A SYSTEM AND METHOD FOR COLLECTING, FORWARDING AND VIEWING OF REMOTE DATA

Abstract: A system for collecting, forwarding and displaying of remote data over a wireless network, the system including a server, a subscriber's device having a transceiver for coupling to the server via the wireless network, the transceiver being configured for sending a request signal to the server, and for receiving data from the server, a data generator, and a remote device coupled to the data generator for receiving data therefrom, the remote device having a transceiver for coupling to the server via the wireless network for sending remote data corresponding to the received data to the server, the server being configured for receiving the remote data from the remote device, and a graphic display generator coupled to the server for generating at least one graphic display of a portion of the sent data, wherein the remote device is associated with the subscriber's device.
A SYSTEM AND METHOD FOR COLLECTING, FORWARDING AND VIEWING OF REMOTE DATA

FIELD OF THE INVENTION

The present invention relates to a wireless positioning system, in general and, in particular, to a system for collecting, forwarding and viewing of remote data, such as positioning data, via cellular networks.

BACKGROUND OF THE INVENTION

Location data systems provide a user carrying a mobile device with information regarding his/her location. One example of a location data system is a GPS system, which includes a mobile device having a GPS receiver configured to receive GPS signals from a plurality of GPS satellites. The GPS receiver calculates its position by determining the transit time of each received GPS signal and computes therefrom the distances to each satellite. Based on the computed distances, and the predefined location of each satellite, the GPS receiver calculates its position. This position is then displayed to the user, as text, a map or a moving map, which is pre-stored inside the mobile device.

Another example of a location data system is a Cellular Positioning system, which includes a plurality of broadcasting base stations arranged geographically in a cellular pattern, and a mobile device having a cellular receiver, such as a cellular telephone. The position of the mobile device is determined based on the signals received from the different base stations.

However, these location data systems are configured to send the mobile device raw data. The mobile device is then required to execute calculations, in order to derive coordinates, and to indicate its location on a pre-stored map according to these coordinates. In addition, these location data systems are not configured to provide one mobile device with location data of another mobile device. Therefore, sending the location data from one mobile device to another mobile device must be carried
out directly between the two devices, which require strong wireless communication capabilities. Furthermore, this arrangement cannot provide for continuous tracking of a mobile device in motion.

Accordingly, there is a long felt need for a location data system which allows a mobile device to receive location data without requiring extensive calculation and a pre stored map, and it would be very desirable to have a location data system which provides for continuous tracking of a remote mobile device.

SUMMARY OF THE INVENTION

There is provided according to the present invention a system for collecting, forwarding and displaying of remote data over a wireless network. The system includes a server, and a subscriber's device having a transceiver for coupling to the server via the wireless network. The transceiver is configured for sending a request signal to the server, and for receiving data from the server. The system further includes a data generator, and a remote device coupled to the data generator for receiving data therefrom. The remote device includes a transceiver for coupling to the server via the wireless network for sending remote data, corresponding to the received data, to the server. The server is configured for receiving the remote data from the remote device. The system further includes a graphic display generator coupled to the server for generating at least one graphic display of at least a portion of the remote data. The remote device is associated with the subscriber's device.

According to one embodiment of the invention there is provided a system for collecting, forwarding and displaying of remote positioning data over a wireless network. The system includes a server, an Multimedia Messaging Service (MMS) carrier coupled to the server, and a subscriber's device having a transceiver for coupling to the server and to the MMS carrier via the wireless network. The transceiver is configured for sending a request signal to the server, and for receiving data from the MMS carrier. The system further includes a remote device including a GPS receiver for receiving GPS signals, and a processing unit, for generating
positioning data corresponding to the GPS signals. The remote device further includes a transceiver for sending the positioning data to the server via the wireless network. The remote device is associated with the subscriber's device.

The system further includes a map picture generator coupled to the server for receiving the positioning data from the server and generating at least one map picture representing at least a portion of the positioning data. The server is further configured to receive the map picture from the map picture generator, and send the map picture to the MMS carrier for forwarding to the subscriber's device.

There is further provided according to the present invention a method for forming a system for collecting, forwarding and displaying of remote data over a wireless network. The method includes coupling a subscriber's device, having a transceiver, to a server via the wireless network, and configuring the transceiver for sending a request signal to the server and for receiving data from the server. The method further includes coupling a remote device associated with the subscriber's device to a data generator for receiving data therefrom. The remote device includes a transceiver for coupling to the server via the wireless network, for sending remote data corresponding to the received data to the server. In addition, the method includes configuring the server for receiving the remote data from the remote device, and coupling a graphic display generator to the server for generating at least one graphic display of at least a portion of the data.

