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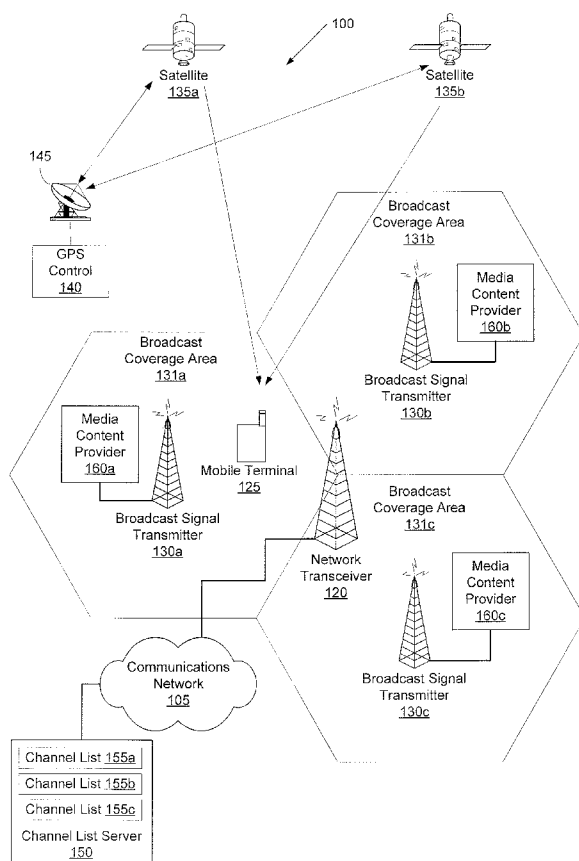
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(54) Title: METHODS, SYSTEMS, AND DEVICES FOR IDENTIFYING AND PROVIDING ACCESS TO BROADCAST MEDIA CONTENT USING A MOBILE TERMINAL



(57) Abstract: A method for providing access to broadcast media content includes determining positioning information corresponding to a current location of a mobile terminal. Based on the determined positioning information, a channel list including available broadcast media content channel information for the current location of the mobile terminal is automatically retrieved. Related systems and devices are also discussed.

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METHODS, SYSTEMS, AND DEVICES FOR IDENTIFYING AND PROVIDING ACCESS TO BROADCAST MEDIA CONTENT USING A MOBILE TERMINAL

CROSS-REFERENCE TO RELATED PATENT APPLICATIONS

[0001] This application claims priority from U.S. Provisional Application Serial No. 60/831,811, filed July 19, 2006, the disclosure of which is hereby incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

[0002] The present invention relates to mobile terminals, and more particularly, to methods of operating mobile terminals to provide multimedia services and related devices.

[0003] Mobile terminals are widely used to provide a variety of communications, multimedia, and/or data processing capabilities. For instance, mobile terminals, such as cell phones, personal digital assistants, and/or laptop computers, may provide storage and/or access to data in a wide variety of multimedia formats, including text, pictures, music, and/or video. As such, some mobile terminals may include tuner and/or decoder capabilities, thereby allowing mobile terminal users to receive multimedia signals that are broadcast over-the-air (OTA) via terrestrial and/or satellite transmission means. Some examples of signals which may be broadcast over-the-air include analog and/or digital television signals, AM/FM/digital radio signals, and/or Internet protocol broadcasts. In addition, other audio/video content, such as interactive games, music, and/or movies, may also be broadcast. As used herein, text, pictures, audio, and/or video data that may be broadcast over-the-air may be generally referred to as "media content."

[0004] For example, Digital Video Broadcasting for Handhelds (DVB-H) is a digital TV service that may be implemented in mobile terminals in the near future. The DVB-H standard is used for broadcasting digital TV signals that are optimized for use in mobile terminals. As such, DVB-H services may be provided to mobile terminal users by a telecommunications service provider, for example, via a subscription-based pricing plan. In such a subscription-based plan, the service provider may provide a TV portal from which subscribers can retrieve frequencies and/or other information required to decode and/or otherwise access broadcast TV channels and/or program content that are available under the

subscription.

[0005] However, some DVB-H channels may be publicly-accessible and/or otherwise "free" broadcast channels, which may be available to compatibly-equipped mobile terminals without payment therefor. For such free-to-air services, available channels in a particular location may be identified either by scanning the entire UHF frequency band (and/or other applicable frequency band) using the mobile terminal's tuner, or by searching the Internet for a channel list that describes available channels for the particular location and manually entering the channels/frequencies. For DVB-H and/or other digitally encoded signals, it may be relatively time-consuming to identify available channels by scanning, even when the frequency band is known. For example, a mobile terminal tuner may require about 5 minutes or more to identify DVB-H channels that are available at a particular location over a given frequency band. In addition, searching for a channel list for a given location on the Internet, for instance, using an Internet Search Engine, may be even more time-consuming.

[0006] As such, a user of a tuner-equipped mobile terminal may be required to perform such time-consuming channel searches in order to find available broadcast media channels every time he visits a new location. For mobile terminal users who frequently travel to different locations, performing such searches may become inconvenient and/or a nuisance.

SUMMARY OF THE INVENTION

[0007] According to some embodiments of the present invention, a method for providing access to broadcast media content includes determining positioning information corresponding to a location of a mobile terminal. A channel list including available broadcast media content channel information for the location of the mobile terminal is automatically retrieved based on the determined positioning information.

[0008] In some embodiments, a channel list request including the determined positioning information may be transmitted to a server configured to maintain the channel list for the current location. The channel list for the current location may be received from the server responsive to transmitting the channel list request. For example, the channel list request and/or the channel list may be a short message service (SMS) and/or a multimedia message service (MMS) message.

[0009] In other embodiments, a server may be configured to maintain a plurality of channel lists for a corresponding plurality of locations. One of the plurality of channel lists may be identified as the channel list for the location of the mobile terminal based on the

determined positioning information, and the identified channel list may be transmitted to the mobile terminal.

[0010] In some embodiments, a channel list request including the determined positioning information may be received at the server, and the channel list may be transmitted to the mobile terminal responsive to receiving the channel list request.

[0011] In some embodiments, the channel list may be automatically retrieved responsive to activation of a mobile terminal application configured to present the broadcast media content.

[0012] In other embodiments, the channel list may include at least one available channel for the current location of the mobile terminal and frequency information corresponding thereto. A tuner of the mobile terminal may be tuned to the at least one available channel based on the corresponding frequency information to receive media content broadcast over the at least one available channel. The media content may be presented via a user interface of the mobile terminal.

[0013] In some embodiments, the channel list may be displayed via the user interface of the mobile terminal, and a user selection indicating the at least one available channel from the channel list may be received via the user interface. The tuner may be tuned responsive to receiving the user selection.

[0014] In other embodiments, the frequency information corresponding to the at least one available channel may be stored in the mobile terminal as channel preset information associated with the positioning information.

