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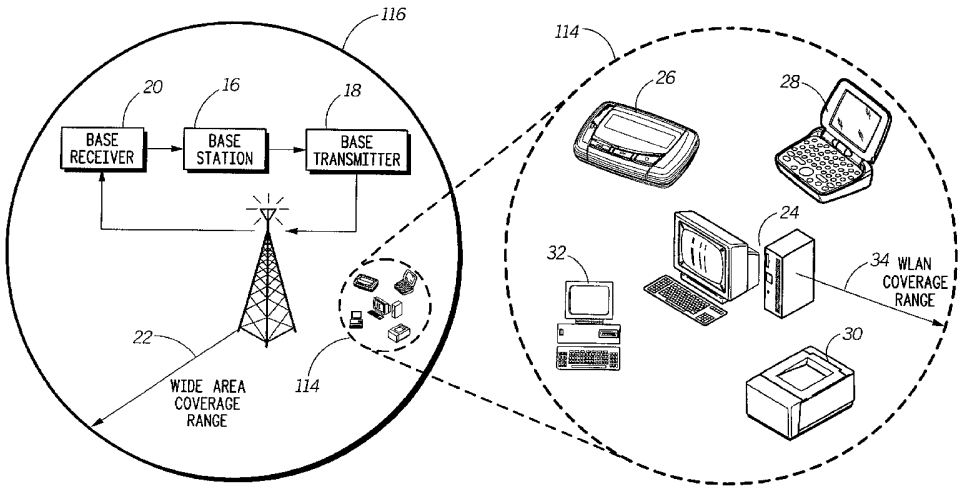

(57) Abstract: A portable device (100) communicates with a short range wireless local area network (114) and a wide area communication system (116). The portable device (100) receives a location data from the short range wireless local area network (114). The portable device (100) generates a location sensitive information request to the wide area communication system (116) including the location data received from the short range wireless local area network (114).

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COMMUNICATION SYSTEM FOR LOCATION SENSITIVE INFORMATION AND METHOD THEREFOR

Background of the Invention

Field of the Invention

This invention relates in general to communication systems and in particular to systems for communication of location sensitive information.

Description of the Related Art

Short range wireless communication and personal area networking capability will soon proliferate in common household products as well as mobile business products. Currently many products that have wireless capability are incompatible. Short range wireless local area network (WLAN) protocols such as Bluetooth, HomeRF, and IEEE 802.11 provide an avenue towards compatibility. These short range WLAN protocols operate at lower power and over shorter distances. Further, these short range WLAN protocols generally use unlicensed spectrum and require minimal coordination with the wide area communication protocol also used by the device such as the Global System for Mobile Communications (GSM) and ReFLEX™ protocols.

Short range wireless communication can be, for example, provided using an Infrared Data Association (IrDA) communication standard. IrDA is a point-to-point, narrow angle (30 degree cone), ad-hoc data transmission standard designed to operate over a distance of zero (0) to one (1) meter and at speeds of ninety six hundred (9600) bits per second to sixteen (16) Mega bits per second. Similarly, the short range communication can be provided using a Bluetooth communication standard. Bluetooth is a short range, point-to-multipoint voice and data transfer standard designed to operate over a nominal distance of ten (10) centimeters to ten (10) meters, which can be extended to one hundred (100) meters by increasing transmit power. Bluetooth operates in the 2.4 Gigahertz radio frequency range.

Short range WLAN protocols such as IrDA and Bluetooth technology allow for the replacement of the many proprietary cables that connect one device to another with one universal short range radio link. For example, short range WLAN protocol technology can replace the cumbersome cables used today to connect between a laptop computer and a cellular telephone, between printers, personal digital assistants, desktops, fax machines, keyboards, and joysticks, or between other similar digital devices. Further, appliances such as refrigerators, microwave ovens, dishwashers, laundry washers & dryers, stereos, televisions, digital video disks, video games, lighting, irrigation, cooling and heating systems can also take advantage of such short range radio links.

Potential applications of low power, short range protocols include wireless connection of peripheral devices, high-speed data transfers to desktop computers and wireline networks, and establishment of short range WLANs by the sharing of the same channel between similar wireless communication devices. Typically, in a short range WLAN, one of the devices functions as the master while the others function as slaves. For example, in a Bluetooth system, up to seven active slaves can exist in a WLAN, while many more can remain locked to the same master in a so-called parked state. These parked units cannot be active on the channel, but remain synchronized to the master. The master always controls the channel access for both the active and the parked units. The master in a Bluetooth system controls the traffic across the channel using a polling scheme. Once a short range WLAN has been established, master-slave roles can be exchanged. To avoid collisions, communication between two slaves can only be accomplished through the master unit.

Many short range WLANs such as the Bluetooth system support scatternets. A scatternet is the combination of two or more networks with overlapping coverage area. Each network can only have one master. However, a master in one network can participate as a slave in another and slaves can also participate in different networks on a time division multiplex basis. Networks within a scatternet are not time or frequency synchronized. Each network uses its own hopping sequence.

Recently some portable devices incorporate the capability to determine device location. For example, a wireless communication system can use direction finding equipment at each base station site in order to fix the location of the portable device. The current device location is computed by triangulation when two or more transmitter

base stations receive the same signal. Thus, when two or more transmitter base stations cannot receive the same signal the location of the portable device cannot be accurately determined. In addition, even when the two or more base stations can receive the same signal the system still has limited ability to accurately determine the location of the portable device due to the random propagations signaling paths between the portable device and the base station receivers.

Similarly, the portable device can include a Global Positioning System (GPS) receiver for determining its current location. The Global Positioning System (GPS) is a worldwide radio-navigation system formed from a constellation of twenty four (24) satellites and their ground stations. GPS uses these "man-made stars" as reference points to calculate positions accurate to a matter of meters. The GPS receiver uses the satellites in space as reference points for locations here on earth. The GPS receiver measures distance using the travel time of radio signals. The GPS receiver has very accurate timing to measure travel time. Along with distance, the GPS receiver knows exactly where the satellites are in space. Finally, the GPS receiver corrects for any delays the signal experiences as it travels through the atmosphere. Disadvantageous to the portable device is the added cost and size requirements associated with the inclusion of on-board location determining components

Typically, a short range WLAN determines the location of a portable device by pre-knowledge of the location of a fixed smart network access point or the knowledge of the location limitations of the short range WLAN network that the portable device is utilizing to communicate through. Therefore, the short range WLAN does not need to request the present location from the portable device to provide location sensitive information. For example, the short range WLAN can be a private network with firewalls that have predetermined smart network access points located in an office building. Therefore, getting information with regards to vending machine locations or directions to a meeting room within the building from a current device location can be done within such a private network without the portable device having knowledge of its current location.

One disadvantage of today's communication systems is that the local area communication system alone has the location data. Therefore, only location sensitive information requested through that local area communication system can be provided. The portable device does not have the capability of receiving location sensitive

information independent of the local area communication system. Disadvantageously to the device user, the short range WLAN could be void of any location sensitive information for the surrounding area, which otherwise could be provided by a wide area communication system. For example, although directions to a meeting room from an office can be given from the short range WLAN within an office building, the daily lunch specials and directions to the local seafood restaurant may not be available to be retrieved from that same short range WLAN located behind the firewall.

Portable devices that do not have on-board location determining capability either cannot use location sensitive software applications or require a user to enter the location data manually. (i.e.: by entering a street address and city, or a zip code). For example, this lack of on-board location capability can be due to either the absence of a hardware or software solution or can be due to the inability to access information required by the solution to enable location determination. Manual entry of location data can be problematic, especially when the user has traveled away from his home geographic area.

Dedicated short range WLAN devices typically contain a single method of communication capabilities used to communicate within the short range WLAN. These devices probably do not need to know their location as the network from which they can receive information can have accurate knowledge of where they are located. Therefore, it would be inefficient use of the short range WLAN bandwidth to provide such devices with their current location, as it may not be able to be used by the device.

What is needed is a system and method for facilitating the identification and communication of location sensitive information for a portable device that has multiple communication methods without requiring the use by the portable device of on-board location determining capability. (For example, when the portable device on-board location determining capability is not available due to either the absence of a hardware or software solution or due to the inability to access information required by the solution to enable location determination.) Further, what is needed is an efficient low cost system and method for location sensitive information access independent of a particular local area communication network or system.

Brief Description of the Drawings

The present invention will be described by way of exemplary embodiments, but not limitations, illustrated in the accompanying drawings in which like references denote similar elements, and in which:

FIG. **1** is a block diagram of a communication system having a short range wireless local area network and a wide area communication system;

FIG. **2** is an electrical block diagram of a portable device for use within the communication system of FIG. **1** in accordance with the present invention;

FIG. **3** is an electrical block diagram of a short range wireless local area network for use in the communication system of FIG. **1** in accordance with the present invention; and

FIGs. **4-6** are flow diagrams illustrating the operation of the communication system of FIG. **1** in accordance with the present invention.

Detailed Description Of The Preferred Embodiment(s)

As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention, which may be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one of ordinary skill in the art to variously employ the present invention in virtually any appropriately detailed structure. Further, the terms and phrases used herein are not intended to be limiting; but rather, to provide an understandable description of the invention.