There is further provided according to the present invention a method for collecting, forwarding and displaying of remote data over a wireless network. The method includes generating remote data in a remote data generator, receiving the remote data in a remote device coupled to the data generator, and sending the remote data to a server coupled to the remote device. The method further includes receiving a request signal from a subscriber's device coupled to the server, generating a graphic display representing at least a portion of the remote data in the server, and providing the graphic display to a subscriber's device.
BRIEF DESCRIPTION OF THE DRAWINGS
The present invention will be further understood and appreciated from the following detailed description taken in conjunction with the drawing in which:

Figure 1 is a block diagram illustrating a positioning system constructed and operative in accordance with one embodiment of the present invention; and,

Figure 2 is a block diagram illustrating a data collecting system constructed and operative in accordance with one embodiment of the present invention.
DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to a system and method for positioning and tracking a remote mobile device and providing a subscriber with a positioning map showing the position of the remote device. The system includes a subscriber's device having means for sending a signal requesting a positioning map, a server coupled to the subscriber's device for receiving the requesting signal from, and providing the positioning map to, the subscriber's device, a remote mobile device associated with the subscriber's device and having means for determining its own location and pushing positioning data onto the server, and a wireless network coupling the server, the subscriber's device, and the remote mobile device.

Preferably, the subscriber's device, the remote mobile device, and the server, have dedicated telephone numbers, for communicating with each other via a cellular communication network.

The subscriber's device includes a transceiver for communicating with the server via the cellular communication network, for requesting and receiving positioning maps. The subscriber's device further includes a screen for displaying the positioning maps received from the server. The "map picture" as described in the present application shall mean a segment of a map which may be generated in different scales and resolutions. Depending on the scale of the map, the map picture can include names of locations, such as states, counties, cities, and streets. The map picture may further include the exact address where the remote device is currently located. According to one embodiment of the present invention, the server provides a series of map pictures of different scales to the subscriber's device. For example, a first map picture of the general area of the location of the remote device is sent, followed by a second map picture of its exact street address.

The remote device further includes a GPS receiver for receiving GPS signals from GPS satellites and generating positioning data relating to the receivers location, as known. The remote device includes a transceiver for electronically communicating with the server automatically, periodically, or upon a prompting signal from the
server, via the cellular communication network. The server includes a database which is configured for storing a telephone number of at least one subscriber's device, and a telephone number of at least one remote mobile device associated with the subscriber's device. The server further includes a second database for collecting the positioning data pushed from remote device via the cellular network. In addition, the server includes a transceiver for communicating with the remote device and the subscriber's device via a cellular communication network. The server further includes a processing unit configured for storing the data received from remote device in the database, sending the positioning data to graphic display generator, such as a map provider, for constructing one or more map pictures from the positioning data, and sending the map pictures to the subscriber device. Preferably, the processing unit implements digital rights management for controlling access to the database. For example, the processing unit identifies the subscriber's device according to the telephone number of the incoming call and determines the positioning data of the remote device associated with the requesting subscriber which is to be sent to the map provider. It will be appreciated that one remote device may be associated with several subscriber's devices; alternatively, several remote devices may be associated with subscriber's devices.

A "request signal", as used in the present application, shall mean a signal which can be sent by the subscriber's device to the server, a "positioning signal" shall mean a signal which can be sent by the remote device to the server, and a "prompting signal" shall mean a signal which can be sent by the server or the subscribers' device to the remote device, all via the cellular communication network. Preferably, these signals can be sent as a TCP/IP data packet, as an SMS, or other text message, which can be sent and received by a conventional cellular phone. The signals are sent utilizing technologies employed by a conventional cellular network, for example, GSM, CDMA, GPRS, etc.

"A subscriber's device", as used in the present application, shall mean a device, such as a cellular phone, a handheld device or a personal computer, having
cellular phone communication capabilities, which are configured to send and receive a request or positioning signals through a cellular network.

"A remote device", as used in the present application, shall mean a device, such as a cellular phone, a handheld device having cellular phone capabilities, or a personal computer, which is configured to receive a GPS signal and to send a positioning signal through a cellular network. Preferably, the remote device is a dedicated device, which includes fewer components than a conventional cellular phone or one of the other devices. This way, the remote device can operate on low energy consumption and for long periods of time between power charges.

According to one embodiment of the present invention, the remote device continually receives GPS signals from GPS satellites and calculates the coordinates of its own location. The remote device continually sends positioning signals containing this coordinate data (data indicating its location) to the server. The subscriber's device sends a request signal to the server prompting the server to prepare a map picture indicating the location of the associated remote device and send the map picture to the subscriber's device. **Figure 1** is a block diagram illustrating a system for collecting, forwarding and viewing of remote data, here illustrated as a positioning system 10 constructed and operative in accordance with one embodiment of the present invention. Positioning system 10 includes a subscriber device 12, a remote device 16, and a server 20, each having a dedicated telephone number which permits creating a telephone connection via a wireless cellular communication network 18.