[0015] In some embodiments, a quality of service (QoS) for the received media content may be determined, and the positioning information of the mobile terminal may be re-determined when the QoS falls below a predetermined threshold. A second channel list including available broadcast media content channel information for a location corresponding to the re-determined positioning information may be automatically retrieved responsive to re-determining the positioning information.

[0016] In other embodiments, the channel list may include approximate geographic coverage area information corresponding to the at least one available channel included therein. The positioning information of the mobile terminal may be re-determined at predetermined periods of time, and the re-determined positioning information of the mobile terminal may be compared to the geographic coverage area information for the at least one available channel responsive to re-determining the positioning information. A second

channel list including available broadcast media content channel information for a location corresponding to the re-determined positioning information may be automatically retrieved when the re-determined positioning information indicates that the mobile terminal is within a predetermined range of an end of the geographic coverage area for the at least one available channel.

[0017] In some embodiments, the channel list may include information corresponding to at least one free over-the-air broadcast media content channel. For example, the broadcast media content may include digital television, digital radio, and/or emergency information signals.

[0018] In other embodiments, the positioning information of the mobile terminal may be determined using a first mobile terminal receiver. The channel list may be automatically retrieved using a second mobile terminal receiver. For example, the first mobile terminal receiver may be a global positioning system (GPS) receiver, while the second mobile terminal receiver may be a wireless local area network transceiver (such as a Bluetooth, Wi-Fi, and/or infrared transceiver) and/or a public land mobile network transceiver.

[0019] In some embodiments, an internet search for the channel list for the current location of the mobile terminal may be automatically performed responsive to determining the mobile terminal positioning information.

[0020] In other embodiments, the positioning information may identify a cell in a network corresponding to the current location of the mobile terminal. The channel list may include at least one channel having a geographic coverage area corresponding to the cell.

[0021] In some embodiments, the positioning information may identify a country code corresponding to the current location of the mobile terminal. The channel list may include at least one channel having a broadcast frequency corresponding to a frequency band associated with the country code.

[0022] In other embodiments, a plurality of positioning signals may be received at the mobile terminal, and ranging measurements may be calculated based on the plurality of positioning signals. The mobile terminal positioning information may be determined based on the ranging measurements.

[0023] In some embodiments, a frequency band may be scanned for the available broadcast channel information in parallel with automatically retrieving the channel list.

[0024] According to other embodiments of the present invention, a mobile terminal includes a receiver and a controller coupled to the receiver. The controller is configured to

determine positioning information corresponding to a location of the mobile terminal and automatically retrieve a channel list comprising available broadcast media content channel information via the receiver based on the positioning information.

[0025] In some embodiments, the receiver may include a first receiver and a second receiver. The first receiver may be configured to be used for determining the positioning information of the mobile terminal, and the second receiver may be configured to be used for automatically retrieving the channel list.

[0026] In other embodiments, the channel list may include at least one available channel for the current location of the mobile terminal and frequency information corresponding thereto. The mobile terminal may further include a tuner and a user interface coupled to the controller. The tuner may be configured to be tuned to the at least one available channel based on the corresponding frequency information to receive media content broadcast over the at least one available channel. The user interface may be configured to present the received media content.

[0027] In some embodiments, the user interface may also be configured to display the channel list and receive a user selection indicating the at least one available channel from the channel list. The tuner may be configured to be tuned to the at least one available channel responsive to receipt of the user selection at the user interface. In addition, the tuner may be configured to scan a frequency band for the available broadcast channel information when the controller automatically retrieves the channel list.

[0028] In other embodiments, the mobile terminal may also include a memory device coupled to the controller. The memory device may be configured to store the frequency information corresponding to the at least one available channel as channel preset information associated with the positioning information.

[0029] According to further embodiments of the present invention, a system for providing access to broadcast media content includes a server. The server is configured to determine positioning information corresponding to a current location of a mobile terminal. The server is further configured to automatically retrieve a channel list based on the positioning information. The channel list includes available broadcast media content channel information for the current location of the mobile terminal.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] **FIG. 1** is a schematic block diagram illustrating systems, methods, and devices for identifying and providing access to broadcast media content according to some embodiments of the present invention;

[0031] **FIG. 2** is a schematic block diagram illustrating a mobile terminal according to some embodiments of the present invention;

[0032] **FIG. 3** is a flowchart illustrating operations for providing access to available broadcast media content according to some embodiments of the present invention;

[0033] **FIGS. 4A and 4B** are flowcharts illustrating operations for automatically retrieving a channel list to access broadcast media content according to some embodiments of the present invention;

[0034] **FIG. 5** is a flowchart illustrating operations for identifying and providing access to broadcast media content according to further embodiments of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0035] The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which illustrated embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[0036] As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless expressly stated otherwise. It should be further understood that the terms "comprises" and/or "comprising" when used in this specification is taken to specify the presence of stated features, integers, steps, operations, elements, and/or components, but does not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof. It will be understood that when an element is referred to as being "connected" or "coupled" to another element, it can be directly connected or coupled to the other element or intervening elements may be present. Furthermore, "connected" or "coupled" as used herein may include wirelessly connected or coupled. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items, and may be abbreviated as "/".

[0037] It will also be understood that, although the terms first, second, etc. may be used herein to describe various elements, these elements should not be limited by these terms.

These terms are only used to distinguish one element from another. For example, a first receiving station could be termed a second receiving station, and, similarly, a second receiving station could be termed a first receiving station without departing from the teachings of the disclosure.

[0038] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0039] As will be appreciated by one of skill in the art, the present invention may be embodied as methods, systems, or devices. Accordingly, the present invention may be embodied in hardware and/or in software (including firmware, resident software, micro-code, *etc.*). Computer program code for carrying out operations of the present invention may be written in an object oriented programming language such as Java®, Smalltalk or C++, a conventional procedural programming languages, such as the "C" programming language, or lower-level code, such as assembly language and/or microcode. The program code may execute entirely on a single processor and/or across multiple processors, as a stand-alone software package or as part of another software package.

[0040] The present invention is described below with reference to flowchart illustrations and/or block and/or flow diagrams of methods, systems, and devices according to embodiments of the invention. It will be understood that each block of the flowchart illustrations and/or block diagrams, and combinations of blocks in the flowchart illustrations and/or block diagrams, can be implemented by computer program instructions. These computer program instructions may be provided to a processor of a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the flowchart and/or block and/or flow diagram block or blocks.

[0041] These computer program instructions may also be stored in a computer-readable memory that can direct a computer or other programmable processor to function in a particular manner, such that the instructions stored in the computer-readable memory produce

an article of manufacture including instruction means which implement the function/act specified in the flowchart and/or block diagram block or blocks.

[0042] The computer program instructions may also be loaded onto a computer or other programmable data processor to cause a series of operational steps to be performed on the computer or other programmable processor to produce a computer implemented process such that the instructions which execute on the computer or other programmable processor provide steps for implementing the functions or acts specified in the flowchart and/or block diagram block or blocks.