Referring to FIG. **1**, a communication system **10** having a short range WLAN **114** and a wide area communication system **116** is illustrated. The wide area communication system **116** as shown in FIG. **1** includes a base station **16** with a co-located base transmitter **18** and a base receiver **20** covering a wide area coverage range

22 as shown. A typical wide area communication system could, for example, utilize Motorola's ReFLEX™ messaging protocol.

It will be appreciated by one of ordinary skill in the art that the wide area communication system **116**, in accordance with the present invention, can function utilizing any wireless RF channel, for example, a one or two-way pager channel, a mobile cellular telephone channel, or a mobile radio channel. Similarly, it will be appreciated by one of ordinary skill in the art that the wide area communication system **116** can function utilizing other types of communication channels such as infrared channels, audio channels, and local area networks. In the following description, the term "wide area communication system" refers to any of the systems mentioned above or an equivalent.

The communication system **10** of FIG. **1** includes a plurality of devices for operation within the communication system **10**. Preferably, each of the devices (i.e.: a personal computer **24**, a wireless communication device **26**, a personal digital assistant **28**, a printer **30**, and a computer **32**) is a device using a short range WLAN protocol, such as Bluetooth technology to communicate within the WLAN coverage range **34** of the short range WLAN **114**. It will be appreciated by one of ordinary skill in the art that the short range WLAN protocol, in accordance with the present invention, can function utilizing any short range wireless protocol such as IrDA, HomeRF, and IEEE 802.11. Further it will be appreciated by one of ordinary skill in the art that some of the devices, for example the wireless communication device **26,** can also operate on the wide area communication system **116**.

FIG. **2** is an electrical block diagram of a preferred embodiment of a portable device **100** for use within the communication system **10** of FIG. **1** in accordance with the present invention. It will be appreciated by one of ordinary skill in the art that the portable device **100**, in accordance with the present invention, can be the personal computer **24**, the wireless communication device **26**, the personal digital assistant **28**, the printer **30**, or the computer **32** of FIG. **1**. Further, it will be appreciated by one of ordinary skill in the art that the portable device **100**, in accordance with the present invention, can be a mobile cellular telephone, a mobile radio data terminal, a mobile cellular telephone having an attached data terminal, or a two way pager, such as the "Pagewriter 2000X" manufactured by Motorola Inc. of Schaumburg, Illinois. Further,

the portable device **100** can be a small portable personal computer having wireless communications capability. In the following description, the term "portable device" refers to any of the devices mentioned above or an equivalent.

The portable device **100** preferably comprises a short range wireless transceiver **102**, a wide area wireless transceiver **104**, a processor **106**, a user interface **108**, a display **110**, an alert circuit **118**, and a memory **112**.

The short range wireless transceiver **102** provides communication means for the portable device **100** to communicate using a short range WLAN protocol, such as Bluetooth technology, with other similar devices within the short range WLAN **114**. The short range wireless transceiver **102** employs conventional demodulation techniques for receiving the communication signals from the short range WLAN **114**. Further, the short range wireless transceiver **102** is coupled to the processor **106** and is responsive to commands from the processor **106**. When the short range wireless transceiver **102** receives a command from the processor **106**, the short range wireless transceiver **102** sends a signal to the short range WLAN **114**. The short range wireless transceiver **102** includes components well known by one of ordinary skill in the art, such as filters, mixers, small-signal amplifiers, a demodulator, and other known elements necessary to receive, demodulate, decode, and transmit information-bearing signals in accordance with the short range WLAN protocol.

The wide area wireless transceiver **104** provides communication means for the portable device **100** to communicate using a wide area communication protocol within the wide area communication system **116**. The wide area wireless transceiver **104** employs conventional demodulation techniques for receiving the communication signals from the wide area communication system **116**. Further, the wide area wireless transceiver **104** is coupled to the processor **106** and is responsive to commands from the processor **106**. When the wide area wireless transceiver **104** receives a command from the processor **106**, the wide area wireless transceiver **104** sends a signal to the wide area communication system **116**. The wide area wireless transceiver **104** includes components well known by one of ordinary skill in the art, such as filters, mixers, small-signal amplifiers, a demodulator, and other known elements necessary to receive, demodulate, decode, and transmit information-bearing signals in accordance

with the wide area communication protocol used by the wide area communication system **116**.

The portable device **100** further comprises the processor **106** coupled to the short range wireless transceiver **102** and further coupled to the wide area wireless transceiver **104** for controlling the short range wireless transceiver **102** and the wide area wireless transceiver **104**. The processor **106** utilizes conventional signal processing techniques for processing received messages. Preferably, the processor **106** is similar to the MC68328 micro controller manufactured by Motorola, Inc. of Schaumburg, Illinois. It will be appreciated by one of ordinary skill in the art that other similar processors can be utilized for the processor **106**, and that additional processors of the same or alternative type can be utilized as required to handle the processing requirements of the processor **106**.

The processor **106** is preferably coupled to the display **110**. Upon receipt of a message, the processor **106** communicates a command signal to the display **110** to generate a visual notification of the receipt and storage of the message. When the display **110** receives the command signal from the processor **106** that the message has been received and stored, a message indication is displayed. The message indication, for example can be the activation of one of a plurality of message icons on the display **110**. Further, the processor **106** communicates a command signal to the display **110** to notify the device user of any other information of interest to the device user such as an approximated device location. Upon receipt of the command signal from the processor **106**, the display **110** displays the required information such as the approximated device location for visual notification to the device user. The display **110** can be, for example, a liquid crystal display utilized to display text. It will be appreciated by one of ordinary skill in the art that other similar displays such as dot matrix displays can be utilized for the display **110**.

The processor **106** is preferably further coupled to and responsive to the user interface **108**. The user interface **108** can be a keypad, one or more buttons, a voice response interface, or some other similar method of interfacing with a manual response initiated by the device user of the portable device **100**. Upon receipt of a signal from the user interface **108**, the processor **106** performs an associated function. For example, upon visual notification of an approximated device location on the display

110, the device user, via the user interface **108** can accept or reject the displayed approximated device location.

The processor **106** is preferably further coupled to the alert circuit **118**. Upon receipt and processing of a message, the processor **106** preferably generates a command signal to the alert circuit **118** as a notification that the message has been received and stored. Further, the processor **106** can generate a command signal to the alert circuit **118** for any other purpose as required by the portable device **100**. For example, the command signal from the processor **106** to the alert circuit **118** can be generated to inform the device user of a change in device location, of leaving the short range WLAN coverage area **34** (see FIG. **1**), or of the availability of location sensitive information. The alert circuit **118** can include a speaker (not shown) with associated speaker drive circuitry capable of playing melodies and other audible alerts, a vibrator (not shown) with associated vibrator drive circuitry capable of producing a physical vibration, or one or more LEDs (not shown) with associated LED drive circuitry capable of producing a visual alert. It will be appreciated by one of ordinary skill in the art that other similar alerting means as well as any combination of the audible, vibratory, and visual alert outputs described can be used for the alert circuit **118**.

To perform the necessary functions of the portable device **100**, the processor **106** is coupled to the memory **112**, for storing information and software for programming the processor **106** in accordance with the present invention. The memory **112** preferably includes a random access memory (RAM), a read-only memory (ROM), and an electrically erasable programmable read-only memory (EEPROM)(not shown). In a preferred embodiment, the memory **112** comprises a location information memory **120**, a device profile memory **122**, a discovery routine memory **124**, a communications processing memory **126**, and a device identity memory **128**.

The portable device **100** preferably stores a plurality of location data in the location information memory **120** of the memory **112**. The plurality of location data can be obtained by the portable device **100** via a command from the processor **106** to the short range wireless transceiver **102** requesting from the short range WLAN **114** the location coordinates for the portable device **100**. Alternatively, the plurality of location data such as the device location coordinates can be received from the short range WLAN **114** automatically without request from the portable device **100**. For

example, the short range WLAN **114** can send the plurality of location data to the portable device **100** as a message using the short range WLAN protocol or as an attachment to another message, (i.e. as part of a service discovery process) using the short range WLAN protocol. The location coordinates are then stored as the plurality of location data in the location information memory **120**. The plurality of location data, for example, can include a current location, a current time, as well as previous locations and associated previous times. It will be appreciated by one of ordinary skill in the art that the current and previous times can be determined by the short range WLAN **114** and transmitted to the portable device **100** with the other location data. Alternatively, the portable device **100** can include a clock (not shown) for calculation of the current time or previous times. In a preferred embodiment of the present invention, the processor **106** receives location data of the short range WLAN **114** from the short range WLAN **114** and stores the location data in the location information memory **120**. Using the stored location data, the processor **106** can approximate the location of the portable device **100**.

Advantageously to the portable device and device user, upon receipt and storage of the location data in the location information memory **120**, the portable device **100** can request location sensitive information from not only the short range WLAN **114**, but also from any other communication system independent of the short range WLAN **114** such as the wide area communication system **116**. The location sensitive information, for example, can be a listing of restaurants, gas stations, or community parks in a particular city. The location sensitive information also can be a listing of offices within a particular office building. It will be appreciated by one of ordinary skill in the art that the locations sensitive information can be any of the items mentioned above or an equivalent. The location sensitive information can be obtained by the short range WLAN **114** or the wide area communication system **116** via the Internet or via a database stored in any other server connected to the short range WLAN **114** or the wide area communication system **116**. Further, the location sensitive information can be obtained by the short range WLAN **114** or the wide area communication system **116** by requesting the information using the respective protocols of each system to other devices connected to each system. It will be

appreciated by one of ordinary skill in the art that the location sensitive information can be obtained from any of the sources mentioned above or an equivalent.