Subscriber's device 12, here illustrated as a conventional cellular phone, includes a transceiver (not shown) configured for sending a request signal, such as a text message, and receiving a map picture via cellular communication network 18. According to one embodiment, the transceiver of subscriber's device 12 is a GSM transceiver, configured to send a text message (SMS), and to receive a data message, such as a Multimedia Messaging Service (MMS) carrier with a map picture. Subscriber's device 12 includes a keyboard 13, such as in conventional cellular
phones, to permit the subscriber to create a personal text message which serves as the request signal. Subscriber's device 12 is further configured for receiving an MMS with a map picture 15 via cellular phone network 18. According to one embodiment, subscriber's device 12 receives map picture 15 directly from server 20 and/or receives a link of a map picture stored in a remote location, for example, in server 20. In addition, subscriber's device 12 includes a display 14, here illustrated as a conventional cellular phone screen, for displaying map picture 15. Subscriber's device 12 is associated with a specific telephone number for establishing a wireless connection between subscriber's device 12 and other devices connected to cellular network 18.

According to one embodiment of the invention, subscriber's device 12 is a conventional cellular phone used by the subscriber to send and receive phone calls or text messages, and/or connect to the Internet. Thus, in this embodiment, when the subscriber wishes to monitor the location of remote device 16, he/she can use his/her personal cellular phone for that purpose without the need for an additional device.

Remote device 16 is a mobile device having a cellular transceiver 17, such as a GSM transceiver, configured for sending and receiving an electronic signal, such as a text message (SMS), and an MMS. Remote device 16 further includes a power source (not shown), and a GPS receiver 19 for receiving GPS signals from GPS satellites 11. Remote device 16 further includes a processing unit (not shown) for calculating the coordinates of the remote device based on the GPS signals received from satellites 11, as known in the art. The processing unit also handles and processes the received GPS signal. Thus, in this embodiment, the GPS receiver generates the data which may be processed and this remote data is sent by the remote device to the server.

According to one embodiment of the invention, remote device 16 is a conventional cellular phone having a GPS receiver. Remote device 16 is associated with a specific telephone number for establishing a wireless telephone connection between remote device 16 and other devices connected to wireless cellular network
18. Alternatively, remote device 16 may be a dedicated device which is configured only to receive GPS signals and transmit remote data consisting substantially of positioning signals. According to this embodiment, remote device 16 consumes very low power and, thus can be carried around for a long period of time without charging/replacing the power source. Remote device 16 may further include a circuit for controlling the power consumption.

Server 20 includes a database 22 for storing the telephone numbers of all participating subscriber's devices 12, and for storing the telephone numbers of all remote devices 16. In database 22, each subscriber's telephone number is associated with a telephone number of a remote device. It will be appreciated that each subscriber's telephone number may be associated with the telephone numbers of several remote devices. Server 20 further includes a second database 22a for storing positioning data pushed onto the server 20 from remote device 16 via the cellular network. It will be appreciated that the time period over which such data is retained can be set in advance.

Server 20 is coupled to cellular network 18, and includes a transceiver 24, such as a GSM transceiver, for receiving positioning data from the remote devices and request signals from subscribers' devices and sending map pictures to the subscribers' devices. In addition, server 20 includes a telephone number identifier 25, as part of a Digital Rights Management implementation, for identifying the telephone number of subscriber's device 12 and remote device 16 from which a signal (for instance, a TCP/IP signal) is received. Server 20 further includes a processing unit 28, such as a microprocessor, a Central Processing Unit (CPU) or an Arithmetic Logic Unit (ALU). Processing unit 28 is configured for receiving request signals and positioning signals via cellular network 18 or via the internet.

According to one embodiment, processing unit 28 is further configured for generating a map picture 15, based on GPS data, and preferably providing a location mark 15a indicating an exact location of remote device 16 on map picture 15.
According to one embodiment, processing unit 28 is further configured for sending the map picture to the subscriber's device directly or via an MMS carrier. Preferably, server 20 further includes means for connecting to the Internet, such as a cable modem, ADSL modem, or a wireless Internet modem, etc.

Positioning system 10 may further include a graphic display generator, here illustrated as a map generator 30 operated by a map provider, and an MMS carrier 32 operated by an MMS carrier, both communicating with server 20, preferably via the Internet. It will be appreciated that, alternatively, map generator 30 and/or MMS carrier 32, may be incorporated in server 20.

Positioning system 10 allows a subscriber to track the position of a remote device 16 by sending a request signal to server 20 and receiving a map picture 15 of the location of the remote device. Preferably, a location mark 15a, here illustrated as a pinpoint, indicating the exact location of remote device 16 on the map picture, is also provided. Map picture 15 is received by subscriber's device 12 and can be viewed on display 14.