[0043] Some embodiments of the present invention may employ location/position determination techniques having certain characteristics in common with conventional location determination techniques. For example, location may be estimated by collecting a requisite number of ranging measurements such as, for example, a time of arrival (TOA), a time difference of arrival (TDOA), and/or an observed time difference (OTD), from signals passed between transmitter(s) and receiver(s), wherein either the transmitter(s) or the receiver(s) have known or determinable locations (*i.e.*, positions). Further, each of the collected ranging measurements can generally be converted from a time interval measurement to a corresponding distance measurement, for example, by multiplying by the speed of light or an expected speed of transmission associated with the signal. When the conversion from time to distance has been accomplished, traditional triangulation, or other like mathematical techniques, can be used to determine the positional coordinates of the mobile device, based on the known locations and calculated distances.

[0044] For example, known location techniques include uplink signal location, downlink signal location, Global Positioning System (GPS) based approaches and approaches based on digital television signals. For "uplink signal" location techniques, the mobile telecommunications network is typically configured to determine where the MT is located based on ranging measurements associated with one or more uplink signals. These uplink signals are transmitted by the MT and received by a requisite number of receivers having known locations, such as, for example, cellular telephone base stations (BSs). For the "downlink signal" location techniques, the mobile telecommunications network is typically configured to determine where the MT is located based on ranging measurements associated with the reception, by the MT, of downlink signals from a requisite number of transmitters having known locations.

[0045] In the case of a GPS location technique, GPS receivers collect and analyze

ranging measurements from signals transmitted by GPS satellites having known locations. More specifically, a constellation of 24 satellites orbiting the earth continually emit a GPS radio signal. A GPS receiver, *e.g.*, a hand-held radio receiver with a GPS processor, receives the radio signals from the closest satellites and measures the time that the radio signal takes to travel from the GPS satellites to the GPS receiver antenna. By multiplying the travel time by the speed of light, the GPS receiver can calculate a range for each satellite in view. Ephemeris information provided in the satellite radio signal typically describes the satellite's orbit and velocity, thereby generally enabling the GPS processor to calculate the position of the GPS receiver through a process of triangulation. Also, as the positions of the GPS satellites may vary with regard to time, a GPS receiver may generally require an accurate measurement of time from the GPS satellites (or an accurate GPS-related source on the ground) in order to know the positions of the GPS satellites at the time of the ranging measurements. The startup of a GPS receiver typically requires the acquisition of a set of navigational parameters from the navigational data signals of four or more GPS satellites. It is known to include a GPS receiver in a mobile terminal to provide position location functionality to the mobile station.

[0046] In addition, digital television signals may be used to determine the location of a mobile terminal. For example, as described in "Positioning Using the ATSC Digital Television Signal," Rabinowitz, M. and Spilker, J., Rosum Corporation Whitepaper, www.rosun.com (circa 2001), digital television signals may be broadcast, at least in the United States, from terrestrial digital television transmitters having determinate locations. The Rosum Corporation Whitepaper proposes a technique for determining range information to digital television transmitters using the synchronization fields of the digital television signal. Also, commonly assigned U.S. Patent Application No. 11/168,044 describes including identifiable signals and/or range assistance information in digital television signals simulcast from a plurality of transmitters having known locations, and determining ranging information to the digital television transmitters based on the received identifiable signals and/or the range assistance information. The determined ranges may then be used to estimate the position of the mobile terminal.

[0047] Thus, the underlying location processes generally uses signals received from certain known positions, and determines ranging measurements from a sufficient number of signals to solve for the mobile device's location. Further discussion of mathematical solutions suitable for use with embodiments the present invention are provided in United

States Patent No. 6,252,543. These common characteristics and others will be described below to show how the present invention may advantageously use these location techniques to provide identification and access to broadcast media signals at a determined location.

[0048] More particularly, according to some embodiments of the present invention, a channel list describing publicly-accessible broadcast channels configured to provide media content may be automatically retrieved based on the current location of a mobile terminal.

FIG. 1 is a block diagram illustrating systems, methods, and devices according to some embodiments of the present invention for identifying and providing access to broadcast media content. Referring now to **FIG. 1**, a communications system **100** includes a plurality of media content providers **160a-160c**, a plurality of broadcast signal transmitters **130a-130c** coupled thereto, and a mobile terminal **125**. The system **100** also includes a communications network **105** (which may be, for example, a wide-area network or a local area network), a network transceiver **120** coupled thereto, and a channel list server **150** coupled to the communication network **105**. The system **100** may further include a plurality of satellites, for example, GPS satellites **135a** and **135b**. The GPS satellites **135a** and **135b** may be controlled by a GPS control unit **140** via a satellite dish **145**.

[0049] The plurality of transmitters **130a-130c** are configured to broadcast media content signals, such as radio, television, emergency information, and/or other audio/video signals, over respective channels and over respective broadcast coverage areas **131a-131c**. For example, the broadcast media content may be digital television content broadcast according to the Digital Video Broadcasting for Handhelds (DVB-H) protocol. Also, the media content may be broadcast over free-to-air (*i.e.* publicly accessible) channels. Although only one transmitter per coverage area is illustrated in **FIG. 1**, it is to be understood that a number of transmitters and/or repeater transmitters may be employed by the media content providers **160a-160c** to sufficiently provide broadcast media content over their respective desired coverage areas **131a-131c**. Also, although illustrated in **FIG. 1** as non-overlapping, it is to be understood that the broadcast coverage areas **131a-131c** may be non-overlapping, partially overlapping, or wholly overlapping.

[0050] As such, the mobile terminal **125** may receive broadcast media content from one or more of the media service providers **160a-160c**, depending on the current location of the mobile terminal **125**. In particular, when the mobile terminal **125** is located in broadcast coverage area **131a** as illustrated in **FIG. 1**, the mobile terminal **125** may receive media content from media service provider **160a** that is broadcast via transmitter **130a**, when tuned

to the appropriate channel or frequency. However, the mobile terminal **125** (and/or a user thereof) may be unaware of the particular channel/frequency on which the media content is broadcast. Accordingly, the mobile terminal **125** may be configured to determine positioning information corresponding to its current location and automatically retrieve a channel list for the current location based on the positioning information.

[0051] The mobile terminal **125** may be configured to determine positioning information corresponding to its current location using a variety of location calculation techniques, as are well-known in the art. For example, the mobile terminal **125** may be configured to receive GPS communication signals from a plurality of GPS satellites, such as the GPS satellites **135a** and/or **135b**. As such, the mobile terminal **125** may calculate ranging measurements based on the GPS communication signals and determine the positioning information based on the ranging measurements. More particularly, the ranging measurements between the mobile terminal **125** and each of at least four (4) GPS satellites may be calculated based on the "time of flight" for the respective communication signals received from each GPS satellite, which may then be converted to distance. The resulting four (4) range measurements allow for a solution to the position of the mobile terminal **125** in x, y and z coordinates, and for determination of the unknown time difference between the GPS time and the independent clock of the mobile terminal **125**.

