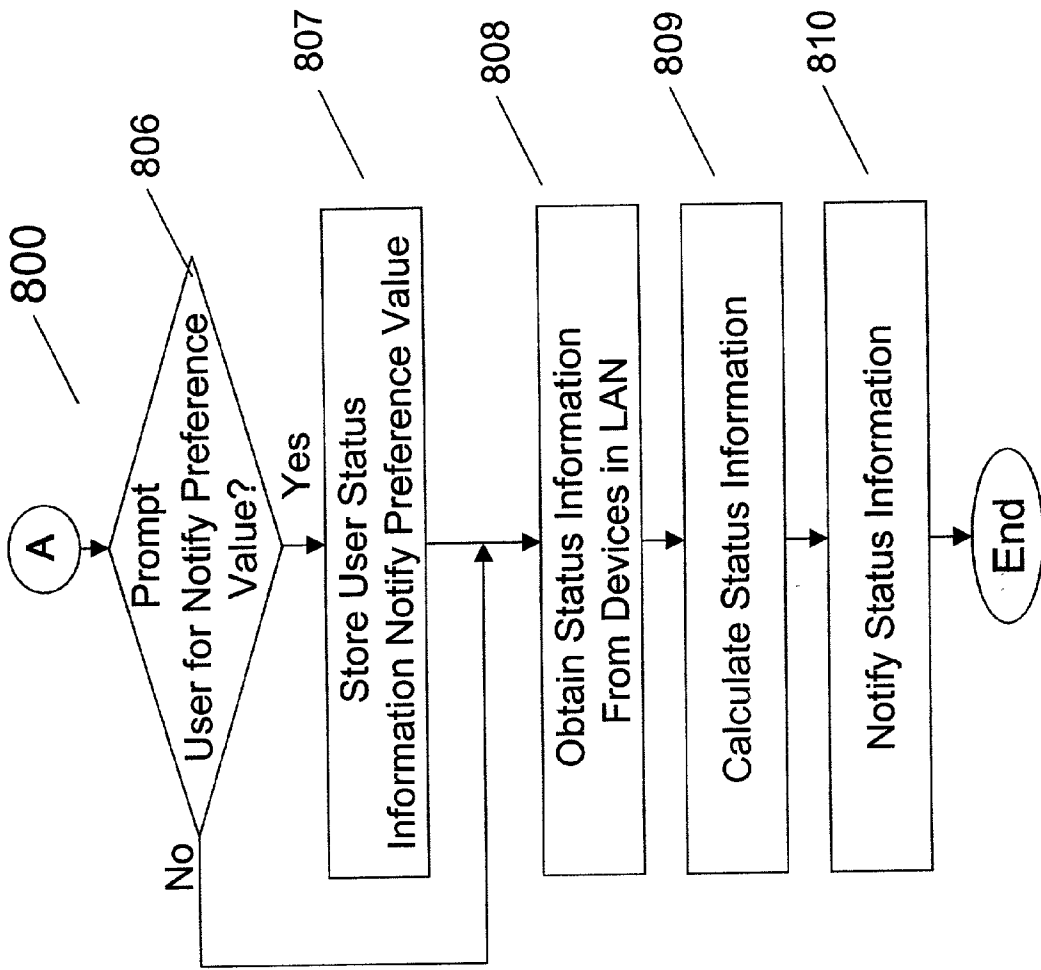y also be a part of a LAN or short distance wireless network for communicating with other user devices, such as a laptop, printer, Personal Digital Assistant ("PDA") and/or headset. For example, Bluetooth™ technology (www.Bluetooth.com) provides wireless communications between devices.

[0004] A user typically has difficulty obtaining status information regarding devices in a short distance wireless network.

[0005] First, each device in the short distance wireless network may not be able to provide visible status information to a user. For example, a headset typically does not have a display that can provide visual status information. If a user is moving out of the range of a short distance wireless network, a user cannot observe visually that signal reception by the headset will soon be reduced or lost until audio reception is distorted or dropped.

[0006] Second, a short distance wireless network may include a relatively large number of devices that have different types of status information. A user generally has to physically go to each device in order to assess its status. For example, if a printer is not printing out a desired file, a user would have to go to the location of the printer in order to determine if the printer is causing the problem (i.e. printer turned off, out of paper, lack of short distance wireless network signal reception) and the location of the device sending the print job. Moreover, devices may not easily or readily be available. For example, some devices may be in backpacks or in desks.

[0007] Third, a short distance wireless network device may provide status information, but not in a preferable type. A device may indicate remaining power from a battery, but not the amount of time remaining for operation.

[0008] Fourth, a short distance wireless network device may also not provide relevant status information in a timely manner and/or in an easily viewable format. A device may provide status information indicating the device has lost signal reception only after the signal has been dropped. Similarly, a user may not be interested in all status information and would like to select when and what status information is provided.

[0009] Fifth, while a short distance wireless network device may provide status information for itself, a user may be interested in status information for all devices, singularly or in various combinations, in the short distance wireless network. For example, a user may be interested in the combined remaining battery power of both a handset and a headset in a short distance wireless network having two or more devices.