In the embodiment illustrated in Figure 1, server 20 further includes a modem 26, for sending and receiving data over the World Wide Web, such as a cable modem, ADSL modem, etc.

In addition, server 20 may further include a web module 27 allowing a subscriber to view information regarding remote device 16, using an Internet Based System 34 via the Internet. Preferably, web module 27 is programmed for accessing via the Internet.

Server 20 retrieves positioning data associated with remote device 16 stored in database 22a and sends it to map generator 30. Map generator 30 generates a map picture 15 based on coordinates or other positioning data received from server 20, and MMS carrier 32 converts map picture 15 to a multimedia message and forwarding it to subscriber's device 12, as known. It will be appreciated that the accumulated remote positioning data stored in the second database 22a permits the
map generator to mark on the map picture the traveled route over time, as generated from the stored remote data.

According to this embodiment, receiving a map picture 15 with a location mark 15a indicating the location of remote device 16 is carried out by positioning system 10 of the present invention as follows: subscriber's device 12 sends an electronic request signal, for example a text message, to server 20 via cellular wireless network 18; telephone number identifier module 25, on server 20 identifies the telephone number of subscriber's device 12 from which the request signal is received, and matches the telephone number of subscriber's device 12 with an associated telephone number of remote device 16, which is stored in database 22. If more than one remote device is associated with subscriber's device 12, the request signal sent by the subscriber will include a code or other indicator identifying the desired remote device, and server 20 will use this code to match the request to the telephone number of the associated remote device.

Alternatively, the subscriber's device may be configured for sending a request signal encoded according to a predefined code, which server 20 can decode and use for matching the positioning data stored in database 22 of one or more remote devices, which are associated with the requesting subscriber's device. The code can be used to verify the authenticity of the signal source, thus precluding unauthorized use of subscribers' devices to locate remote devices.

According to another embodiment of the invention, the request signal sent by subscriber's device 12 is a telephone call, which is directed to server 20. Telephone number identifier 25 on server 20 is configured to automatically identify the telephone number of the incoming call. The server 20 is configured to automatically accept a request signal received from an identified subscriber's device and reject a request signal received from an unidentified subscriber's device. Based on the identified telephone number of subscriber's device 12, server 20 locates the positioning data of a remote device 16 whose telephone number is stored in database 22 associated with the subscriber's telephone number.
According to one embodiment, remote device 16 automatically receives GPS signals from GPS satellites 11, calculates the coordinates based on the received GPS signals, and automatically in preselected time periods sends positioning signals (e.g. its coordinates) to server 20. Preferably, server 20 may be farther configured to send a prompting signal to remote device 16, in case a positioning signal was not received after a predefined period of time. For example, remote device 16 may be configured to automatically send an updated positioning signal every 10 minutes. However, in the event that a request signal is received from a subscriber's device 12, requesting a map picture 15, 3 minutes after the last positioning signal was received, and server 20 may be programmed to send remote device 16 a special request signal prompting remote device 16 to immediately send server 20 a positioning signal. This way the subscriber receives an updated location indication of remote device 16. In addition, server 20 may be configured to send subscriber's device 12 an alert in case a positioning signal is not received from remote device 16 within a predefined period of time. In this way, the subscriber is notified that remote device 16 in non-operative, for whatever reason.

According to another embodiment, remote device 16 is configured to receive GPS signals from GPS satellites 11 only in case a prompting signal is received from server 20. Following the calculation of the coordinates, a positioning signal is sent from remote device 16 to server 20 including that information. Accordingly, in order to save electric power, remote device 16 may include a hibernate mode, which deactivates the remote device when no prompting signal is received.

Preferably, the calculations of the coordinates based on the GPS signal are carried out by a processor unit in remote signal 16, which then sends a positioning signal to server 20. Alternatively, the GPS signals received by remote device 16 may be forwarded to server 20, where the coordinates are calculated by processor unit 28 based on the received GPS signals.

According to one embodiment, the coordinates, which are sent by transceiver 17 to server 20 via cellular network 18, are sent as a data packet signal according to
an Internet protocol, such as TCP/IP. Utilizing an Internet protocol permits sending a large volume of data by remote device 16. Sending the positioning data via other protocols may restrict the data which can be transferred. For example, sending data in GSM protocol is restricted to 160 characters. Alternatively, the data may be sent to server 20 according to any other protocol which can be sent via a cellular network.

The positioning signals with the coordinate data which are sent by remote device 16 are received by modem 26 in server 20. Telephone number identifier module 25 in server 20 identifies the telephone number of remote device 16, from which the signal was received. The coordinate data received from remote device 16 is saved in database 22a. If remote device 16 is programmed to periodically send its coordinate data to server 20, a list of coordinates and the time of receiving each set of coordinates is saved in database 22a. It will be appreciated that, in order to allow a later retrieval of the saved coordinates, each set of coordinates preferably is saved in database 22a in a folder associated with the specific remote device.