The benefit of this method is the ability for the portable device **100** to obtain its location data from the short range WLAN **114** and then obtain location sensitive information associated with that particular location from the short range WLAN **114**, the wide area communication system **116**, and/or any other independent communication network which would have otherwise not have access to such information. This inability to access by the portable device **100** can be due to not having on-board location determining capability, due to the need to save the additional cost for such a solution, due to the inability to access information required by the solution that enable location determination, or any other equivalent reason.

In one embodiment, the plurality of location data is updated periodically as the portable device **100** travels among a plurality of locations. For example, a person walking through an airport can obtain information of the location of desired services, offices, restaurants, clubs, restrooms, gates, and the like within the other parts of the airport. An application on the person's portable device preferably utilizes the location data such as location coordinates received from each smart network access point he passes while in motion to update the location data for the portable device **100** and display the updated location data on the display **110** of the portable device.

The portable device **100** stores device profile information in the device profile memory **122** of the memory **112**. The device profile information, for example, can include the device battery life, device battery capacity, device processing power, and access to both short range WLANs and wide area communication systems. The device profile information can further include dial up networking, facsimile, printing, TCS-binary (Telephony Control/signaling for phones), TCS-AT, Personal Area Networking (PAN), audiovisual (A/V), OBEX (Object Exchange protocol), and still imagery. Preferably, a profile is a set of rules that are followed to insure interoperability for that profile. For example a PAN profile can require PPP (Point to Point Protocol) running over IP (Internet Protocol). It will be appreciated by one of ordinary skill in the art that the device profile information of the portable device **100**, in accordance with the present invention, can be any of the technology enablers mentioned above or an equivalent.

The memory **112** further includes the discovery routine memory **124**. The discovery routine memory **124** stores a program for controlling the operation of the processor **106** in decoding a service discovery protocol. For example, when the short range WLAN uses a Bluetooth protocol, the service discovery protocol (SDP) within Bluetooth provides a means for applications programmed into a device to discover which services are available and to determine the characteristics of those available services. Within the service discovery protocol a mechanism is provided that incrementally discovers information about the services provided by a device. This is intended to minimize the quantity of data that must be exchanged in order to determine that a client does not need a particular service. Bluetooth's service discovery mechanism is self-contained and therefore requires no registration with a central server/database. After the initial connection and setup the portable device **100** will do a service request to the short range WLAN **114**. The service discovery protocol involves communication between a SDP client and SDP server within the short range WLAN **114**. The SDP server maintains a list of service records that describe the characteristics of services associated with the SDP server. Each service record contains information about a single service. A client may retrieve information from a service record maintained by the SDP server by issuing a SDP request. A Global Positioning System (GPS) record can be created so that this information could be provided to a SDP client upon request. The record can include longitude, latitude, alleviation and time derived from the GPS satellites or other source. The SDP record information can be data of the access point and would be stored locally. It will be appreciated by one of ordinary skill in the art that the service discovery protocol can be the service discovery protocol (SDP) within Bluetooth or any equivalent service discovery protocol used by the short range WLAN protocol of the short range WLAN **114**.

The memory **112** further includes the communications processing memory **126** for programming the processor **106** to process communications in accordance with the short range WLAN protocol used by the short range WLAN **114** and to process communications in accordance with the wide area communications protocol used by the wide area communication system **116**.

The memory **112** further includes the device identity **128** for uniquely identifying the portable device **100**. The device identity **128** assigned to the portable device **100**

preferably is a unique selective call address in the wide area communication system **116** and also in the short range WLAN **114**. It will be appreciated by one of ordinary skill in the art that other portable devices assigned for use in wide area communication system **116** and in the short range WLAN **114** also have a device identity assigned thereto, which preferably also comprise a unique selective call address. The device identity **128** enables the transmission of a message from the wide area communication system **116** and/or the short range WLAN **114** only to the portable device having the specified device identity; and identifies the messages and responses received by the wide area communication system **116** and/or by the short range WLAN **114** from the portable device **100** with the device identity **128**. In one embodiment, the portable device also has a pin number assigned thereto, the pin number being associated with a telephone number within a Public Switched Telephone Network (PSTN). A list of assigned pin numbers and correlated telephone numbers for the portable devices is stored in a terminal in the form of a subscriber database for use by the wide area communication system **116** and/or the short range WLAN **114**.

FIG. **3** illustrates a preferred embodiment of the short range WLAN **114** of FIG. **1** in accordance with the present invention. The short range WLAN **114** of FIG. **3** includes the portable device **100**, a smart network access point **130**, a wireless device **132**, a printer **134**, a networked device **136**, a network backbone **138**, and a terminal **140**.

As illustrated in FIG. **3**, the portable device **100** is coupled to the smart network access point **130**. Preferably, the smart network access point **130** functions as a master and the plurality of devices such as the portable device **100**, the printer **134**, and the wireless device **132**, each coupled to the smart network access point **130**, function as slaves. It will be appreciated by one of ordinary skill in the art that each of the plurality of devices in accordance with the present invention, can be a mobile cellular telephone, a mobile radio data terminal, a mobile cellular telephone having an attached data terminal, or a two way pager, such as the "Pagewriter 2000X" manufactured by Motorola Inc. of Schaumburg, Illinois. Similarly, each of the plurality of devices, in accordance with the present invention, can be a printer, a personal computer, or a personal digital assistant. Further, the plurality of devices can include a small portable personal computer having wireless communications capability. In the following

description, the term "device" refers to any of the devices mentioned above or an equivalent. It will be further appreciated by one of ordinary skill in the art that alternatively one or more of the plurality of devices can take the role of the smart network access point **130**.

The smart network access point **130** can be a bridge between the short range WLAN **114** and the wide area communication network **116**. Similarly, the smart network access point **130** can be a bridge between a plurality of short range WLANs in a fast changing mobile environment. One device within the short range WLAN **114** preferably includes a GPS receiver or a similar means to determine location that can be broadcasted to other devices on the move. Alternatively, the smart network access point **130** can be a Bluetooth telephone offering dial up networking where GPS coordinates are communicated to the portable device **100** in the service record immediately after connection. An application on the portable device **100** can then utilize the data to format a location query to obtain location sensitive information. Further, the smart network access point **130** can be a facsimile machine that is Bluetooth enabled. The device then can send a facsimile, including the GPS coordinates received from the service discovery record contained with the facsimile machine. This data can be used to notify the recipient of the device's location. It will be appreciated by one of ordinary skill in the art that the smart network access point **130** in accordance with the present invention can be any of the above or an equivalent.

The smart network access point (SNAP) **130** preferably includes a SNAP memory **142** and a SNAP processor **144**. The SNAP processor **144** utilizes conventional signal processing techniques for processing received information. Preferably, the SNAP processor **144** is similar to the MC68328 micro controller manufactured by Motorola, Inc. of Schaumburg, Illinois. It will be appreciated by one of ordinary skill in the art that other similar processors can be utilized for the SNAP processor **144**, and that additional processors of the same or alternative type can be utilized as required to handle the processing requirements of the SNAP processor **144**.

To perform the necessary functions of the smart network access point **130**, the SNAP processor **144** is coupled to the SNAP memory **142**, for storing information, and software for programming the SNAP processor **144** in accordance with the present invention. The SNAP memory **142** preferably includes a random access memory

(RAM), a read-only memory (ROM), and an electrically erasable programmable read-only memory (EEPROM)(not shown). In a preferred embodiment, the SNAP memory **142** comprises a SNAP location information memory **146**, a SNAP profile memory **148**, a SNAP discovery routine memory **150**, and a SNAP communications processing memory **152**.

The smart network access point **130** preferably stores a plurality of location data in the SNAP location information memory **146** of the SNAP memory **142**. The plurality of location data can be obtained by the smart network access point **130** for example by the SNAP processor **144** of the smart network access point **130** calculating the location position utilizing a plurality of GPS signals broadcast from a GPS system in a manner well known in the art. Alternatively, the location data comprises manually entered location coordinates of the short range WLAN **114**. Alternatively, the smart network access point **130** can obtain location data from a wired access point such as the Internet. It will be appreciated by one of ordinary skill in the art that other methods of obtaining location data by the smart network access point **130** can be utilized in accordance with the present invention.

The location data stored in the SNAP location information memory **146** preferably includes location coordinates for the smart network access point **130.** In accordance with the present invention, the SNAP processor **144** sends registration information, including the location coordinates of the smart network access point **130** to the portable device **100**, to allow the portable device access to the short range WLAN **114**. The portable device **100** further utilizes the location coordinates of the smart network access point **130** to approximate the location of the portable device **100**.