[0010] Therefore, it is desirable to provide a device, system, computer readable medium and method that allow a user to obtain status information from a device in a short distance wireless network. It is further desirable to provide timely and preferable status information in an easily viewable format of selected devices in a short distance wireless network.

SUMMARY OF THE INVENTION

[0011] A processing device notifies a user of status information of a first device in a short distance wireless network responsive to a first short-range radio signal. The processing device comprises a storage device coupled to a processor. The storage device stores a first software component for notifying the user of status information of the first device.

[0012] According to an embodiment of the present invention, the processing device is a cellular telephone or a cellular modem.

[0013] According to an embodiment of the present invention, the first device is a cellular telephone or a cellular modem.

[0014] According to an embodiment of the present invention, the first device is selected from a group consisting of a desktop computer, a laptop computer, a personal digital assistant, a headset, a pager, a printer, a watch, a digital camera and equivalent.

[0015] According to an embodiment of the present invention, the processing device includes a short-range radio processor and a 2.4 GHZ transceiver or a 5.7 GHZ transceiver.

[0016] According to an embodiment of the present invention, the software component notifies a user of status information of a second device responsive to a second short-range radio signal.

[0017] According to an embodiment of the present invention, the processing device, the first device and the second device form a short distance wireless network.

[0018] According to an embodiment of the present invention, the processing device, the first device and the second device form an 802.11 network.

[0019] According to an embodiment of the present invention, the processing device, the first device and the second device form a Bluetooth™ network.

[0020] According to still another embodiment of the present invention, the status information regarding the first device includes an available battery power of the first device.

[0021] According to an embodiment of the present invention, the status information regarding the first device includes an available operating time of the first device.

[0022] According to an embodiment of the present invention, the status information regarding the first device includes a quality of received signal from the short distance wireless network.

[0023] According to an embodiment of the present invention, the status information regarding the first device includes a quality of received signal from a cellular network. In an embodiment of the present invention, the quality of the received signal is the signal strength and/or a bit error rate of the signal.

[0024] According to still another embodiment of the present invention, a cellular network, coupled to the processing device, generates a cellular protocol signal selected from the group consisting of Global System for Mobile Communications ("GSM") protocol, Code Division Multiple Access ("CDMA") protocol, CDMA 2000 protocol, Universal Mobile Telecommunications System ("UMTS") protocol, Time Division Multiple Access ("TDMA") protocol, General Packet Radio Service ("GPRS") or an equivalent.

[0025] According to an embodiment of the present invention, the status information is calculated by the processing device. The calculated status information includes a quality of received signal indication calculated from a bit error rate of the first device and/or signal strength of the first device.

[0026] According to an embodiment of the present invention, the status information includes a selected minimum battery status of the processing device and the first device.

[0027] According to an embodiment of the present invention, the storage device stores a second software component for polling the first device in order to obtain the status information.

[0028] According to an embodiment of the present invention, the first short-range radio signal includes status information generated on a periodic basis from the first device.

[0029] According to an embodiment of the present invention, the storage device stores a second software component for obtaining the status information of the first device responsive to a user selection.

[0030] According to an embodiment of the present invention, the first short-range radio signal includes status information generated from the first device in response to a first device event.

[0031] According to an embodiment of the present invention, the first device event includes the remaining power of the first device falling below a threshold value.

[0032] According to an embodiment of the present invention, the first device event includes a quality of the received signal of the first device falling below a threshold value.

[0033] According to an embodiment of the present invention, a system for providing status information in a short distance wireless network is provided. The system comprises a first device for generating a first short-range radio signal containing status information and a second device for receiving the short-range radio signal and notifying a user of the status information.

[0034] According to an embodiment of the present invention, the first device and the second device include a short-range radio processor and a short-range radio transceiver.

[0035] According to an embodiment of the present invention, the system further comprises a third device providing a second short-range radio signal containing status information. The second device receives the second short-range radio signal and notifies a user of the status information of the third device.

[0036] According to an embodiment of present invention, an article of manufacture including a computer readable medium for providing status information is provided. The article manufacture comprises a short-range radio software component for receiving a radio signal in a short distance wireless network. A notify software component notifies status information of a device in the short distance wireless network.

[0037] According to an embodiment of the present invention, a method for obtaining status information of devices in a short distance wireless network is provided. The method comprises the steps of obtaining user selected values: a user status information threshold value, a user status information type value and user status information notify preference value. Status information from devices in the short distance wireless network is obtained and provided to a user in response to the selected values.

[0038] Other aspects and advantages of the present invention can be seen upon review of the figures, the detailed description, and the claims that follow.

BRIEF DESCRIPTION OF THE FIGURES

[0039] FIG. 1 illustrates a system according to an embodiment of the present invention.

[0040] FIG. 2 illustrates thin terminals and a wireless device according to an embodiment of the present invention.

[0041] FIGS. 3a-b are hardware block diagrams of a device according to an embodiment of the present invention.

[0042] FIG. 4 is a software block diagram architecture for providing status information in a short distance wireless network according to an embodiment of the present invention.

[0043] FIGS. 5a-b illustrates providing status information, and in particular power status, of devices in a short distance wireless network according to an embodiment of the present invention.