When positioning data is automatically and periodically received from remote device 16, server 20 sends the latest coordinate data stored in database 22a to map generator 30, in response to a request signal sent by subscriber's device 12. According to an alternative embodiment, server 20 may be programmed to send to map generator 30 positioning data (i.e., sets of coordinates) of the associated remote device 16, which were received over a preselected period of time, for example, during the 10 hours prior to receipt of the request signal from subscriber device 12, and stored in database 22a. Map generator 30 generates one or more map pictures 15 from these coordinates, preferably including a location mark 15a for indicating the precise location of remote device 16 within the map picture. According to another embodiment, the map generator is not an external device, but is incorporated in server 20.

According to yet another embodiment, a prompting signal is sent from subscriber's device 12 to remote device 16. In response, remote device 16 is prompted to send positioning data to server 20. Server 20 either prepares a map
picture 15 or sends the received coordinates to map generator 30 located at a map provider to generate the map picture.

According to another embodiment, the scale of map picture 15 is determined so as to allow the subscriber to clearly view the location of remote device 16 on the map, according to the information presented on map picture 15. The scale of the map picture may also vary depending on the size of the area within which the remote device 16 is located. For example, when remote device 16 is carried by a traveler who is traveling in several countries in an area size of hundreds of kilometers, map picture 15 may be generated on a small scale to allow the subscriber to view all the countries in which the traveler is presumed to have traveled during the selected time period in one map. However, when remote device 16 is carried by a user who is walking in an area within a county or a city having a size of only few kilometers, map picture 15 may be generated on a large scale, so as to allow the subscriber to view the exact street on which the user is walking.

According to one embodiment, map generator 30 generates at least two and preferably several different map pictures, each having a different scale. For example, a first map picture in a relatively small scale is generated to display a map of the general area of the location of remote device 16. Then a second map picture in a relatively large scale is generated to display a map of the precise number and street address of remote device 16. Accordingly, the first map picture may include names of cities, highways, towns etc., and the second map picture may include names of streets and house numbers.

Preferably, map generator 30 sends map pictures 15 to server 20 which, in turn, sends them to subscriber's device 12. According to one embodiment, map picture 15 is sent to subscriber's device 12 via a device or server electronically coupled to the subscriber's device. One example of such a device or server is MMS carrier 32, which converts map picture 15 to a MMS, which is forwarded to subscriber's device 12. MMS carrier 32 can further store a MMS of map picture 15 for later use. In case subscriber's device 12 and server 20 do not share the same
cellular network, and consequently are not coupled to the same MMS carrier, MMS carrier 32 of the server's network may forward the MMS to the MMS carrier of the subscribers' device network, via the Internet. The MMS carrier of the subscriber's device network will then forward the MMS to the subscriber's device 12.

MMS carrier 32 is configured to determine whether subscriber's device 12 includes capabilities for receiving an MMS: if it does, the MMS including map picture 15 is forwarded to device 12; if it does not, the MMS may be delivered to a web based server, from which the map picture can be viewed through a cellular Internet browser. Additionally, MMS carrier 32 may determine the size of the map picture based on the size of display 14 of subscriber's device 12. It will be appreciated that in order to allow MMS carrier 32 to determine the permissible size of map pictures 15, it utilizes information regarding the subscriber's device 12, for example, the size of display 14.

According to yet another embodiment, map generator 30 may be configured to send picture map 15 directly to MMS carrier 32. It will be appreciated that along with map picture 15 sent to server 20 or to MMS carrier 32, an indication must be sent indicating to which subscriber's device 12 map picture 15 is to be sent.

Preferably, MMS carrier 32 is further configured to convert map picture 15 into a format which is compatible with the technical features of subscriber's device 12, for example, a format which is compatible with the capabilities of the transceiver, the processing unit, or display 14 of subscriber's device 12. Map picture 15 is sent via cellular network 18 to subscriber's device 12, where it can be viewed on display 14.

Preferably, along with map picture 15, MMS carrier 32 sends the precise address of the location of remote device 16, for example the street name and number, name of city and country, to subscriber's device 12.

According to one embodiment, a subscriber may view information regarding remote device 16 by accessing web module 27 through remote computing device 34. Web server 27 allows the subscriber to view a picture map 35, which is substantially
similar to picture map 15 sent to subscriber's device 12. Preferably, web module 27 further allows the user to change the scale of map picture 35, and to select additional data he/she wishes to view, such as location names, street names, points of interest, etc.