[0052] In addition, some or all of the transmitters **130a-130c** may be configured to provide range assistance information (such as location and/or time correction data) and/or identifiable signals (respectively identifying a signal as transmitted from one of the transmitters **130a-130c**) in broadcast media content signals, as discussed in U.S. Patent Application No. 11/168,044. A range of the mobile terminal from each of the transmitters **130a-130c** may then be determined based on the received identifiable signal and/or the range assistance information, and the position of the mobile terminal **125** may be determined using traditional triangulation or other like mathematical techniques based on known location data for each of the transmitters **130a-130c** and the calculated ranges.

[0053] Based on the positioning information, the mobile terminal **125** may be configured to automatically retrieve a corresponding channel list from the channel list server **150**. The channel list server **150** is configured to maintain one or more channel lists **155a-155c** respectively including available broadcast media content channel information for one or more of the corresponding coverage areas **131a-131c**. For instance, the channel lists **155a-155c** may respectively describe one or more DVB-H channels, as well as frequency and/or

decoding information that may be required to access each channel, that are broadcast over the corresponding coverage areas **131a-131c**. The channel list server **150** may also include a public land mobile network (PLMN) transceiver and/or a wireless local area network transceiver. As such, the channel list server **150** may be accessed by the mobile terminal **125** via the network **105** over a packet-switched connection, such as a GPRS/IP connection, or a circuit-switched connection. In addition, the channel list server **150** may be accessed via an ad-hoc wireless connection with the mobile terminal **125**, such as an infrared (IR), Wi-Fi, and/or Bluetooth connection.

[0054] Accordingly, the mobile terminal **125** may be configured to automatically retrieve the channel list **155a** from the channel list server **150** based on its current location in broadcast coverage area **131a**, as shown in **FIG. 1**. For example, the mobile terminal **125** may automatically retrieve the channel list **155a** responsive to activation of a mobile terminal application configured for presentation of the broadcast media content. More particularly, when the broadcast media content presentation application is launched, the mobile terminal **125** may transmit a channel list request including the determined positioning information to the channel list server **150**. The channel list request may be included, for example, in a short message service (SMS) and/or a multimedia message service (MMS) message that is transmitted to the server **150**. The channel list server **150** may receive the channel list request, identify the channel list **155a** as corresponding to the current location of the mobile terminal **125** based on the positioning information, and transmits the channel list **155a** to the mobile terminal **125** via the network **105** and the transceiver **120**. The channel list **155a** may also be transmitted to the mobile terminal **125** in a SMS and/or a MMS message. The mobile terminal **125** may be tuned to a particular channel, for example, responsive to a user selection of one of the channels listed on the channel list **155a**. As such, media content broadcast on the selected channel may be received and presented via the mobile terminal **125**.

[0055] In addition, the channel lists **155a-155c** may include information regarding the approximate geographic broadcast coverage areas for the listed channels. As such, the mobile terminal **125** may be able to anticipate when a new channel list may be needed. More particularly, the mobile terminal **125** may be configured to re-determine its positioning information at periodic and/or intermittent periods of time, and compare the re-determined position information with the coverage areas for one or more channels to determine when it is within a predetermined range of an end of one or more of the coverage areas. For example, when the mobile terminal **125** of **FIG. 1** moves near an end of the coverage area **131a**

(adjacent to coverage area **131b**), the mobile terminal **125** may automatically retrieve the channel list **155b** from the server **150**. Thus, the mobile terminal **125** may automatically retrieve a new channel list in anticipation of moving beyond the respective coverage areas of one or more channels on a retrieved channel list.

[0056] The mobile terminal **125** may also anticipate when to request a new channel list based on the quality of service (QoS) of the received media content signal. The QoS of the received media content signal may be based on the transmission rate, bit error rate (BER), and/or other factors. As such, the QoS may indicate that the mobile terminal **125** has moved beyond the coverage area for the currently-selected channel. Accordingly, the mobile terminal **125** may be configured to re-determine its positioning information and automatically retrieve a new channel list when the QoS falls below a minimum value or other predetermined threshold.

[0057] However, in some systems according to embodiments of the present invention, accurate position determination may not be required to identify available broadcast channel information. For example, where the broadcast coverage area for one or more channels is relatively large, only a general location of the mobile terminal **125** may be needed to retrieve a corresponding channel list. As such, network-based positioning technologies, such as cell identification, may provide sufficient positioning information. More specifically, the positioning information may identify a cell in the network that corresponds to the current location of the mobile terminal, and a channel list describing channels having a coverage area corresponding to the cell may be retrieved. In addition, for a smaller countries, a relatively large broadcast coverage area may substantially cover or even exceed the boundaries of the countries. In such cases, the positioning information may identify only a country code corresponding to the current location of the mobile terminal, and the retrieved channel list may specify one or more channels having a geographic coverage area corresponding to the identified country.

[0058] Also, in some embodiments, the mobile terminal may be configured to automatically retrieve the desired channel list from locations other than the channel list server **150**. For example, the mobile terminal **125** may store one or more previously retrieved channel lists in its internal memory, which may respectively be associated with the positioning information used to request the channel lists. As such, upon returning to a location, the mobile terminal **125** may automatically retrieve a corresponding channel list associated with from its internal memory based on the associated positioning information.

[0059] Furthermore, the mobile terminal **125** may be configured to automatically perform an internet search to retrieve the channel list for the current location based on the positioning information. Although such an approach may be more time-consuming than downloading the channel list from the server **150**, it may be useful in a situation where the server **150** for some reason does not include a channel list for a given location.

[0060] In addition, in some embodiments, the mobile terminal **125** may be configured to scan a particular frequency band for the available broadcast channel information based on the positioning information. For example, where the positioning information includes the country code, the mobile terminal **125** may identify a particular frequency band as used for broadcasting media content in the country designated by the country code. As such, identification of the country where the mobile terminal **125** is currently located may significantly reduce the time required to scan for available channels. In addition, the mobile terminal **125** may be configured to scan a particular frequency band in parallel with automatically retrieving the channel list from the server **150**. Thus, the mobile terminal **125** may be configured to perform a hybrid of conventional searching and/or scanning techniques along with position determination to identify available broadcast channel information.

[0061] Moreover, in some embodiments, the channel list server **150** may be configured to determine the positioning information corresponding to the current location of the mobile terminal **125**, and may be configured to automatically retrieve one of the channel lists **155a-155c** based on the determined positioning information. For example, the channel list server **150** may determine that the mobile terminal **125** is currently located in a particular cell using cell identification and/or other network-based positioning technologies, as described above. As such, the channel list server **150** may identify the channel list **155a** as corresponding to the current location of the mobile terminal **125** based on the positioning information, and may transmit the channel list **155a** to the mobile terminal **125** via the network **105** and the transceiver **120**. Accordingly, in some embodiments, the channel list server **150** (or other network server) may be configured to automatically retrieve and forward an applicable channel list to the mobile terminal **125** without receiving a request therefor.