The smart network access point **130** stores SNAP profile information in the SNAP profile memory **148** of the SNAP memory **142**. The SNAP profile information can include the device battery life, device battery capacity, device processing power, and access to both a plurality of short range WLANs and wide area communication systems. The SNAP profile information can further include dial up networking, facsimile, printing, TCS-binary, TCS-AT, Personal Area Networking (PAN), audiovisual (A/D), OBEX, and still imagery. It will be appreciated by one of ordinary skill in the art that the SNAP profile information, in accordance with the present invention, can be any of the technology enablers mentioned above or an equivalent.

The SNAP memory **142** further includes the SNAP discovery routine memory **150**. The SNAP discovery routine memory **150** for example stores a program for controlling the operation of the SNAP processor **144** in decoding a service discovery protocol. For example, when the short range WLAN uses a Bluetooth protocol, the service discovery protocol (SDP) within Bluetooth provides a means for applications within a device to discover which services are available and to determine the characteristics of those available services. It will be appreciated by one of ordinary skill in the art that the service discovery protocol can be the service discovery protocol (SDP) within Bluetooth or any equivalent service discovery protocol used by the short range WLAN protocol of the short range WLAN **114**.

The SNAP memory **142** further includes the SNAP communications processing memory **152** for programming the SNAP processor **144** to process communications in accordance with the short range WLAN protocol used by the short range WLAN **114**.

The smart network access point **130** is coupled to the network backbone **138**. In a preferred embodiment, the smart network access point **130** provides network access for the wireless device **132** with on-board location-determining capability, e.g., a Wireless Access Protocol (WAP) enabled mobile telephone with built-in GPS. Also coupled to the network backbone **138** is the terminal **140**. The terminal **140** includes a terminal interface **154**, a terminal processor **156**, and a terminal memory **158**.

The terminal processor **156** processes the communications of the short range WLAN **114** and controls the short range WLAN **114**. In a preferred embodiment, the terminal processor **156** cooperates with the smart network access point **130** to provide access to the communication network by the wireless device **132**, which has on-board location-determining capability, to request location coordinates of the wireless device **132,** to receive the location coordinates from the wireless device **132,** and to store the location coordinates in terminal memory **158** to which the terminal processor **156** is coupled. The terminal processor **156** utilizes conventional signal processing techniques for processing received information. Preferably, the terminal processor **156** is similar to the MC68328 micro controller manufactured by Motorola, Inc. of Schaumburg, Illinois. It will be appreciated by one of ordinary skill in the art that other similar processors can be utilized for the terminal processor **156**, and that

additional processors of the same or alternative type can be utilized as required to handle the processing requirements of the terminal processor **156**.

The terminal processor **156** is preferably coupled to the terminal interface **154** for providing control and programming of the terminal processor **156** by an operator. The terminal interface **154** for example can be a conventional keypad and display combination. Alternatively, the terminal **140** can be a network router or bridge that is remotely controlled and does not have its own keyboard. It will be appreciated by one of ordinary skill in the art that other similar terminal types can be utilized to handle the requirements of the terminal **156**.

To perform the necessary functions of the terminal **140**, the terminal processor **156** is coupled to the terminal memory **158**, for storing information and software for programming the terminal processor **156** in accordance with the present invention. The terminal memory **158** preferably includes a random access memory (RAM), a read-only memory (ROM), and an electrically erasable programmable read-only memory (EEPROM)(not shown).

FIG. **4** is a flow diagram illustrating one embodiment of the operation of the communication system of FIG. **1** in accordance with the present invention. The flow diagram of FIG. **4** describes interactions between the short range WLAN **114** and the portable device **100**. The process begins with Step **160** wherein a plurality of location data is stored in the SNAP location information memory **146** of the smart network access point **130**. The plurality of location data can be obtained by the smart network access point **130** for example by the SNAP processor **144** of the smart network access point **130** calculating the location position utilizing a plurality of GPS signals broadcast from a GPS system in a manner well known in the art. Alternatively, the location data comprises manually entered location coordinates of the smart network access point **130** or of the short range WLAN **114**. It will be appreciated by one of ordinary skill in the art that other methods of obtaining location data by the smart network access point **130** can be utilized in accordance with the present invention.

Next, in Step **162**, the portable device **100** detects the presence of the smart network access point **130.** Next, in Step **164**, the portable device **100** identifies itself to the smart network access point **130** as a member of a class of devices having wide area communication capabilities. For example, the portable device **100** identifies itself

as having the capability to communicate within the wide area communication system **116** of FIG. **1**. Next, in Step **166**, the portable device **100** starts the discovery operation using the discovery routine stored in the discovery routine memory **124** of the portable device **100**. Next, in Step **168**, the process determines whether the portable device **100** is allowed on the short range WLAN **114**. When the portable device **100** is not allowed on the short range WLAN **114**, the process stops. Alternatively, when the portable device **100** is allowed on the short range WLAN **114**, the process moves to Step **170** wherein the smart network access point **130** sends location data to the portable device **100** during the discovery operation. Next, in Step **172**, the portable device **100** stores the location data received in Step **170** in the location information memory **120** of the portable device **100**. Next, in Step **174**, the portable device **100** requests location sensitive information. Next, in Step **176**, the process determines whether the portable device **100** is in the range of the smart network access point **130** from which the location data was received. When the portable device **100** is in the range of the smart network access point **130** from which the location data was received, the process moves to Step **178** wherein the portable device **100** transmits a location sensitive information request via the wide area wireless transceiver **104** to the wide area communication system **116**. The process then stops. When the portable device **100** is not in the range of the smart network access point **130** from which the location data was received, the process moves to Step **180** wherein the location stored in the location information memory **120** is shown to the user of the portable device **100**. For example, the location data can be displayed on the display **110**. The process then moves to Step **182** wherein it is determined whether the location shown is acceptable to the user. For example, the user can accept the location using the user interface **108** of the portable device **100**. When the location shown is not acceptable to the user, in Step **183**, the user can manually enter a current location. Next, in Step**178** the portable device **100** transmits a location sensitive information request via the wide area wireless transceiver **104** to the wide area communication system **116.** The process then stops. When the location shown is acceptable to the user in Step **182**, the process moves to Step **178** wherein the portable device **100** transmits a location sensitive information request via the wide area wireless transceiver **104** to the wide area communication system **116**. The process then stops.

In the manner described herein above, the portable device **100** can take advantage of the benefits of location sensitive software applications by obtaining location data from the short range WLAN **114**.

FIG. **5** is a flow diagram illustrating an alternative embodiment of the operation of the communication system of FIG. **1** in accordance with the present invention. The flow diagram of FIG. **5** describes interactions between the short range WLAN **114** and the portable device **100**. The process begins with Step **160** wherein a plurality of location data is stored in the SNAP location information memory **146** of the smart network access point **130**. The plurality of location data can be obtained by the smart network access point **130** for example by the SNAP processor **144** of the smart network access point **130** calculating the location position utilizing a plurality of GPS signals broadcast from a GPS system in a manner well known in the art. Alternatively, the location data comprises manually entered location coordinates of the smart network access point **130** or of the short range WLAN **114**. It will be appreciated by one of ordinary skill in the art that other methods of obtaining location data by the smart network access point **130** can be utilized in accordance with the present invention.

Next, in Step **162**, the portable device **100** detects the presence of the smart network access point **130.** Next, in Step **164**, the portable device **100** identifies itself to the smart network access point **130**, as a member of a class of devices having wide area communication capabilities. For example, the portable device **100** identifies itself as having the capability to communicate within the wide area communication system **116** of FIG. **1**. Next, in Step **166**, the portable device **100** starts the discovery operation using the discovery routine stored in the discovery routine memory **124** of the portable device **100**. Next, in Step **168**, the process determines whether the portable device **100** is allowed on the short range WLAN **114**. When the portable device **100** is not allowed on the short range WLAN **114**, the process stops. Alternatively, when the portable device **100** is allowed on the short range WLAN **114**, the process moves to Step **170** wherein the smart network access point **130** sends location data to the portable device **100** during the discovery operation. Next, in Step **172**, the portable device **100** stores the location data received in Step **170** in the location information memory **120** of the portable device **100**. Next, in Step **174**, the

portable device **100** requests location sensitive information. Next, in Step **176**, the process determines whether the portable device **100** is in the range of the smart network access point **130** from which the location data was received. When the portable device **100** is in the range of the smart network access point **130** from which the location data was received, the process moves to Step **178** wherein the portable device **100** transmits a location sensitive information request via the wide area wireless transceiver **104** to the wide area communication system **116**. The process then stops.