Preferably, access to web module 27 is enabled by an identification code assigned to each subscriber. The identification code permits the subscriber to view only information regarding the location of the remote device which is associated with that identification code and subscriber. Accordingly, a subscriber who wishes to track and/or trace the location of remote device 16 is requested to sign into the web module with a pre-assigned identification code. It will be appreciated that other schemes of Data Rights Management may be applied to protect information relating to remote device 16.

Preferably, the web module is configured to be accessed from a cellular phone. For example, the web server may include a Wireless Application Protocol (WAP) which is written in, or dynamically converted into, Wireless Markup LAN (WML).

It will be appreciated that cellular network 18, coupling subscriber device 12, remote device 16, and server 20, may include more than a single communication network. For example, subscriber's device 12 may be connected to a first cellular network operating in one country, whereas remote device 16 may be connected to a second cellular network operating in another country. In the description of the present invention, the first and second networks are considered as one cellular wireless network, provided that the first and second cellular networks are coupled to each other so as to enable a subscriber utilizing the first network to communicate with a subscriber utilizing the second network, and vice versa. Similarly, server 20 may share the same communication network with subscriber device 12 and/or remote device 16. Alternatively, server 20 may be coupled to a third communication network, so long as the third communication network is coupled to the communication networks of subscriber's device 12 and/or the remote device 16.
If desired, remote device 16 may be designed without an accessible on/off switch, precluding the possibility of the user turning it off intentionally or by accident.

In addition, remote device 16 may be provided with a distress button 21, which actuates remote device 16 to send an alert signal along with a positioning signal to server 20. In response to the alert signal, server 20 may send a map picture 15 to an associated subscriber's device 12, along with an alert message that the distress button was pressed. In addition, remote device 16 may further include an actuator coupled to a microphone (not shown), and a voice recognition software (not shown). The actuator can be programmed to send a signal to server 20 when a pre-recorded voice is detected by the voice recognition software. For example, if a child is in danger, his voice calling his mother, can be identified by the voice recognition software, following which the actuator prompts remote device 16 to send to server 20 an alert signal along with the positioning data, such as an SMS sent via cellular network 18. In response server 20 sends an alert signal to subscriber's device 12, which may be held by the child's mother. Remote device 16 may further include a speaker allowing the subscriber to send vocal messages to the person holding remote device 16.

Remote device 16 may include a power indicator 23, such as an LED, for indicating when the battery is charging or when it needs to be replaced or charged. Alternatively, or in addition, remote device 16 may be configured to send server 20 a power alert signal, when the power source of the remote device needs to be charged. In response to the power alert signal, server 20 may be configured to send subscriber's device 12 a low power alert, such as by an SMS.

Server 20 may be programmed to send subscriber's device 12 an alert when the coordinate data received from a remote device show that the person carrying the remote device entered a dangerous region, or went out of a predefined zone, for example, left the perimeters of a preselected city or a predefined area within a city.
Remote device 16 may be carried by a child, allowing his/her parents or other persons to determine his/her location, and to trace the locations in which he/she visited in a pre-selected period of time.

Alternatively, the remote device may be carried by an elderly person, for example, one who suffers from Alzheimer's disease. The positioning system according to the present invention can be used to notify a family member or a medical attendant of the location of the elderly person carrying the remote device.

According to a further embodiment, remote device 16 may be coupled to a vehicle. Subscriber's device 12 may be held by the owner of the vehicle or by a control center or security personnel. This way, the vehicle owner can receive reliable information regarding the current location of the vehicle. As described above, remote device 16 may be configured to notify the vehicle owner when the vehicle leaves the perimeters of a preselected zone.

In addition, electric systems of a vehicle may include means for creating electronic signals, for example electronic switches and relays as known, when the vehicle motor is ignited, or when the vehicle begins to move. These signals are fed to remote device 16, which may be programmed to receive the signals and respond automatically by sending alert signals to server 20. Upon receiving an alert signal from remote device 16, server 20 may send to subscriber's device 12 via the positioning system along with map picture, an alert message notifying the subscriber that the motor was ignited or that the vehicle is in motion. This embodiment is particularly useful for a vehicle owner who wishes to be notified when an unauthorized person is entering the car.

According to this embodiment, remote device 16 may further include an actuator, for example an electronically controlled switch, as known, which can be coupled to the electric system of a vehicle for controlling the system. This arrangement permits the subscriber to remotely control the vehicle. For example, the actuator in remote device 16 may be connected to the electric supply line from the battery to the ignition switch of the vehicle and can shut down the electric supply of a
vehicle in response to a signal sent by a subscriber's device of the vehicle owner and received by remote device 16. Thus, the remote device having an actuator allows the subscriber to remotely stop the vehicle. In this way remote device 16 can be used in addition to providing signals, remote control of the vehicle. This is particularly useful when the vehicle owner suspects that the vehicle has been stolen.