[0044] FIGS. 6a-b illustrates providing status information, and in particular quality of received signal, of devices in a short distance wireless network according to an embodiment of the present invention

[0045] FIGS. 7a-b illustrates providing status information, and in particular calculated remaining operating time, of devices in a short distance wireless network according to an embodiment of the present invention.

[0046] FIGS. 8a-b are flowcharts illustrating providing status information of devices in a short distance wireless network according to an embodiment of the present invention.

DETAILED DESCRIPTION

I. System Overview

[0047] The following description and claims relate to a device, a system, a computer readable medium and a method

for providing status information of a device or devices in a short distance wireless network according to an embodiment of the present invention.

[0048] In an embodiment of the present invention, a short distance wireless network is a network of processing devices, such as a personal computer or wireless headset, that span a relatively small physical area, wherein at least one device generates and receives a short-range radio signal for communicating with another device in the network. In an embodiment of the present invention, the short-range radio signal can travel between approximately 0 and approximately 1000 feet. An example of a short distance wireless network includes a network of devices formed by Bluetooth™, HomeRF, 802.11 technologies, singly or in combinations, or an equivalent thereof. In an embodiment of the present invention, each processing device in a short distance wireless network has its own processing unit that executes a software component stored on the processing device memory, but also may access data and devices on the short distance wireless network. In an embodiment of the present invention, a wire, and in particular an Ethernet, provides communication between two or more processing devices in a short distance wireless network. In an alternate embodiment, electromagnetic signals provide wireless communication between one or more processing devices in a short distance wireless network. In still another embodiment, both wires and electromagnetic signals provide communication between processing devices in a short distance wireless network.

[0049] In an embodiment of the present invention, a WAN includes multiple LANs and/or short distance wireless networks connected over a relatively large distance. Telephone lines and electromagnetic signals, singly or in combination, couple the LANs and/or short distance wireless networks in a WAN. In an embodiment of the present invention, WAN 105 includes a cellular network generating and receiving cellular signals 111. In an embodiment of the present invention, a cellular network is defined as a communications system dividing a geographic region into sections, called cells. In an analog embodiment of the present invention, the purpose of this division is to make the most use out of a limited number of transmission frequencies. In an analog embodiment of the present invention, each connection, or for example conversation, requires its own dedicated frequency, and the total number of available frequencies is about 1,000. To support more than 1,000 simultaneous conversations, cellular systems allocate a set number of frequencies for each cell. Two cells can use the same frequency for different conversations so long as the cells are not adjacent to each other.

[0050] FIG. 1 illustrates system 100 according to an embodiment of the present invention. System 100 includes terminals 107 coupled to wireless device 106. In an embodiment of the present invention, device 106 and one or more terminals 107 communicate to form a short distance wireless network 116. In an embodiment of the present invention, terminals 107 are coupled to device 106 by short-range radio signals 110 to form short distance wireless network 116. In an embodiment of the present invention, some or all of terminals 107 may have wired connections. In an embodiment of the present invention, terminals 107 include watch 107a, PDA 107b, headset ("Hdst") 107c and laptop computer 107d. In an alternate embodiment, fewer or more

terminals are used in short distance wireless network 116. In an alternate embodiment, terminals 107 include a desktop computer, a pager, a printer, a thin terminal, messaging terminal, a digital camera or an equivalent. In an embodiment of the present invention, terminals 107 include a Bluetooth™ 2.4 GHz transmitter/receiver. Likewise, device 106 includes a Bluetooth™ 2.4 GHZ transmitter/receiver. In an alternate embodiment of the present invention, a Bluetooth™ 5.7 GHZ transmitter/receiver is used. Hardware for device 106 and terminals 107 is illustrated in FIGS. 3a-b in an embodiment of the present invention.

[0051] In alternate embodiments of the present invention, other local wireless technologies, such as 802.11 or HomeRF signals, are used to communicate between device 106 and terminals 107.

[0052] In an embodiment of the present invention, WAN 105 is coupled to device 106. In an embodiment of the present invention, WAN 105 includes a cellular network transmitting and receiving cellular signals 111. In an embodiment of the present invention, cellular signals 111 are transmitted using a protocol, such as a Global System for Mobile communications ("GSM") protocol. In alternate embodiments, a Code Division Multiple Access ("CDMA"), CDMA 2000, Universal Mobile Telecommunications System ("UMTS"), Time Division Multiple Access ("TDMA"), General Packet Radio Service ("GPRS") protocol or an equivalent is used.

[0053] In an embodiment of the present invention, WAN 105 includes carrier backbone 104, server 101-102 and Internet 103. In an embodiment of the present invention, IP packets are transferred between the components illustrated in FIG. 1. In alternate embodiments of the present invention, other packet types are transferred between the components illustrated in FIG. 1.

[0054] In an embodiment of the present invention, a WAN 105 includes an IP public or private network, such as a corporate secured network using a Virtual Private Network ("VPN").

[0055] In an alternate embodiment of the present invention, device 106 is coupled to a WAN 105 by an Ethernet, Digital Subscriber Line ("DSL"), or cable modem connection, singly or in combination.