[0062] Although the communications system **100** has been described with reference to specific elements as shown in **FIG. 1**, communication systems according to embodiments of the present invention are not limited to the elements illustrated therein and may include additional elements which may be configured to perform the operations and/or functions described herein. For example, although illustrated as a central server configured to store a

plurality of channel lists **155a-155c**, the channel list server **150** may be a plurality of servers distributed throughout the system **100**, and each server may be configured to store one or more of the channel lists **155a-155c** for each of the broadcast coverage areas **131a-131c**. Also, while illustrated in **FIG. 1** as terrestrial transmitters, some or all of the transmitters **130a-130c** may be satellite transmitters configured to broadcast media content to the corresponding coverage areas **131a-131c**. In addition, although specific position calculation techniques have been described herein, it is to be understood that embodiments of the present invention are not limited to these techniques and may employ other position calculation techniques.

[0063] **FIG. 2** is a schematic block diagram illustrating a mobile terminal **225** according to some embodiments of the present invention. In some embodiments, the mobile terminal **225** may correspond to the mobile terminal **125** illustrated in **FIG. 1**. Referring now to **FIG. 2**, the mobile terminal **225** includes a user interface **201**, a transceiver **235**, and a memory **230** that communicate with a controller **240**. The user interface **201** may include a keyboard/keypad **205**, a display **210**, a speaker **215**, and a microphone **220**. However, additional and/or fewer elements of the user interface **255** may actually be provided depending on the functionalities offered by the mobile terminal **225**.

[0064] The transceiver **235** may typically include a transmitter circuit **250** and a receiver circuit **245**, which respectively transmit outgoing radio frequency signals and receive incoming radio frequency signals via an antenna **265**. The radio frequency signals may include both traffic and control signals (*e.g.*, paging signals/messages for incoming calls), which may be used to establish and maintain communication with another party or destination. For example, the transceiver **235** may include a public land mobile network (PLMN) transceiver and/or a wireless local area network (WLAN) transceiver. As such, the mobile terminal **225** may use the PLMN transceiver and/or the WLAN transceiver to establish a wireless connection with a server, such as the channel list server **150**, via a base station/network transceiver. The wireless connection may be a packet-switched connection, such as that provided by the Enhanced Data GSM Environment (EDGE) standard, the General Packet Radio Service (GPRS) standard, and/or the Universal Mobile Telecommunications System (UMTS) standard, or a circuit-switched connection. In addition, the wireless connection may be an ad-hoc wireless network connection between the mobile terminal **225** and the server, such as a Bluetooth, Wi-Fi, and/or infrared (IR) connection. While a single antenna **265** is shown in **FIG. 2**, it should be understood that multiple

antennas and/or different types of antennas may be utilized based on the types of signals being received.

[0065] The foregoing components of the mobile terminal **225** may be included in many conventional mobile terminals and their functionality is generally known to those skilled in the art. It should be further understood that, as used herein, the term "mobile terminal" or "mobile device" may include conventional cell phones, Personal Communications Systems (PCS)/smart phones that may include data processing, voice, video, text message, e-mail and/or Web access capabilities, Personal Digital Assistants (PDA) with wireless communications capabilities, wireless pagers, Blackberry wireless handheld e-mail devices, laptop computers, portable televisions, radios, and/or other devices that may include a radiotelephone transceiver. In addition, the mobile terminal **225** according to some embodiments of the present invention may include a media content tuner/receiver **255** and a positioning receiver **260**, as will be described in detail below.

[0066] Still referring to **FIG. 2**, the controller **240** may be, for example, a commercially available or custom microprocessor that is configured to coordinate and manage operations of the transceiver **235**, the memory **230**, the receivers **255** and **260**, the position computation circuit **285**, and the user interface **201**. As such, the mobile terminal controller **240** may be configured to determine positioning information corresponding to a current location of the mobile terminal **225** based on positioning signals received at the positioning receiver **260**, and may be configured to automatically retrieve a channel list including available broadcast channel information for the current location of the mobile terminal **225** via the transceiver **235** based on the positioning information. The controller **240** may be configured to retrieve the channel list, for example, responsive to activation of a mobile terminal application that is configured to present the broadcast media content.

[0067] More specifically, as shown in **FIG. 2**, the mobile terminal **225** may include a positioning receiver **260**, such as a GPS receiver, coupled to the controller **240**. The positioning receiver **260** may be configured to receive a plurality of positioning signals, calculate ranging measurements based on the plurality of positioning signals, and determine the positioning information based on the ranging measurements. For example, the positioning receiver **260** may be configured to receive the positioning signals from GPS satellites (such as the GPS satellites **135a** and **135b** of **FIG. 1**), terrestrial transmitters (such as the transmitters **130a-130c** of **FIG. 1**), and/or a combination thereof. The mobile terminal **225** may also include a position computation circuit **285** that is configured to estimate a

position of the mobile terminal **225** based on the determined ranging measurements. For example, the position computation circuit **285** may be configured to internally perform the calculations based on the ranging measurements to determine the positioning information at the mobile terminal **225** itself. However, in some embodiments, the position computation circuit **285** may also be configured to provide range estimates to a remote position determination server via the transmitter **250**. While the position computation circuit **285** and the controller **240** are illustrated as distinct blocks in **FIG. 2**, it is to be understood that the functionality of these blocks may be combined into a single controller and/or spread across a plurality of different controllers and/or other hardware configured to operate in a manner described herein. As such, the positioning receiver **260**, in cooperation with the controller **240** and the position computation circuit **285**, may provide a processing circuit configured to process received positioning signals to determine positioning information for the mobile terminal **225**.

[0068] Accordingly, when a media content presentation application is launched on the mobile terminal **225**, the transmitter **250** may be configured to transmit a channel list request including the positioning information to a server configured to maintain the channel list for the current location, such as the channel list server **150** of **FIG. 1**. The receiver **245** may be configured to receive the channel list for the current location from the server responsive to transmission of the channel list request. The channel list may include at least one available channel for the current location of the mobile terminal, and frequency and/or other decoding information corresponding to the listed channel(s). In some embodiments, the listed channels may be free over-the-air broadcast channels. As discussed above, the channel list request and/or the channel list may be included in a short message service (SMS) and/or a multimedia message service (MMS) message communicated between the mobile terminal **225** and the server.