According to one embodiment, server 20 includes a software system that learns the standard patterns of the position of remote device 16 and from the coordinate data which is collected and stored in server 20 over a preselected period of time. This software system may generate alerts to the subscriber's device 12 when these patterns are changed. For example, the system may learn that during the morning hours of weekdays, the position of remote device 16, which is carried by a child, is within the school premises. Accordingly, during these hours the system checks the location of remote device 16 and compares it with the locations in the regular patterns. In case the coordinate data received from remote device 16 do not match the coordinates of the regular pattern, server 20 is configured to generate an SMS with an alert to subscriber's device 12 indicating that remote device 16 is out of its expected zone. This behaviorally adaptive system is programmed to learn the position patterns of any remote device 16 according to predetermined parameters provided by the subscriber upon activation.

Referring now to Figure 2, there is shown a block diagram illustrating a data collecting, forwarding and viewing system 50 constructed and operative in accordance with another embodiment of the present invention. In Figures 1 and 2, like elements are denoted by like reference numerals. System 50 is substantially the same as positioning system 10 of Figure 1, and includes a subscriber's device 12, a remote device 16, and a server 20, each having a dedicated telephone number which permits creating a telephone connection via cellular wireless communication networks 18. System 50 may further include a graphic display generator 60 and an MMS carrier 32 having electronic communication with server 20, preferably via the Internet.
According to this embodiment, remote device 16 is coupled not to a GPS receiver, which in the positioning system described above acts as a positioning data generator, but to an electronic sensor of various other measurements of physical phenomena changes. One example of such an electronic sensor is a thermometer, which senses heat and generates data signals corresponding to the measured temperature. Thus, remote device 16 may receive these data signals from a data generator 55 and periodically send them automatically to server 20, were they are processed similarly to the coordinate data, as described above. Server 20 may include a graphic display generator 60 which plots a graph 57 according to the data received from data generator 55, and forwards graph 57 to subscriber's device 12. Server 20 may be programmed to send graph 57 to subscriber's device 12 in response to a request signal received from the latter. Thus, for example, if the subscriber wishes to know the temperature change in a remote location, it will send a request signal to server 20, in which the temperature data pushed by remote device 16 is collected and processed, and in turn server 20 sends the temperature data to the subscriber's device 12. Alternatively, the subscriber's device may be coupled to the remote device permitting the subscriber wishing to know the temperature change in a remote location to send a prompting signal directly to the remote device. In this example, graph 57 illustrating the temperature change over a preselected time period can be plotted and sent to subscriber's device 16. As described above in reference to Figure 1, graph 57 may be sent to subscriber's device 12 directly from server 20, through an MMS carrier 32, or in any other suitable fashion. It will be appreciated that graph generator 60, and/or MMS carrier 32, may be included in server 20, or alternatively, may be operated by an external graph provider and a MMS provider, respectively, coupled to server 20.

It will be appreciated that data generator 55 may include any one of a variety of sensors, for example a light sensor, contact sensor, humidity sensor, heat sensor, a motion sensor, a current sensor, etc., which is configured to sense a physical change and generate data signals corresponding to the sensor readings. Thus, system 50 can
be used to collect data and provide visual display of the data signals to a subscriber upon request.

It is a particular feature of the present invention that the data signals, such as the positioning signals and heat data signals, can be accumulated over time and displayed to the subscriber as a positioning track on a map picture or as a plotted graph over time.

While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications and other applications of the invention may be made. It will further be appreciated that the invention is not limited to what has been described hereinabove merely by way of example. Rather, the invention is limited solely by the claims which follow.
CLAIMS

1. A system for collecting, forwarding and displaying of remote data over a wireless network, the system comprising:
   a server;
   a subscriber's device having a transceiver for coupling to said server via the wireless network, said transceiver being configured for sending a request signal to said server, and for receiving data from said server;
   a data generator; and
   a remote device coupled to said data generator for receiving data therefrom,
   said remote device having a transceiver for coupling to said server via the wireless network for sending remote data corresponding to said received data to said server;
   said server being configured for receiving said remote data from said remote device; and
   a graphic display generator coupled to said server for generating at least one graphic display of at least a portion of said remote data;
   wherein said remote device is associated with said subscriber's device.

2. The system of claim 1, wherein said server further includes at least one database for storing a telephone number of at least one said subscriber's device, and a telephone number of at least one said remote mobile device associated with said subscriber's device.

3. The system of claim 2, wherein said server further includes a second database for storing said remote data from said remote device.

4. The system of claim 2, wherein said second database is arranged to store data from said remote device accumulated over a predefined period of time.

5. The system of claim 1, wherein said data generator is a GPS receiver.
6. The system of claim 1 wherein said graphic display generator is a map generator.