[0056] In an embodiment of the present invention, device 106 is a cellular handset or telephone. In an alternate embodiment of the present invention, device 106 is a cellular enabled PDA, wireless modem and/or wireless laptop computer.

[0057] In an embodiment of the present invention, WAN 105 is coupled to a wireless carrier internal network or carrier backbone 104. In an embodiment of the present invention, server 102 is coupled to carrier backbone 104. In an alternate embodiment of the present invention, carrier backbone 104 is coupled to Internet 103. Server 101 is coupled to Internet 103. In an embodiment of the present invention, servers 101 and 102 provide information, such as web pages or application software components, to terminals 107 by way of device 106. In an embodiment of the present invention, terminals 107 share services and communicate by way of device 106.

II. Hand-held Device/Terminal Hardware

[0058] FIG. 2 illustrates embodiments of terminals 107 and device 106. In an embodiment of the present invention,

there are two types of terminals: 1) smart terminals and 2) thin terminals. In an alternate embodiment of the present invention, smart terminals execute user logic and applications. Smart terminals have a relatively powerful processing unit, operating system and applications. Their main needs from a short distance wireless network **116** are access to a WAN **105** through TCP/IP and other network services such as storage and execution. For example, a laptop computer **107***d* and PDA **107***b* are smart terminals. Thin terminals have a relatively low power processing unit and operating system. They are mainly used as peripherals to an application server in a network and their main task is user interaction, rendering output for a user and providing an application server with a user's input. For example, a watch **107***a* or messaging terminals can be thin terminals.

[0059] **FIG. 2** illustrates thin terminals and a cellular modem in an embodiment of the present invention. Voice terminal **204** includes a display **204***b* and a retractable keypad **204***a*. Messaging Terminal **203** is illustrated in a closed position with a hinge **203***a* used to open and close terminal **203**. Terminal **203** also includes a miniature QWERTY keyboard and display when opened. In an embodiment of the present invention, device **201** is a cellular modem and includes a clip **202** for a belt.

[0060] **FIG. 3***a* illustrates a hardware block diagram of device **106** in an embodiment of the present invention. Device **106** includes both internal and removable memory. In particular, device **106** includes internal FLASH (or Electrically Erasable Programmable Read-Only Memory ("EEPROM")) and static Random Access Memory ("SRAM") **302** and **303**, respectively. Removable FLASH memory **304** is also used in an embodiment of the present invention. Memories **302**, **303**, and **304** are coupled to bus **305**. In an embodiment of the present invention, bus **305** is an address and data bus. Application processor **301** is likewise coupled to bus **305**. In an embodiment of the present invention, processor **301** is a 32-bit processor.

[0061] Bluetooth™ processor **307** is also coupled to bus **305**. Bluetooth™ RF circuit **309** is coupled to Bluetooth™ processor **307** and antenna **313**. Processor **307**, RF circuit **309** and antenna **313** transceive and receive short-range radio signals to and from terminals **107**, illustrated in **FIG. 1**, or device **350** illustrated in **FIG. 3***b*.

[0062] Cellular, such as GSM, signals are transmitted and received using digital circuit **306**, analog circuit **308**, transmitter **310**, receiver **311** and antenna **312**. Digital circuit **306** is coupled to bus **305**. In alternate embodiments, device **106** includes a display, a speaker, a microphone, a keypad and a touchscreen, singly or in combination.

[0063] **FIG. 3***b* illustrates device **350** that is a hand-held device in an embodiment of the present invention. Device **350**, in an embodiment of the present invention, is one of the terminals **107** illustrated in **FIG. 1**. Similar to device **106**, device **350** includes SRAM and FLASH memory **351** and **352**, respectively. Memories **351** and **352** are coupled to bus **357**. In an embodiment of the present invention, bus **357** is an address and data bus. Keypad **353** is also coupled to bus **357**. Short-range radio signals are transmitted and received using Bluetooth™ processor **354** and Bluetooth™ RF circuit **355**. Antenna **356** is coupled to Bluetooth™ RF circuit **355**. In an embodiment of the present invention, antenna **356** transmits and receives short-range radio signals. In alternate

embodiments, device **350** includes a display, a speaker, a microphone, a keypad and a touchscreen, singly or in combination. As one of ordinary skill in the art would appreciate, other hardware components would be provided for device **350** in alternate embodiments of the present invention. For example in an embodiment in which device **350** is a laptop computer **107***d*, a disk drive and other input/output components are present.

III. Software

[0064] **FIG. 4** illustrates a software architecture **500** for device **106** illustrated in **FIG. 3***a* according to an embodiment of the present invention. Software **500** is stored in FLASH memory **302**. In an embodiment of the present invention, software components referenced in **FIG. 4** represent a software program, a software object, a software function, a software subroutine, a software method, a software instance, and a code fragment, singly or in combination. In an alternate embodiment, functions performed by software components illustrated in **FIG. 4** are carried out completely or partially by hardware.

[0065] In an embodiment of the present invention, software **500**, or components of software **500**, is stored in an article of manufacture, such as a computer readable medium. For example, software **500** is stored in a magnetic hard disk, an optical disk, a floppy disk, CD-ROM (Compact Disk Read-Only Memory), RAM (Random Access Memory), ROM (Read-Only Memory), FLASH, Electrically Erasable Programmable Read-Only Memory ("EEPROM"), or other readable or writeable data storage technologies, singly or in combination. In yet another embodiment, software **500**, or components thereof, is downloaded from server **102** illustrated in **FIG. 1**.