[0069] Based on the received channel list, the mobile terminal **225** may be configured to be tuned to an available channel based on the corresponding frequency information to receive the media content that is broadcast over the at least one available channel. More particularly, as shown in **FIG. 2**, the mobile terminal **225** may include a broadcast media content tuner/receiver **255**, such as a DVB-H tuner/receiver, coupled to the controller **240**. The broadcast media content tuner/receiver **255** may be tuned to an available channel based on the corresponding frequency information, and may present the received media content via the user interface **201**. For example, the user interface **201** may be configured to display the

channel list via the display **210** and receive a user selection indicating one of the available channels from the channel list via the keypad **205**. The controller **240** may tune the broadcast media content tuner/receiver **255** to the selected channel responsive to receipt of the user selection at the user interface **201**. As such, the broadcast media content tuner/receiver **255**, in cooperation with the controller **240**, may provide a signal processing circuit configured to process DVB-H signals and/or other broadcast signals received from media content transmitters, such as the transmitters **130a-130c** of **FIG. 1**.

[0070] The memory **230** may be configured to store the frequency information corresponding to the available channel(s) included in the retrieved channel lists as channel preset information associated with the positioning information. Thus, the channel list for a particular location may be stored internally, and may thereby be subsequently used when the mobile terminal **225** returns to the current location. More particularly, the mobile terminal **225** may be configured to automatically retrieve the channel list for the particular location from the memory **230** responsive to determining positioning information that matches the positioning information associated with the stored channel list. As such, in some embodiments, a previously stored channel list may be automatically retrieved from the internal memory **230** of the mobile terminal, rather than from an external server.

[0071] In addition, in some embodiments, the broadcast media content signals may include GPS assistance information, such as satellites in view, approximate location, accurate time signals and/or ephemeris data for the satellites. As such, the position computation circuit **285** may be configured to estimate the position of the mobile terminal **225** based on both received DVB-H signals and/or GPS communication signals.

[0072] Also, the position computation circuit **285** may be configured to provide positioning information indicating only a general location of the mobile terminal **225**. For example, where the broadcast signal transmitters cover a relatively large area, the positioning information provided by the position computation circuit **285** may identify a cell in the network that corresponds to the current location of the mobile terminal **225**, and a channel list describing channels having a coverage area corresponding to the identified cell may be retrieved. In addition, for a smaller countries, a relatively large broadcast coverage area may substantially cover or even exceed the boundaries of the countries. In such cases, the position computation circuit **285** may identify only a country code corresponding to the current location of the mobile terminal **225**, and the retrieved channel list may specify one or more channels having a geographic coverage area corresponding to the identified country.

[0073] Although illustrated in **FIG. 2** as separate components, the media content receiver **255**, the positioning receiver **260**, and/or the receiver **245** may be implemented in a single module. As such, the mobile terminal **225** may be configured to receive both DVB-H protocol signals and GPS communication signals during respective distinct timeslots using a common receiver. For instance, for DVB-H channels at 1670 MHz, the receiver may be time-shared between GPS reception and DVB-H reception without retuning an associated antenna circuit, as this DVB-H frequency is close to the 1570 MHz GPS frequency. More generally, although the present invention may be embodied in communication systems and/or devices such as the mobile terminal **225** of **FIG. 2**, the present invention is not limited to such devices and/or systems.

[0074] **FIG. 3** is a flowchart illustrating operations for providing access to broadcast media content according to some embodiments of the present invention. More particularly, **FIG. 3** illustrates operations that may be carried out by a mobile terminal, such as the mobile terminal **125** of **FIG. 1**, and/or a server, such as the channel list server **150**, for providing access to broadcast media content, such as television, radio, and/or emergency information signals. As shown in **FIG. 3**, operations begin at Block **305** when positioning information corresponding to a location of a mobile terminal is determined. For example, the positioning information may be determined using one or more well-known position calculation techniques, such as GPS. More particularly, the positioning information may be determined from ranging measurements, which may be calculated based on receipt of a plurality of GPS positioning signals.

[0075] Still referring to **FIG. 3**, a channel list including available broadcast media content channel information is automatically retrieved at Block **310** based on the positioning information. For example, a channel list specifying at least one available free over-the-air broadcast channel (and corresponding frequency and/or decoding information) for the current location of the mobile terminal may be automatically retrieved responsive to activation of a media content presentation application on the mobile terminal. In some embodiments, the channel list may be automatically retrieved from a server configured to maintain one or more channel lists. In other embodiments, the channel list may be automatically retrieved from the internal memory of the mobile terminal rather than from an external server, for example, in a case where a desired channel list has been previously stored in the internal memory of the mobile terminal.

[0076] In addition, in some embodiments, the broadcast coverage area for one or

more channels may be relatively large, such that only a general position of the mobile terminal may be required to automatically retrieve an appropriate channel list. Accordingly, positioning information corresponding to a general location of the mobile terminal may be determined at Block **305** using well-known network-based positioning technologies, such as identification of a cell or even identification of a country code corresponding to the current location of the mobile terminal. As such, a channel list including one or more channels having a geographic coverage area corresponding to the particular cell or country identified in the positioning information may be automatically retrieved at Block **310** based on the general positioning information.

[0077] **FIGS. 4A and 4B** are flowcharts illustrating operations for automatically retrieving a channel list according to some embodiments of the present invention. More particularly, **FIG. 4A** illustrates operations that may be carried out by a mobile terminal, such as the mobile terminal **225** of **FIG. 2**. Referring now to **FIG. 4A**, a channel list request is transmitted to a server that is configured to maintain the channel list for the current location at Block **405**. For example, the channel list request may be automatically transmitted when a media content application is launched on the mobile terminal. The channel list request may include the positioning information for the mobile terminal determined by a variety of position determination techniques, as discussed above. A channel list corresponding to the mobile terminal's location may thereby be identified by the server and provided to the mobile terminal based on the positioning information included in the channel list request. As such, the channel list corresponding to the location of the mobile terminal is received from the server at Block **410**. The channel list may be automatically retrieved via a packet-switched or circuit-switched connection to the server via a network, such as the communications network **105** of **FIG. 1**. For example, the channel list may be requested by sending an SMS/MMS message including the positioning information to the server, which may reply with an SMS/MMS message containing the channel list. In addition, the channel list may be retrieved via an ad-hoc wireless network connection established with the server, such as a Bluetooth, Wi-Fi, and/or IR connection.

[0078] **FIG. 4B** illustrates operations for automatically retrieving the channel list that may be carried out by a server, such as the channel list server **150** of **FIG. 1**. Referring now to **FIG. 4B**, operations begin at Block **420** when one of a plurality of channel lists maintained by a server is identified as corresponding to a current location of the mobile terminal. More particularly, a plurality of channel lists corresponding to a plurality of different locations may

be maintained by the server. Each channel list may include one or more broadcast channels/frequencies that are available for reception at each of the different locations. As such, the channel list corresponding to the current location of the mobile terminal may be identified based on positioning information for the mobile terminal. For example, the presence of the mobile terminal in the network may be detected by the server (or other network element), and positioning information corresponding to the current location of the mobile terminal may be determined using a variety of position determination techniques, as discussed above. In addition, a channel list request including the positioning information may be received at the server, and the corresponding channel list may be identified based on the positioning information provided in the channel list request. Accordingly, the identified channel list for the location corresponding to the positioning information is transmitted to the mobile terminal at Block **425**. The channel list may be transmitted over a packet-switched or circuit-switched connection to the mobile terminal via a network, such as the communications network **105** of **FIG. 1**. In addition, the channel list may be transmitted via an ad-hoc wireless network connection established with the mobile terminal, such as a Bluetooth, Wi-Fi, and/or IR connection.