7. The system of claim 1, wherein said data generator includes an electronic sensor, and is configured to generate data signals corresponding to said sensor readings.

8. The system of claim 7, wherein said sensor is selected from the group consisting of a heat sensor, a motion sensor, a humidity sensor, light sensor, a current sensor, and a contact sensor.

9. The system of claim 1, wherein said graphic display generator is configured for receiving a portion of said data from said server and generating at least one graphic display of said received data.

10. The system of claim 1 wherein said graphic display generator is incorporated in said server.

11. The system of claim 1 further comprising an MMS carrier coupled to said server for receiving said at least one graphic display from said server and converting said at least one graphic display to a multimedia message (MMS).

12. The system of claim 1 further comprising an MMS carrier coupled to said graphic display generator for receiving said at least one graphic display from said graphic display generator and converting said at least one graphic display to an MMS.
13. A system for collecting, forwarding and displaying of remote positioning data over a wireless network, the system comprising:

a server;

an Multimedia Messaging Service (MMS) carrier coupled to said server;

a subscriber's device having a transceiver for coupling to said server and to said MMS carrier via the wireless network, said transceiver being configured for sending a request signal to said server, and for receiving data from said MMS carrier;

a remote device including a GPS receiver for receiving GPS signals, said remote device having a processing unit, for generating positioning data corresponding to said GPS signals, and a transceiver, for sending said positioning data to said server via the wireless network;

wherein said remote device is associated with said subscriber's device;

a map picture generator coupled to said server for receiving said positioning data from said server and generating at least one map picture representing at least a portion of said positioning data;

said server being further configured to receive said map picture from said map picture generator and send said map picture to said MMS carrier for forwarding to said subscriber's device.

14. The system according to claim 13, wherein said map picture generator is adapted and configured to provide a location mark indicating on said map picture location of said remote device.

15. The system according to claim 13 or 14,

Further comprising a database in said server for storing and accumulating said remote data; and

wherein said map picture generator is adapted and configured to provide location marks indication on said map picture a route traveled by said remote device from said accumulated remote data.
16. A method for forming a system for collecting, forwarding and displaying of remote data over a wireless network, the method comprising:

coupling a subscriber's device, having a transceiver, to a server via the wireless network,

configuring said transceiver for sending a request signal to said server and for receiving data from said server;

coupling a remote device associated with said subscriber's device to a data generator for receiving data therefrom, said remote device having a transceiver for coupling to said server via the wireless network, for sending remote data corresponding to said received data to said server;

configuring said server for receiving said remote data from said remote device; and

coupling a graphic display generator to said server for generating at least one graphic display of at least a portion of said data.

17. A method for collecting, forwarding and displaying of remote data over a wireless network, the method comprising:

generating remote data in a remote data generator

receiving said remote data in a remote device coupled to said data generator;

sending said remote data to a server coupled to said remote device;

receiving a request signal from a subscriber's device coupled to said server;

generating a graphic display representing at least a portion of said remote data in said server; and

providing said graphic display to a subscriber's device.

18. The method according to claim 17, wherein

said step of generating remote data includes generating remote location data;
said step of generating a graphic display includes generating at least one map picture representing a location of said remote location data.

19. The method according to claim 18, further comprising storing accumulated remote positioning data, and said step of generating a graphic display includes marking on the map picture a route traveled over time, as generated from the stored remote data.

20. The method according to claim 18, further comprising providing a location mark on said map picture indicating a location of remote device on said map picture.

21. The method according to any of claims 18-20, further comprising storing said remote data in a database in said server.
A CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H04W 4/00 (2010.01)
USPC - 455/422 1

According to International Patent Classification (IPC) or to both national classification and IPC

B FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

USPC 455/422 1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

USPC 455/422 1; 709/201, 203, 219, 342/357 01, 357 05, 701/207, 208, 213 (text search-see below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWest (PGPB,USPT,EPAB,JPAB), Google Scholar (Patents,Articles)
Search terms map, position, message, multimedia, MMS, GPS, tracking, remote, device, server, database, number, cellular, phone

C DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
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<td>X</td>
<td>US 2005/0020242 A1 (HOLLAND et al ) 27 January 2005 (27 01 2005) FIGs 1 and 8, and para [0024][0027], [0030][0032], [0034][0036], [0040][0043], [01 19]</td>
<td>17, 18, 20, 21</td>
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<td>Y</td>
<td>US 2005/0174235 A1 (DAVIS et al ) 11 August 2005 (11 08 2005) FIGs 2, 7, 11, 12, and para [0050][0051], [0059], [0068], [0096], [0105][01 10]</td>
<td>1-16, 19</td>
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Further documents are listed in the continuation of Box C

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Date of the actual completion of the international search

29 May 2010 (29 05 2010)

Date of mailing of the international search report

10 JUN 2010

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