[0066] Software **500** includes telecommunication software or physical layer protocol stacks, in particular cellular communications software **503** and short-range radio communications software **502**. In an embodiment, communication software **503** is a GPRS baseband software component used with processor **306** to transmit and receive cellular signals. In an embodiment, communication software **502** is a Bluetooth™ baseband software component used with processor **307** to transmit and receive short-range radio signals. Other telecommunication software may be used as illustrated by other basebands **501**.

[0067] In an embodiment of the present invention, operating system ("OS") **403** is used to communicate with telecommunications software **502** and **503**. In an embodiment of the present invention, operating system **403** is a Linux operating system, EPOC operating system available from Symbian software of London, United Kingdom or a PocketPC or a Stinger operating system available from Microsoft® Corporation of Redmond, Wash. or Nucleus operating system, available from Accelerated Technology, Inc. of Mobile, Ala. Operating system **403** manages hardware and enables execution space for device software components.

[0068] Media abstraction layer **504** allows operating system **403** to communicate with basebands **503**, **502** and **501**, respectively. Media abstraction layer **504** and other abstraction layers, described herein, translate a particular communication protocol, such as GPRS, into a standard command set used by a device and/or terminal. The purpose of an

5

abstraction layer is to isolate the physical stacks from the rest of the device software components. This enables future usage of different physical stacks without changing any of the upper layer software and allows the device software to work with any communication protocol.

[0069] Obtain status information software component **404**, calculate status information software component **405** and notify status information software component **406** are used to provide status information of a terminal/device in a short distance wireless network according to an embodiment of the present invention. In an alternate embodiment of the present invention, software components **404**, **405** and **406** are combined and/or partitioned into more software components.

[0070] In an embodiment of the present invention, obtain status information software component **404** obtains status information from each terminal **107** illustrated in **FIG. 1**. In an embodiment of the present invention, obtain status information software component **404** is executed on the hardware components of device **106** in order to generate and receive short-range radio signals containing the status information of each terminal in short distance wireless network **116**. In an embodiment of the present invention, obtain status information **404**, operating system **403** and Bluetooth™ Baseband software component **502** are used to generate and receive short-range radio signals **110** which contain status information. Status information includes, for example, available battery power of a particular terminal and/or a quality of the received signal of each terminal in an embodiment of the present invention. The quality of the received signal may be the quality of short-range radio signals **110** used for communicating in short distance wireless network **116** and/or the quality of cellular signals **111** received by device **106** from WAN **105**. In alternate embodiments of the present invention, other status information is obtained. For example, status information may include a printer in short distance wireless network **116** completing a print job.

[0071] In an alternate embodiment, obtain status information **404** is stored in a terminal and obtains status information from device **116**, such as quality of received signal (cellular signals **111**).

[0072] Obtain status information software component **404** obtains status information from terminals **107** in various embodiments of the present invention.

[0073] In a first embodiment of the present invention, obtain status information software component **404** obtains status information by periodically polling terminals **107**. Device **106** polls terminals **107**, by using short-range radio signals **110**, in order to obtain terminal status information. The period T or time between polling terminals **107** is selected based upon the type of requested status information. For example, if power status, which changes relatively infrequently, is polled, period T is relatively high, such as one minute. In contrast, if quality of received signal status is polled from terminals **107**, period T is relatively low, such as one second.

[0074] In a second embodiment of the present invention, obtain status information software component **404** obtains status information by terminals **107** periodically pushing status information.

[0075] In a third embodiment of the present invention, obtain status information software component **404** obtains status information from terminals **107** in response to a user selection. For example, if a user pushes a power status button, software component **404** polls terminals **107** in order to obtain, and ultimately display, the power status of the selected terminal and/or terminals **107**.

[0076] In a fourth embodiment of the present invention, obtain status information software component **404** obtains status information by terminals **107** generating status information in response to a terminal event. For example, if battery power of PDA **107b** dropped below a 5% threshold, PDA **107b** generates a short-range radio signal **110** containing PDA **107b** power status information.

[0077] Calculate status information software component **405** calculates status information responsive to a status information type value and status information from terminals **107** in an embodiment of the present invention. For example, calculate status information software component **405** calculates the remaining operating time of a terminal responsive to remaining power status information received from the terminal when a user selects a status information type value "operating time." Similarly, calculate status information software component **406** generates alert status information in response to a comparison between status information received from a terminal and a selected threshold value in an embodiment of the present invention.

[0078] Notify status information software component **406** notifies, and in an embodiment displays, status information in response to a notify preference value. For example, status information for all terminals **107** is displayed on display **515** in response to a user selecting an "all" notify preference value.

[0079] In an embodiment of the present invention, notify status information component **406** notifies a user of the status of each selected device in network **116**.

[0080] In an alternate embodiment of the present invention, notify status information component **406** notifies a user of the status of a selected set of devices in network **116**.