When the portable device **100** is not in the range of the smart network access point **130** from which the location data was received, the process moves to Step **184** wherein the time differential "M" between the occurrence of Step **170** (smart network access point **130** sends location data) and the occurrence of Step **174** (portable device **100** requests location sensitive information) is determined. Next, in Step **186**, the time differential "M" is compared to a predetermined number "N". The predetermined number "N" is preferably a differential in time wherein the location of the portable device **100** has a lower confidence of being accurate, and therefore the location sensitive information may not be as accurate for the device user when the device user (and therefore portable device **100**) is in motion. When the time differential "M" is less than the predetermined number "N", the process moves to Step **178** wherein the portable device **100** transmits a location sensitive information request via the wide area wireless transceiver **104** to the wide area communication system **116**. It will be appreciated by one of ordinary skill in the art that the location sensitive information request of Step **178** can include the time differential "M" or alternatively can include an elapsed time from a previous location. (not shown) The process then stops. It will be appreciated by one of ordinary skill in the art that the wide area communication system **116**, in response to receiving the location sensitive information request preferably generates the location sensitive information and transmits the location sensitive information to the portable device **100**. In one embodiment, the wide area communication system **116** uses the received time differential to determine the location sensitive information in response to receiving the location sensitive information request including the time differential from the portable device **100**. (not shown) In an alternate embodiment, the wide area communication system **116** uses

the received elapsed time from a previous location to determine the location sensitive information in response to receiving the location sensitive information request including the elapsed time from a previous location. (not shown)

When the time differential "M" is not less than the predetermined number "N", the process moves to Step **188** wherein the location sensitive information request is revised to include a surrounding area in direct proportion to the difference between "M" and "N". For example, If M is five (5) minutes and N is ten (10) minutes then the request for local restaurants would be expanded from a default request of a one (1) mile radius to a request of a five (5) miles radius because the user may have moved a few miles over the past five (5) minutes and a one (1) mile radius from the previously known location may yield no valuable results for the new location of the portable device user. It will be appreciated by one of ordinary skill in the art that alternatively, in Step **188**, the surrounding area can be a geographic area characterized by a zip code, county borders, city borders or any other equivalent geographic area. (not shown) Next, the process moves to Step **178** wherein the portable device **100** transmits a location sensitive information request via the wide area wireless transceiver **104** to the wide area communication system **116**. It will be appreciated by one of ordinary skill in the art that the location sensitive information request of Step **178** can include the time differential "M" or alternatively can include an elapsed time from a previous location. (not shown) The process then stops.

In the manner described herein above, the portable device **100**, advantageously can take advantage of the benefits of location sensitive software applications by obtaining location data from the short range WLAN **114**.

FIG. **6** is a flow diagram illustrating an alternative embodiment of the operation of the communication system of FIG. **1** in accordance with the present invention. The flow diagram of FIG. **6** describes interactions between the short range WLAN **114** and the portable device **100**. The process begins with Step **160** wherein a plurality of location data is stored in the SNAP location information memory **146** of the smart network access point **130**. The plurality of location data can be obtained by the smart network access point **130** for example by the SNAP processor **144** of the smart network access point **130** calculating the location position utilizing a plurality of GPS signals broadcast from a GPS system in a manner well known in the art.

Alternatively, the location data comprises manually entered location coordinates of the smart network access point **130** or of the short range WLAN **114**. It will be appreciated by one of ordinary skill in the art that other methods of obtaining location data by the smart network access point **130** can be utilized in accordance with the present invention.

Next, in Step **162**, the portable device **100** detects the presence of the smart network access point **130.** Next, in Step **166**, the portable device **100** starts the discovery operation using the discovery routine stored in the discovery routine memory **124** of the portable device **100**. Next, in Step **168**, the process determines whether the portable device **100** is allowed on the short range WLAN **114**. When the portable device **100** is not allowed on the short range WLAN **114**, the process stops.

Alternatively, when the portable device **100** is allowed on the short range WLAN **114**, the process moves to Step **189** wherein the portable device **100** completes the discovery operation. Next, in step **190**, the portable device **100** performs a location service request to the smart network access point **130**. Next, in Step **192**, the smart network access point **130** confirms location service capability. Next in Step **194**, the portable device **100** requests location data from the smart network access point **130**. Next, the process moves to Step **170** wherein the smart network access point **130** sends location data to the portable device **100.** Next, in Step **172**, the portable device **100** stores the location data received in Step **170** in the location information memory **120** of the portable device **100**. Next, in Step **174**, the portable device **100** requests location sensitive information. Next, in Step **176**, the process determines whether the portable device **100** is in the range of the smart network access point **130** from which the location data was received. When the portable device **100** is in the range of the smart network access point **130** from which the location data was received, the process moves to Step **178** wherein the portable device **100** transmits a location sensitive information request via the wide area wireless transceiver **104** to the wide area communication system **116**. The process then stops. When the portable device **100** is not in the range of the smart network access point **130** from which the location data was received, the process moves to Step **180** wherein the location stored in the location information memory **120** is shown to the user of the portable device **100**. For example, the location data can be displayed on the display **110**. The process then

moves to Step **182** wherein it is determined whether the location shown is acceptable to the user. For example, the user can accept the location using the user interface **108** of the portable device **100**. When the location shown is not acceptable to the user, in Step **183,** the user can manually enter a current location. Next, in Step **178** the portable device **100** transmits a location sensitive information request via the wide area wireless transceiver **104** to the wide area communication system **116**. The process then stops. When the location shown is acceptable to the user in Step **182**, the process moves to Step **178** wherein the portable device **100** transmits a location sensitive information request via the wide area wireless transceiver **104** to the wide area communication system **116**. The process then stops.

In the manner described herein above, the portable device **100**, which does not have on-board location-determining capability, advantageously can take advantage of the benefits of location sensitive software applications by obtaining location data from the short range WLAN **114**.

Although the invention has been described in terms of preferred embodiments, it will be obvious to those of ordinary skill in the art that various alterations and modifications may be made without departing from the invention. Accordingly, it is intended that all such alterations and modifications be considered as within the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

CLAIMS

1. A portable device for receiving location sensitive information comprising:

a short range wireless transceiver for communicating within a short range wireless local area network, wherein the short range wireless transceiver receives a location data from the short range wireless local area network;

a wide area wireless transceiver for communicating within a wide area communication system, wherein the wide area wireless transceiver requests a location specific information from the wide area communication system; and

a processor coupled to the short range wireless transceiver and to the wide area wireless transceiver, wherein the processor is programmed to:

receive the location data from the short range wireless transceiver,

determine a location of the portable device in response to receiving the location data, and

send a command to the wide area wireless transceiver including the location, wherein the wide area wireless transceiver requests the location specific information from the wide area communication system associated with the location.

2. A portable device for communicating location specific information as recited in claim 1 further comprising:

a memory coupled to the processor for storing the location data.

3. A portable device for communicating location sensitive information as recited in claim 1 further comprising:

a display coupled to the processor for notifying a device user of the location; and

a user interface coupled to the processor for sending a command to the processor when the device user accepts the location.

4. A short range wireless local area network for communication of location sensitive information comprising:

a smart network access point comprising:

a SNAP memory for storing a location data including a location coordinates for the smart network access point, and

a SNAP processor for sending the location coordinates of the smart network access point to a portable device; and

the portable device, coupled to the smart network access point for using the location coordinates of the smart network access point to determine a location of the portable device.

5. A short range wireless local area network for communication of location sensitive information as recited in claim 4 wherein the SNAP processor is adapted to:

determine when the portable device is in the range of the smart network access point; and

send the location coordinates to the portable device when the portable device is in the range of the smart network access point.

6. A short range wireless local area network for communication of location sensitive information as recited in claim 4 wherein the portable device comprises:

a short range wireless transceiver for communicating with the smart network access point including receiving the location coordinates of the smart network access point;

a wide area wireless transceiver for communicating within a wide area communication system, wherein the wide area wireless transceiver requests a location specific information from the wide area communication system; and

a processor coupled to the short range wireless transceiver and to the wide area wireless transceiver, wherein the processor is programmed to:

receive the location coordinates of the smart network access point from the short range wireless transceiver,

determine a location of the portable device in response to receiving the location coordinates, and

send a command to the wide area wireless transceiver including the location, wherein the wide area wireless transceiver requests the location specific information from the wide area communication system associated with the location.

7. A short range wireless local area network for communication of location sensitive information as recited in claim 6 wherein the SNAP processor is adapted to send the location coordinates to the portable device in response to receiving a notification of the capability for wide area communication by the portable device.

8. A short range wireless local area network for communication of location sensitive information as recited in claim 6 wherein the portable device further comprises:

a display coupled to the processor for notifying a device user of the location; and

a user interface coupled to the processor for sending a command to the processor when the device user accepts the location.

9. A short range wireless local area network for communication of location sensitive information as recited in claim 4 wherein the portable device comprises:

a short range wireless transceiver for communicating with the smart network access point including receiving the location coordinates of the smart network access point; and

a processor coupled to the short range wireless transceiver, wherein the processor is programmed to:

receive the location coordinates of the smart network access point from the short range wireless transceiver,

determine a location of the portable device in response to receiving the location coordinates, and

request the location specific information from the smart network access point associated with the location.

10. A short range wireless local area network for communication of location sensitive information as recited in claim 9, wherein the smart network access point is adapted to:

perform a discovery operation;

determine whether the portable device is allowed on the short range wireless local area network;

receive the request for location specific information from the portable device when the portable device is allowed on the short range wireless local area network;

confirm location service capability; and

send location specific information to the portable device.