[0079] **FIG. 5** is a flowchart illustrating detailed operations for providing access to broadcast media content according to some embodiments of the present invention. For example, **FIG. 5** illustrates operations that may be performed by a mobile terminal, such as the mobile terminal **225** of **FIG. 2**, for identifying and presenting broadcast media content, such as broadcast television, radio, and/or emergency information. As shown in **FIG. 5**, operations begin at Block **500** by determining whether an application configured to present broadcast media content has been activated or "launched" on the mobile terminal. If so, positioning information corresponding to a current location of the mobile terminal is determined at Block **505**. As mentioned above, number of different location calculation techniques may be used to determine the positioning information. As such, these location techniques will not be discussed further hereinafter.

[0080] At Block **510**, a channel list including available broadcast channel information for the current location is automatically retrieved based on the determined positioning information. For example, the channel list may be received via a network connection to a server configured to maintain one or more channel lists, such as the channel list server **150** of **FIG. 1**, responsive to launching the media content presentation application. The channel list is displayed via the user interface of the mobile terminal at Block **515**, and a user selection

indicating one of the channels from the channel list is received at Block **520**. For example, the channel list may be shown on a display of the mobile terminal, and the user selection may be received via navigation keys of the mobile terminal. Based on the user selection, a tuner of the mobile terminal may be tuned to a frequency corresponding to the selected channel to receive the media content signal broadcast over the channel at Block **525**.

[0081] At Block **530**, it is determined whether the quality of service (QoS) of the received media content is above a threshold value for minimum quality of service (QoS_{MIN}). If the QoS is above the threshold value, the media content is presented via the user interface of the mobile terminal at Block **535**. For example, where the media content is radio content, the music and/or other audio provided over the selected channel may be presented via speakers of the mobile terminal. In addition, where the media content is television content, the corresponding video and audio may be presented via the display and the speakers of the mobile terminal. Also, at Block **540**, it is determined whether a timer for re-determining the positioning information has expired. If the timer has not expired, the mobile terminal continues to present the media content at Block **535**.

[0082] However, if the QoS of the received media content falls below the minimum quality of service threshold value QoS_{MIN} at Block **530**, and/or if the predetermined amount of time has expired at Block **540**, the positioning information for the mobile terminal is re-determined at Block **545**. For example, when the QoS is below the threshold value, the reduced QoS may indicate that the location of the mobile terminal has changed and/or moved beyond the coverage area for the selected channel. In addition, the mobile terminal may be configured to re-determine the positioning information at periodic and/or intermittent periods of time based on the timer, to proactively determine whether the location of the mobile terminal has changed. At Block **550**, the re-determined positioning information is compared to geographic coverage area information for the currently-selected channel, which may be included in the channel list. For example, the channel list may include a description of the geographic broadcast coverage area corresponding to each channel included in the channel list. As such, it is determined whether the mobile terminal is within a predetermined range of or is otherwise approaching an end of the coverage area for the currently-selected channel at Block **555**. If the mobile terminal is not near the end of the coverage area (*i.e.*, if the mobile terminal location has not substantially changed since the previous determination of the positioning information), operations return to Blocks **530**, **535**, and **540**, where the mobile terminal continues to present the broadcast media content so long as the QoS is above the

minimum threshold value QoS_{MIN} and the timer has not expired.

[0083] On the other hand, if it is determined at Block **555** that the mobile terminal is within a predetermined range of the end of the coverage area, a second or "new" channel list is automatically retrieved at Block **560** based on the re-determined positioning information. More particularly, a second channel list including available broadcast channel information for a location corresponding to the re-determined positioning information may be automatically retrieved by the mobile terminal when the mobile terminal nears the end of the coverage area for the currently-selected channel, in anticipation of a reduced QoS and/or loss of service. In such a case, operations return to Block **515**, and the newly retrieved channel list is displayed via the user interface of the mobile terminal for selection of a new channel by the user.

[0084] As such, a second channel list may be proactively retrieved by the mobile terminal based on the QoS of the received signal and/or the location of the mobile terminal within a given broadcast coverage area. Although **FIG. 5** illustrates that both conditions of 1) a QoS below the minimum threshold value and 2) a current location within a predetermined range of the end of the coverage area for the selected channel should be met prior to automatically retrieving a new channel list, it is to be understood that either of these conditions may trigger automatic retrieval of a new channel list according to some embodiments of the present invention.

[0085] More generally, the flowcharts, flow diagrams, and block diagrams of **FIGS. 1-5** illustrate the architecture, functionality, and operations of possible implementations of systems, methods, and devices for determining the location of a mobile device based on simulcast communications signals according to some embodiments of the present invention. In this regard, each block in the flowcharts or block diagrams may represent a module, segment, or portion of code which comprises one or more executable instructions for implementing the specified logical acts. It should also be noted that, in some embodiments, the acts noted in the blocks may occur out of the order noted in the figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending on the functionality involved.

[0086] The foregoing is illustrative of the present invention and is not to be construed as limiting thereof. Although a few exemplary embodiments of this invention have been described, those skilled in the art will readily appreciate that many modifications are possible in the exemplary embodiments without materially departing from the novel teachings and advantages of this invention. Accordingly, all such modifications are intended to be included

within the scope of this invention as defined in the claims. Therefore, it is to be understood that the foregoing is illustrative of the present invention and is not to be construed as limited to the specific embodiments disclosed, and that modifications to the disclosed embodiments, as well as other embodiments, are intended to be included within the scope of the appended claims. The invention is defined by the following claims, with equivalents of the claims to be included therein.

CLAIMS:

1. A method for providing access to broadcast media content, the method comprising:
determining positioning information corresponding to a location of a mobile terminal;
and
automatically retrieving a channel list comprising available broadcast media content channel information based on the determined positioning information.
2. The method of claim 1, wherein automatically retrieving the channel list comprises:
transmitting a channel list request including the determined positioning information to a server configured to maintain the channel list for the location of the mobile terminal; and
receiving the channel list for the location from the server responsive to transmitting the channel list request.
3. The method of any of the claims 1-2, wherein automatically retrieving the channel list comprises:
at a server configured to maintain a plurality of channel lists for a corresponding plurality of locations, identifying one of the plurality of channel lists as the channel list for the location of the mobile terminal based on the determined positioning information; and
transmitting the channel list to the mobile terminal.
4. The method of any of the claims 1-3, further comprising:
receiving a channel list request including the determined positioning information at the server,
wherein transmitting the channel list comprises transmitting the channel list to the mobile terminal responsive to receiving the channel list request.
5. The method of any of the claims 1-4, wherein automatically retrieving the channel list comprises:
automatically retrieving the channel list responsive to activation of a mobile terminal application configured to present the broadcast media content.