[0081] In still another embodiment of the present invention, notify status information component **406** notifies a user of the combined status of a selected set of devices in network **116**, for example, the combined operating time of PDA **107b** and device **106**.

[0082] In an alternate embodiment, device **106** stores and executes obtain status information **404** and calculate status information. The status information is then transferred to a thin terminal that stores and executes notify status information **406** in providing the status information from a terminal, such as a thin terminal.

[0083] In an alternate embodiment, any terminal in terminals **107** stores and executes obtain status information software component **404**, calculate status software component **405** and notify software component **406**.

[0084] In an alternate embodiment of the present invention, notify status information software component **406**, stored and executed in device **106**, provides a bit map containing status information to a terminal in terminals **107**.

[0085] Furthermore, Graphics User Interface ("GUI") **407** is provided to allow a user-friendly interface.

[0086] **FIGS. 5**a-b, **6**a-b and **7**a-b illustrate notifying a user of status information of various terminals in short distance wireless network **116** shown in **FIG. 1**. In an embodiment of the present invention, device **106** is a cellular telephone having a display **515** and keypad **516**. In an embodiment of the present invention, a user is notified of status information by providing graphic elements and text to display **515**. The type of status information is communicated to a user by label **510**, such as "Power Status", shown in **FIG. 5**a. In an embodiment of the present invention, the status information is provided by color coded graphical elements. For example, **FIG. 5**a illustrates notifying a user of "Power Status" information of the terminals in short distance wireless network **116**. In this embodiment of the present invention, color coded bars with respective percentages of remaining power in the terminals is displayed. A full green bar **513** with a label of "100%" notifies a user that Watch **107**a is approximately fully charged. A half yellow bar **514** with a label of "53%" notifies a user that PDA **107**b has a battery that is approximately half charged. A three-quarters green bar **511** with a label of "77%" notifies a user that laptop **107**d has a battery that is approximately three-quarters charged. A quarter red bar **512** with a label of "21%" notifies a user that headset **107**c has a battery that is approximately one-quarter charged. In an embodiment of the present invention, a green bar indicates that a particular terminal has sufficient power. In an embodiment of the present invention, a yellow bar indicates that a terminal has a battery that may need to be replaced or recharged soon and a red bar indicates that the battery of a terminal needs to be replaced immediately. The color coded bars allow a user to easily view which terminals need their batteries recharged or replaced.

[0087] In an alternate embodiment, color coded Light Emitting Diodes (LEDs) are positioned on device **106** and/or terminals **107** to likewise notify a user of status information.

[0088] **FIG. 5**b illustrates selectively displaying status information. For example, yellow bar **511** and red bar **512** are selectively displayed to represent the power status of PDA **107**b and headset **107**c, respectively. Selectively displaying status information allows for more available display **515** space for providing other information to a user. Furthermore, selectively displaying status information when user intervention is or will be needed allows for efficient and effective maintenance of short distance wireless network **116**. A user does not have to be concerned with changing or checking batteries until a power status alert is generated.

[0089] In an embodiment of the present invention, alert status information is displayed in **FIG. 5**b. Alert status information is generated in response to a terminal event or status information falling below a status information threshold value. For example, if a battery of PDA **107**b falls below a threshold value of "60%", a power status alert signal in the form of yellow bar **511** is displayed on display **515**. In an embodiment of the present invention, an alert signal is transmitted in short-range radio signals **110** by terminals **107** to device **106**. In an alternate embodiment of the present invention, status information is transmitted to device **106** by short-range radio signals and device **106** compares the status information with a stored threshold value in generating an alert on display **515**.

[0090] **FIGS. 6**a-b illustrate displaying status information, and in particular quality of a terminal received signal

identified as "Quality of Received Signal" label **610**. **FIGS. 6**a-b, like **FIGS. 5**a-b, illustrate displaying the quality of received signal of the respective terminals in short distance wireless network **116**. Color coded bars **611-613** and "No Signal" text **114** notify a user of the signal reception of respective terminals in short distance wireless network **116**. Thus, a user is able to identify the optimal physical orientation of the terminals for maximum signal reception. Further, a user can determine if a terminal will lose communication with short distance wireless network **116** if the terminal is repositioned or moved farther away from short distance wireless network **116** before actual reception is degraded or lost.

[0091] **FIGS. 7**a-b illustrate displaying calculated status information, and in particular remaining operating time of respective terminals identified as "Remaining Operation Time" label **710**. In alternate embodiments of the present invention, remaining talk time and/or standby time is provided. **FIGS. 7**a-b, like **FIGS. 5**a-b and **6**a-b, illustrate displaying the remaining operating time of the respective terminals in short distance wireless network **116**. Remaining operating time **711-714** notify a user of the remaining operating time of respective terminals in short distance wireless network **116**. For example, laptop **107**d has 22 minutes of remaining operating time. Thus, a user is able to replace the laptop battery or connect laptop **107**d to a power source before valuable electronic files are lost when the laptop battery is no longer able to provide sufficient power.