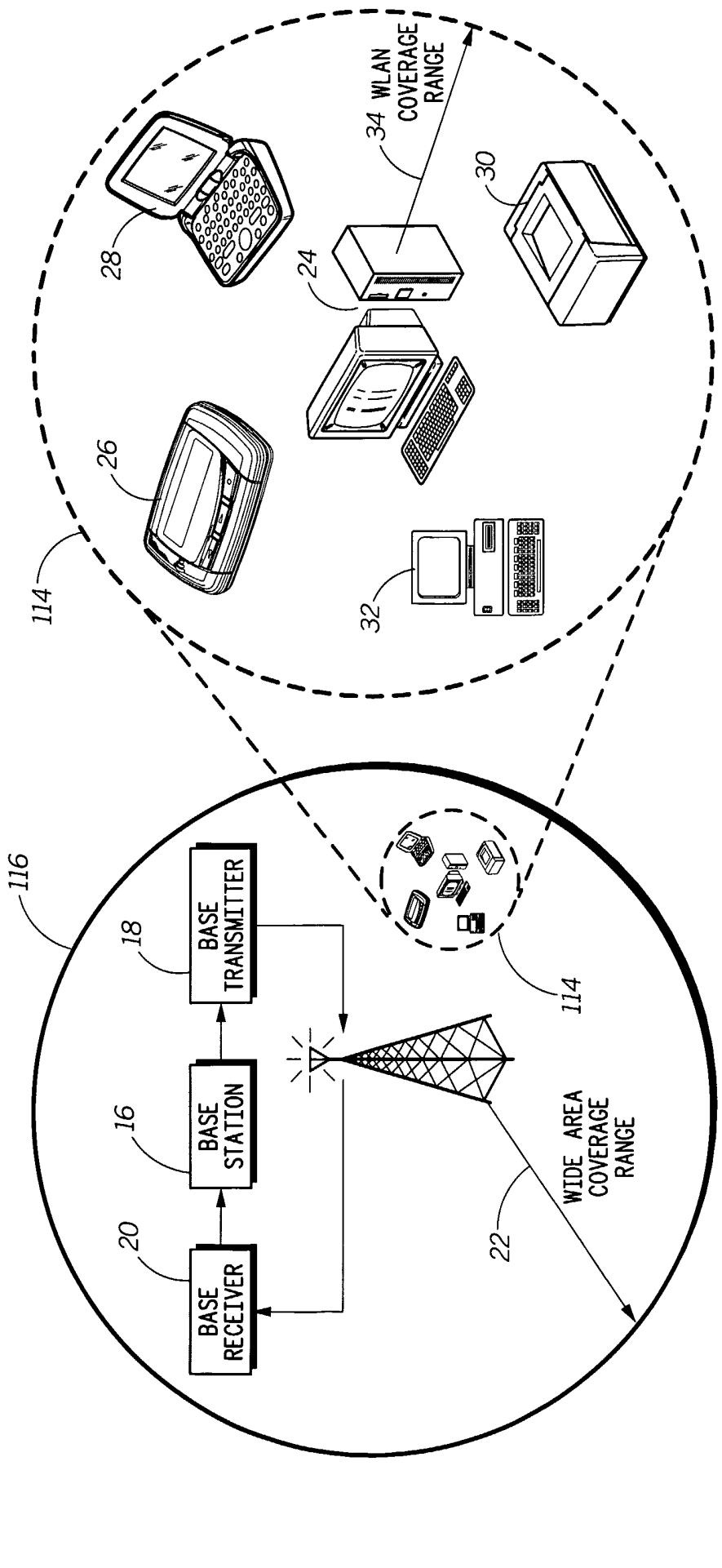
WLAN COVERAGE RANGE
34
30
28
24
26
114
32
116
18
BASE TRANSMITTER
16
BASE STATION
20
BASE RECEIVER
114
WIDE AREA COVERAGE RANGE
22
10

FIG. 1

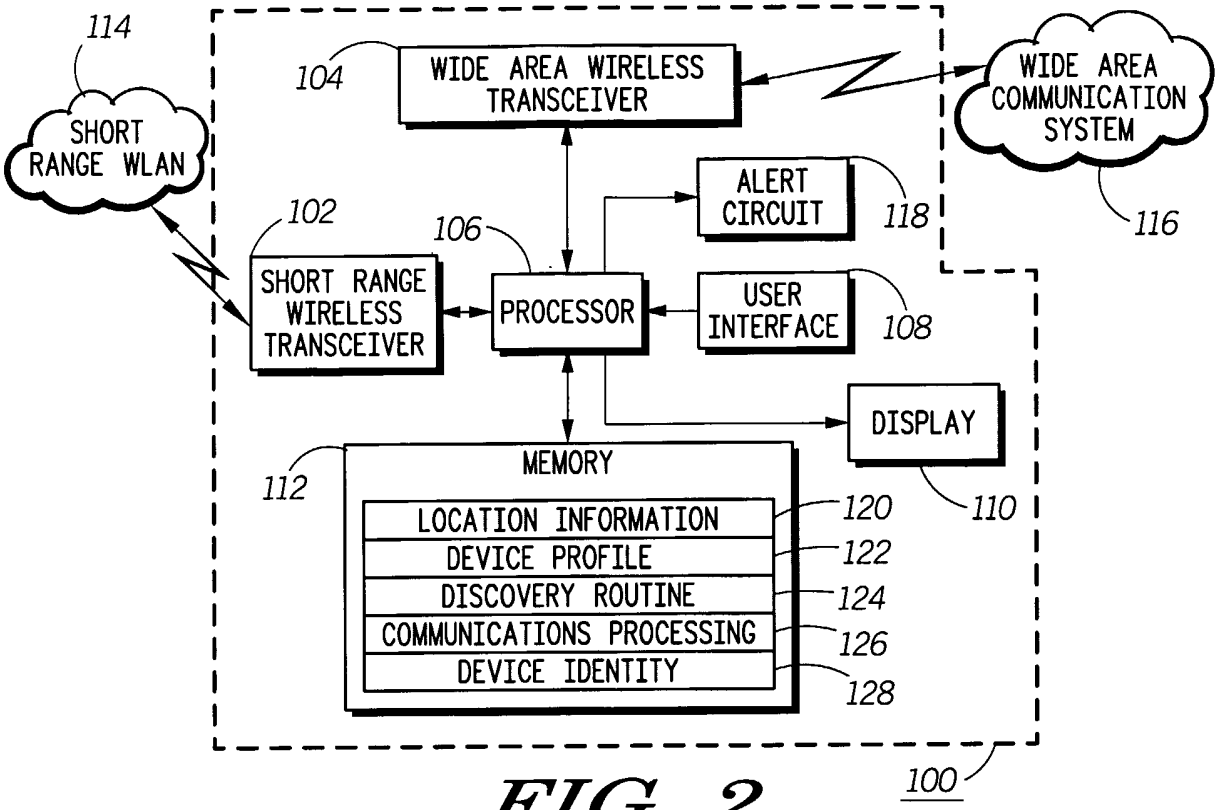
114
SHORT RANGE WLAN
104
WIDE AREA WIRELESS TRANSCEIVER
WIDE AREA COMMUNICATION SYSTEM
116
ALERT CIRCUIT
118
102
106
SHORT RANGE WIRELESS TRANSCEIVER
PROCESSOR
USER INTERFACE
108
DISPLAY
110
112
MEMORY
LOCATION INFORMATION
120
DEVICE PROFILE
122
DISCOVERY ROUTINE
124
COMMUNICATIONS PROCESSING
126
DEVICE IDENTITY
128
100

FIG. 2

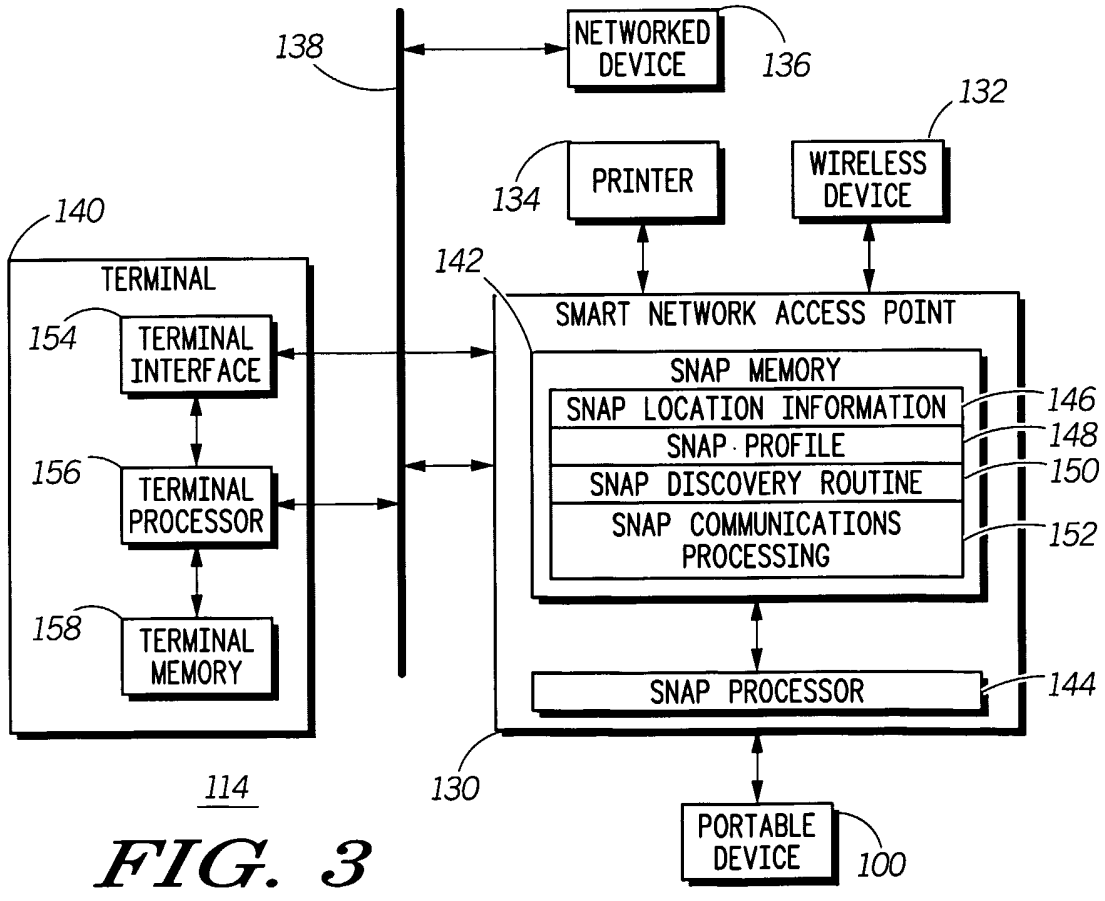
138
NETWORKED DEVICE
136
132
134
PRINTER
WIRELESS DEVICE
140
142
TERMINAL
SMART NETWORK ACCESS POINT
154
TERMINAL INTERFACE
SNAP MEMORY
SNAP LOCATION INFORMATION
146
SNAP PROFILE
148
156
TERMINAL PROCESSOR
SNAP DISCOVERY ROUTINE
150
SNAP COMMUNICATIONS PROCESSING
152
158
TERMINAL MEMORY
SNAP PROCESSOR
144
114
130
PORTABLE DEVICE
100