[0092] **FIGS. 8**a-b illustrate a method **800** for obtaining status information in a short distance wireless network **116** according to an embodiment of the present invention. In an embodiment, method **800** is performed by obtain status information software component **404**, calculate status information software component **405** and notify status information software component **406** illustrated in **FIG. 4**. In an embodiment of the present invention, a logic box or step illustrated in **FIGS. 8**a-b may represent an execution of a software component, such as a software program, a software object, a software function, a software subroutine, a software method, a software instance, a code fragment, singly or in combination. In an alternate embodiment of the present invention, a logic box or step represents execution of a software component, hardware operation or user operation, singly or in combination. In an alternate embodiment of the present invention, fewer or more logic boxes or step are carried out in method **800**.

[0093] As illustrated in **FIGS. 8**a-b, default status information threshold, type and notify preference values are stored as illustrated by logic block **801**. Server **102** illustrated in **FIG. 1** downloads these values in an embodiment of the present invention. In an alternate embodiment of the present invention, these values are stored in device **106** by a manufacturer and/or a reseller. In an embodiment of the present invention, default status information threshold, type and notify preference values are stored in persistent storage, such as FLASH **302** illustrated in **FIG. 3**a.

[0094] A status information threshold value is a predetermined value used to determine when status information will be provided to a user (assuming the status information has been selected to be notified by a notify preference value described below). For example, a user, reseller and/or manufacturer of device **106** can store a battery power threshold

value of "60%" which will be used by calculate status information software component **405** in deciding whether to provide battery power status information of a terminal in short distance wireless network **116** to a user. Short distance wireless network **116** may include numerous terminals. All the terminals' power status may not easily be shown on a relatively small display **515**. Further, a user may only be interested in terminals that may require imminent recharging or battery replacement. For example, **FIG. 5***b* illustrates the power status information of PDA **107***a* and Hdst **107***c* when a threshold value of "60%" is used. Terminals with adequate power availability, such as Watch **107***a* and Laptop **107***d*, are not shown to the user. Thus, a user is not bothered with unnecessary information and display **515** has available screen space for providing a user with other information.

[0095] A status information type value is a predetermined value used to determine what type of status information will be provided to a user. For example, a user may be interested in knowing the available operating time of a laptop **107***d* in short distance wireless network **116** and not necessarily the amount of available power of laptop **107***d*. However, laptop **107***d* may only provide the remaining battery power of laptop **107***d* to device **106** by way of short-range radio signals **110**. In an embodiment of the present invention, a manufacturer, reseller or user of device **106** can store a status information type value. Calculate status information software component **405** calculates status information responsive to a status information type value. For example, calculate status information software component **405** calculates the available operating time of laptop **107***d* responsive to an "operating time" status information type value and battery power status information received by short-range radio signals **110** from laptop **107***d*. In an embodiment of the present invention, laptop **107***d*'s remaining operating time is calculated by averaging the available battery power status information obtained from laptop **107***d*. The average samples then may be extrapolated to obtain a remaining operating time for laptop **107***d*. Likewise, a quality of received signal can be calculated responsive to a "signal strength" status information type value and a signal strength status information provided by a terminal in short distance wireless network **116**. In an alternate embodiment of the present invention, a quality of received signal can be calculated by obtaining the bit error rate of the received signal of a terminal or a combination of strength of the received signal and bit error rate of the received signal.

[0096] A status information notify preference value is a predetermined value used to determine what status information is provided to a user. For example, a user, reseller and/or manufacturer of device **106** can store an "all" value which will be used by notify status information software component **406** in notifying status information of all terminals in short distance wireless network **116** to a user. However, a short distance wireless network **116** may include numerous terminals and a user may be interested in only showing status information of certain terminals. For example, a user may only want to view particular status information of a particular terminal, such as quality of signal of headset **107***c*. Accordingly, a user would set a "Hdst/signal strength" status information notify preference value so that only the quality of signal of headset **107***c* is displayed in an embodiment of the present invention.

[0097] In an alternate embodiment of the present invention, notify status information software component **406** notifies a user of status information by an audio alert or vibration of device **106**. In an alternate embodiment of the present invention, notify status information software component **406** notifies a user by vibrating one or more terminals **107**. In still an alternate embodiment of the present invention, status information software component **406** notifies a user by generating an email or message.

[0098] Returning to **FIG. 8***a*, in an embodiment of the present invention, a determination is made in logic block **802** as to prompt a user for a status information threshold value. The prompt may be presented on display **515** in an embodiment of the present invention. Multiple threshold values are entered in an embodiment of the present invention. If a user inputs affirmatively, a status information threshold value is stored and overrides a default threshold value in logic block **803**.

[0099] Logic blocks **803, 804, 806** and **807**, similarly prompt and override status information type and notify preference values in an embodiment of the present invention.

[0100] Status information from terminals **107** is obtained as illustrated by logic block **808** in an embodiment of the present invention.

[0101] Likewise, status information is calculated as illustrated by logic block **809** in an embodiment of the present invention.

[0102] And, status information is notified to a user in an embodiment of the present invention as illustrated by logic block **810** and method **800** ends.

IV. CONCLUSION

[0103] The foregoing description of the preferred embodiments of the present invention has been provided for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Obviously, many modifications and variations will be apparent to practitioners skilled in the art. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, thereby enabling others skilled in the art to understand the invention for various embodiments and with the various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

What is claimed is:

1) A processing device, comprising:

(a) a storage device;

(b) a processor coupled to the storage device; and,

(c) wherein the storage device stores a first software component for notifying status information of a first device responsive to a first short-range radio signal.