FIG. 3

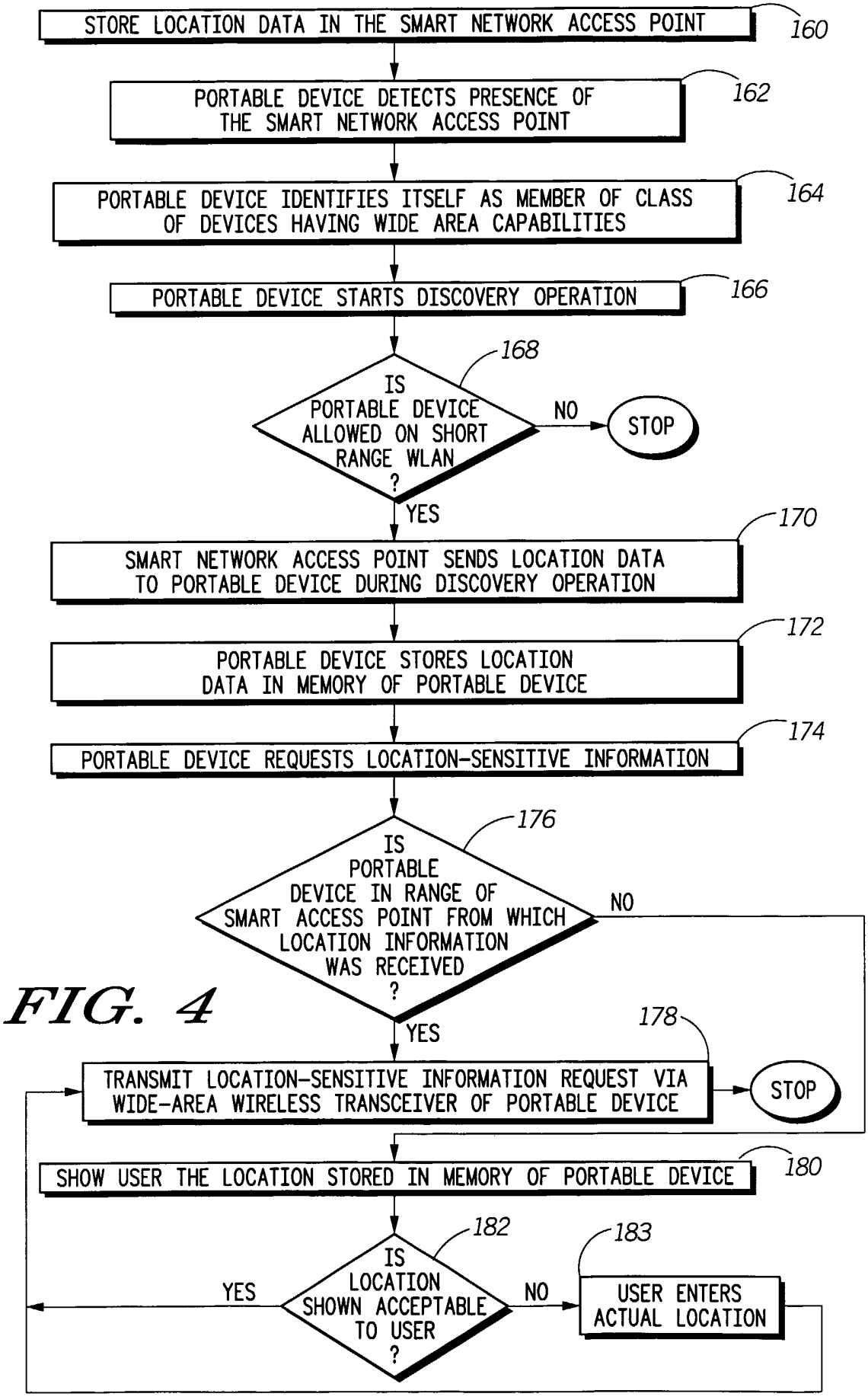
STORE LOCATION DATA IN THE SMART NETWORK ACCESS POINT
160
PORTABLE DEVICE DETECTS PRESENCE OF THE SMART NETWORK ACCESS POINT
162
PORTABLE DEVICE IDENTIFIES ITSELF AS MEMBER OF CLASS OF DEVICES HAVING WIDE AREA CAPABILITIES
164
PORTABLE DEVICE STARTS DISCOVERY OPERATION
166
168
IS PORTABLE DEVICE ALLOWED ON SHORT RANGE WLAN ?
NO
STOP
YES
170
SMART NETWORK ACCESS POINT SENDS LOCATION DATA TO PORTABLE DEVICE DURING DISCOVERY OPERATION
172
PORTABLE DEVICE STORES LOCATION DATA IN MEMORY OF PORTABLE DEVICE
174
PORTABLE DEVICE REQUESTS LOCATION-SENSITIVE INFORMATION
176
IS PORTABLE DEVICE IN RANGE OF SMART ACCESS POINT FROM WHICH LOCATION INFORMATION WAS RECEIVED ?
NO
YES
178
TRANSMIT LOCATION-SENSITIVE INFORMATION REQUEST VIA WIDE-AREA WIRELESS TRANSCEIVER OF PORTABLE DEVICE
STOP
SHOW USER THE LOCATION STORED IN MEMORY OF PORTABLE DEVICE
180
182
IS LOCATION SHOWN ACCEPTABLE TO USER ?
YES
NO
183
USER ENTERS ACTUAL LOCATION

FIG. 4

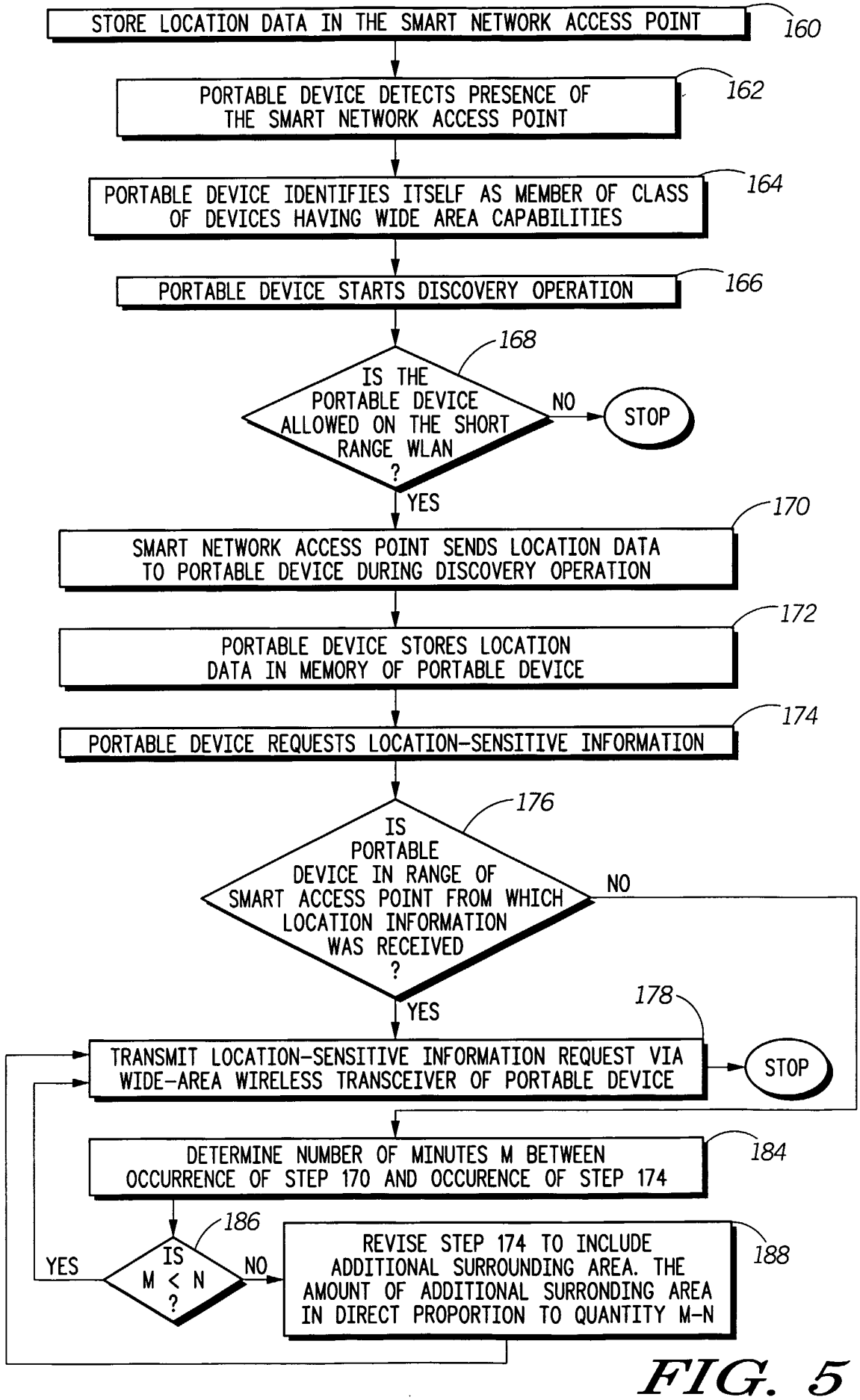
STORE LOCATION DATA IN THE SMART NETWORK ACCESS POINT
160
PORTABLE DEVICE DETECTS PRESENCE OF THE SMART NETWORK ACCESS POINT
162
PORTABLE DEVICE IDENTIFIES ITSELF AS MEMBER OF CLASS OF DEVICES HAVING WIDE AREA CAPABILITIES
164
PORTABLE DEVICE STARTS DISCOVERY OPERATION
166
168
IS THE PORTABLE DEVICE ALLOWED ON THE SHORT RANGE WLAN ?
NO
STOP
YES
SMART NETWORK ACCESS POINT SENDS LOCATION DATA TO PORTABLE DEVICE DURING DISCOVERY OPERATION
170
PORTABLE DEVICE STORES LOCATION DATA IN MEMORY OF PORTABLE DEVICE
172
PORTABLE DEVICE REQUESTS LOCATION-SENSITIVE INFORMATION
174
176
IS PORTABLE DEVICE IN RANGE OF SMART ACCESS POINT FROM WHICH LOCATION INFORMATION WAS RECEIVED ?
NO
YES
178
TRANSMIT LOCATION-SENSITIVE INFORMATION REQUEST VIA WIDE-AREA WIRELESS TRANSCEIVER OF PORTABLE DEVICE
STOP
DETERMINE NUMBER OF MINUTES M BETWEEN OCCURRENCE OF STEP 170 AND OCCURENCE OF STEP 174
184
186
IS M < N ?
YES
NO
REVISE STEP 174 TO INCLUDE ADDITIONAL SURROUNDING AREA. THE AMOUNT OF ADDITIONAL SURRONDING AREA IN DIRECT PROPORTION TO QUANTITY M-N
188

FIG. 5

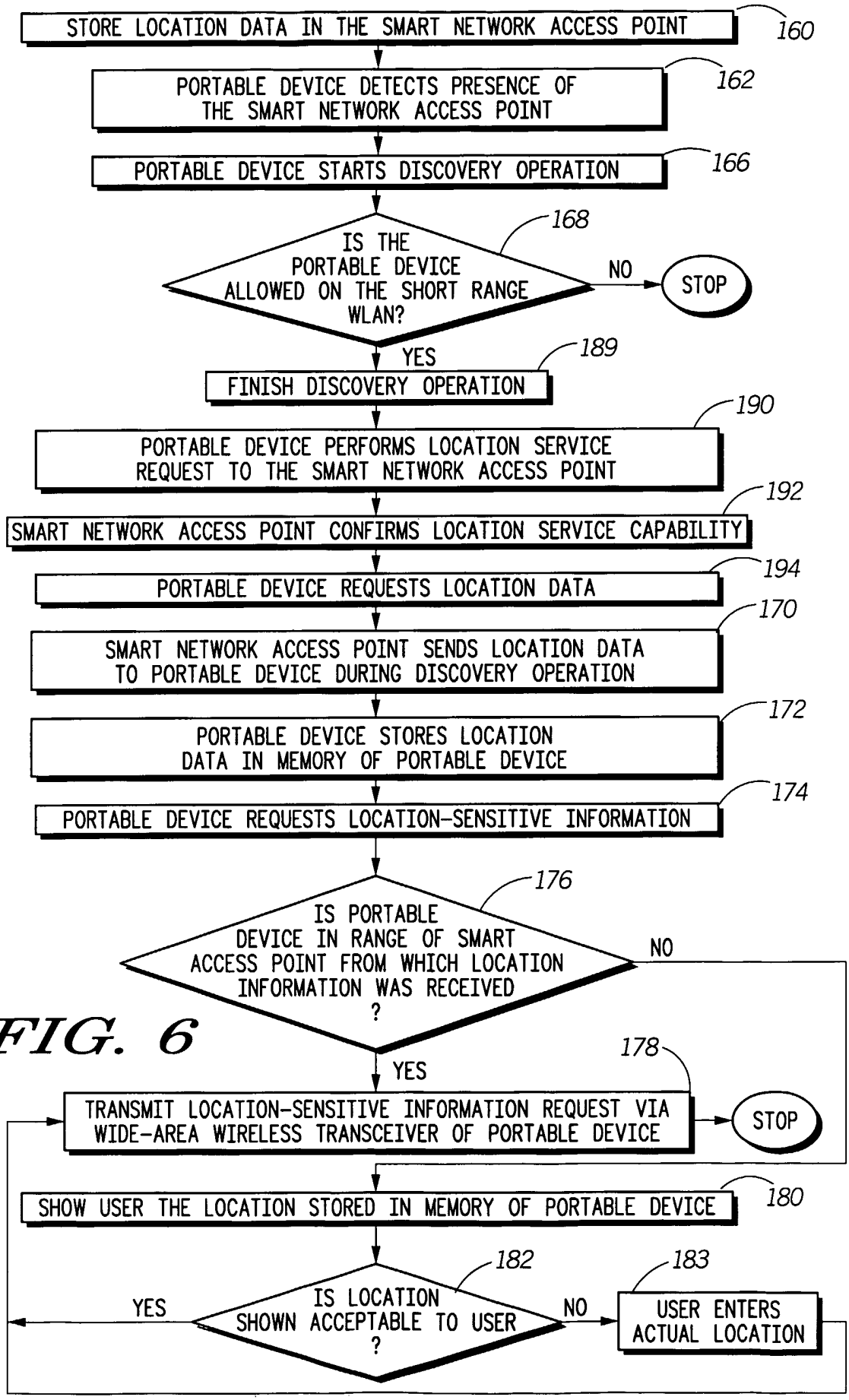
STORE LOCATION DATA IN THE SMART NETWORK ACCESS POINT
160
PORTABLE DEVICE DETECTS PRESENCE OF THE SMART NETWORK ACCESS POINT
162
PORTABLE DEVICE STARTS DISCOVERY OPERATION
166
IS THE PORTABLE DEVICE ALLOWED ON THE SHORT RANGE WLAN?
168
NO
STOP
YES
FINISH DISCOVERY OPERATION
189
PORTABLE DEVICE PERFORMS LOCATION SERVICE REQUEST TO THE SMART NETWORK ACCESS POINT
190
SMART NETWORK ACCESS POINT CONFIRMS LOCATION SERVICE CAPABILITY
192
PORTABLE DEVICE REQUESTS LOCATION DATA
194
SMART NETWORK ACCESS POINT SENDS LOCATION DATA TO PORTABLE DEVICE DURING DISCOVERY OPERATION
170
PORTABLE DEVICE STORES LOCATION DATA IN MEMORY OF PORTABLE DEVICE
172
PORTABLE DEVICE REQUESTS LOCATION-SENSITIVE INFORMATION
174
IS PORTABLE DEVICE IN RANGE OF SMART ACCESS POINT FROM WHICH LOCATION INFORMATION WAS RECEIVED ?
176
NO
YES
TRANSMIT LOCATION-SENSITIVE INFORMATION REQUEST VIA WIDE-AREA WIRELESS TRANSCEIVER OF PORTABLE DEVICE
178
STOP
SHOW USER THE LOCATION STORED IN MEMORY OF PORTABLE DEVICE
180
IS LOCATION SHOWN ACCEPTABLE TO USER ?
182
YES
NO
USER ENTERS ACTUAL LOCATION
183

FIG. 6