2) The processing device of claim 1, wherein the processing device is a cellular telephone.

3) The processing device of claim 1, wherein the processing device is a cellular modem.

4) The processing device of claim 1, wherein the first device is selected from a group consisting of a desktop

computer, a laptop computer, a personal digital assistant, a headset, a pager, a printer, a watch, a digital camera and an equivalent.

5) The processing device of claim 1, wherein the first device is selected form a group consisting of a thin terminal and a smart terminal.

6) The processing device of claim 1, wherein the processing device includes a short-range radio processor and a 2.4 GHZ transceiver.

7) The processing device of claim 1, wherein the processing device includes a short-range radio processor and a 5.7 GHZ transceiver.

8) The processing device of claim 1, wherein the software component notifies the status of a second device responsive to a second short-range radio signal.

9) The processing device of claim 8, wherein the processing device, the first device and second device form a short distance wireless network.

10) The processing device of claim 8, wherein the processing device, the first device and the second device form a 802.11 network.

11) The processing device of claim 8, wherein the processing device, the first device and second device form a Bluetooth™ network.

12) The processing device of claim 8, wherein the processing device, the first device and the second device form a short distance wireless network.

13) The processing device of claim 1, wherein the status information regarding the first device includes an available battery power of the first device.

14) The processing device of claim 1, wherein the status information regarding the first device includes an available operating time of the first device.

15) The processing device of claim 9, wherein the status information regarding the first device includes a quality of a received signal from the short distance wireless network.

16) The processing device of claim 1, wherein the status information regarding the first device includes a quality of a received signal from the cellular network.

17) The processing device of claim 16, wherein the cellular network generates a cellular protocol signal selected from the group consisting of Global System for Mobile Communications protocol, Code Division Multiple Access protocol, Code Division Multiple Access 2000 protocol, Universal Mobile Telecommunications Systems protocol, Time Division Multiple Access protocol, General Packet Radio Service and an equivalent.

18) The processing device of claim 1, wherein the status information is calculated.

19) The processing device of claim 18, wherein the calculated status information includes a received signal indication calculated from a bit error rate of the first device.

20) The processing device of claim 18, wherein the calculated status information includes a received signal indication calculated from a signal strength of the first device.

21) The processing device of claim 1, wherein the status information includes a selected minimum battery level status of the processing device and the first device.

22) The processing device of claim 1, wherein the storage device stores a second software component for polling the first device in order to obtain the status information.

23) The processing device of claim 1, wherein the first short-range radio signal includes status information generated on a periodic basis from the first device.

24) The processing device of claim 1, wherein the storage device stores a second software component for obtain the status information of the first device responsive to a user selection.

25) The processing device of claim 1, wherein the first short-range radio signal includes status information generated from the first device in response to a first device event.

26) The processing device of claim 25, wherein the first device event includes the remaining power of the first device falling below a predetermined value.

27) The processing device of claim 25, wherein the first device event includes a quality of a received signal of the first device falling below a predetermined value.

28) A system for providing status information in a short distance wireless network, comprising:

(a) a first device for generating a first short-range radio signal containing status information; and,

(b) a second device for receiving the short-range radio signal and notifying the status information.

29) The system of claim 28, wherein the first device and the second device includes a short-range radio processor and a short-range radio transceiver.

30) The system of claim 28, further comprising:

(c) a third device providing a second short-range radio signal containing status information, and wherein the second device receives the second short-range radio signal and notifies the status information of the third device.

31) The system of claim 30, wherein the first device, the second device and third device form a short distance wireless network.

32) The system of claim 28, wherein the status information includes a remaining power in the first device.

33) The system of claim 28, wherein the status information includes a quality of a received signal of the first device.

34) The system of claim 28, wherein the status information includes calculated status information regarding of the first device.

35) The system of claim 28, wherein the status information includes a selected minimum battery status from the first device and the second device.

36) The system of claim 28, wherein the first device includes a software component for polling the second device in order to obtain the status information.

37) The system of claim 28, wherein the first short-range radio signal is generated on a periodic basis from the first device.

38) The system of claim 28, wherein second device obtains the status information of the first device responsive to a user selection.

39) The system of claim 28, wherein the first device, responsive to a first device event, generates the status information.

40) The system of claim 39, wherein the first device event includes a remaining power in the first device falling below a predetermined value.

41) The system of claim 39, wherein the first device event includes a quality of a received signal of the first device falling below a predetermined value.

42) An article of manufacture, including a computer readable medium, comprising:

(a) a short-range radio software component for receiving a short-range radio signal in a short distance wireless network; and,

(b) a notify software component for notifying status information of a a first device and a second device in the short distance wireless network.

43) A method for providing status information in a short distance wireless network, comprising the steps of:

(a) obtaining status information of a device in the short distance wireless I network responsive to a short-range radio signal; and,

(b) notifying the status information responsive to a status information notify preference.

44) The method of claim 43, wherein the status information is calculated responsive to a status information type value.

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