6. The method of any of the claims 1-5, wherein the channel list comprises at least one available channel for the current location of the mobile terminal and frequency information corresponding thereto, the method further comprising:

tuning a tuner of the mobile terminal to the at least one available channel based on the corresponding frequency information to receive media content broadcast over the at least one available channel; and

presenting the received media content via a user interface of the mobile terminal.

7. The method of claim 6, further comprising:

displaying the channel list via the user interface of the mobile terminal; and

receiving a user selection indicating the at least one available channel from the channel list via the user interface,

wherein tuning the tuner is performed responsive to receiving the user selection.

8. The method of any of the claims 6-7, further comprising:

storing the frequency information corresponding to the at least one available channel in the mobile terminal as channel preset information associated with the positioning information.

9. The method of any of the claims 6-8, further comprising:

determining a quality of service (QoS) for the received media content;

re-determining the positioning information of the mobile terminal when the QoS falls below a predetermined threshold; and

automatically retrieving a second channel list comprising available broadcast media content channel information for a location corresponding to the re-determined positioning information responsive to re-determining the positioning information.

10. The method of any of the claims 1-9, wherein the channel list includes approximate geographic coverage area information corresponding to the at least one available channel included therein, the method further comprising:

re-determining the positioning information of the mobile terminal at predetermined periods of time;

comparing the re-determined positioning information of the mobile terminal to the geographic coverage area information for the at least one available channel responsive to re-determining the positioning information at the predetermined periods of time; and

automatically retrieving a second channel list comprising available broadcast media content channel information for a location corresponding to the re-determined positioning information when the re-determined positioning information indicates that the mobile terminal is within a predetermined range of an end of the geographic coverage area for the at least one available channel.

11. The method of any of the claims 1-10, wherein the channel list comprises information corresponding to at least one free over-the-air broadcast media content channel.

12. The method of claim 11, wherein the broadcast media content comprises digital television, digital radio, and/or emergency information signals.

13. The method of any of the claims 1-12, wherein determining the positioning information of the mobile terminal is performed using a first mobile terminal receiver, and wherein automatically retrieving the channel list is performed using a second mobile terminal receiver.

14. The method of claim 13, wherein the first mobile terminal receiver comprises a global positioning system (GPS) receiver, and wherein the second mobile terminal receiver comprises a wireless local area network transceiver and/or a public land mobile network transceiver.

15. The method of any of the claims 1-14, wherein automatically retrieving the channel list comprises:

automatically performing an internet search for the channel list for the location of the mobile terminal responsive to determining the positioning information.

16. The method of any of the claims 1-15, wherein determining the positioning information comprises:

identifying a cell in a network corresponding to the location of the mobile terminal,

wherein automatically retrieving the channel list comprises automatically retrieving the channel list comprising at least one channel having a geographic coverage area corresponding to the identified cell.

17. The method of any of the claims 1-16, wherein determining the positioning information comprises:

identifying a country code corresponding to the location of the mobile terminal,
wherein automatically retrieving the channel list comprises automatically retrieving the channel list comprising at least one channel having a broadcast frequency corresponding to a frequency band associated with the country code.

18. The method of any of the claims 1-17, wherein determining the positioning information comprises:

receiving a plurality of positioning signals at the mobile terminal;
calculating ranging measurements based on the plurality of positioning signals; and
determining the positioning information based on the ranging measurements.

19. The method of any of the claims 1-18, further comprising:
scanning a frequency band for the available broadcast media content channel information in parallel with automatically retrieving the channel list.

20. A computer program product for providing access to broadcast media content, the computer program product comprising:

a computer readable storage medium including computer readable program code therein, the computer readable program code configured to carry out the method of any of the claims 1-19.

21. A mobile terminal, comprising:

a receiver; and
a controller coupled to the receiver and configured to determine positioning information corresponding to a location of the mobile terminal and automatically retrieve a channel list comprising available broadcast media content channel information via the receiver based on the positioning information.

22. The mobile terminal of claim 21, wherein the receiver comprises a transceiver configured to transmit a channel list request including the positioning information to a server configured to maintain the channel list for the current location, and receive the channel list for the current location from the server responsive to transmission of the channel list request.

23. The mobile terminal of claim 22, wherein the channel list request and/or the channel list comprises a short message service (SMS) and/or a multimedia message service (MMS) message.

24. The mobile terminal of any of the claims 21-23, wherein the controller is configured to automatically retrieve the channel list responsive to activation of a mobile terminal application configured to present the broadcast media content.

25. The mobile terminal of any of the claims 21-24, wherein the channel list comprises at least one available channel for the current location of the mobile terminal and frequency information corresponding thereto, the mobile terminal further comprising:

a tuner coupled to the controller and configured to be tuned to the at least one available channel based on the corresponding frequency information to receive media content broadcast over the at least one available channel; and

a user interface coupled to the controller and configured to present the received media content.

26. The mobile terminal of claim 25, wherein the user interface is configured to display the channel list and receive a user selection indicating the at least one available channel from the channel list, and wherein the tuner is configured to be tuned to the at least one available channel responsive to receipt of the user selection at the user interface.

27. The mobile terminal of any of the claims 25-26, further comprising:
a memory device coupled to the controller and configured to store the frequency information corresponding to the at least one available channel as channel preset information associated with the positioning information.

28. The method of any of the claims 25-27, wherein the tuner is configured to scan a frequency band for the available broadcast channel information when the controller automatically retrieves the channel list.

29. The mobile terminal of any of the claims 25-28, wherein the controller is further configured to determine a quality of service (QoS) for the received media content, re-determine the positioning information of the mobile terminal when the QoS falls below a predetermined threshold, and automatically retrieve a second channel list comprising available broadcast media content channel information for a location corresponding to the re-determined positioning information via the receiver responsive to re-determination of the positioning information.

30. The mobile terminal of any of the claims 21-29, wherein the channel list includes approximate geographic coverage area information corresponding to at least one available channel included therein, and wherein the controller is further configured to re-determine the positioning information of the mobile terminal at predetermined periods of time, compare the re-determined positioning information of the mobile terminal to the geographic coverage area information for the at least one available channel responsive to re-determination of the positioning information, and automatically retrieve a second channel list comprising available broadcast media content channel information for a location corresponding to the re-determined positioning information via the receiver when the re-determined positioning information indicates that the mobile terminal is within a predetermined range of an end of the geographic coverage area for the at least one available channel.

31. The mobile terminal of any of the claims 21-30, wherein the channel list comprises information corresponding to at least one free over-the-air broadcast media content channel.

32. The mobile terminal of any of the claims 21-31, wherein the receiver comprises:

a first receiver configured to be used for determining the positioning information of the mobile terminal; and

a second receiver configured to be used for automatically retrieving the channel list.

33. The mobile terminal of claim 32, wherein the first receiver comprises a global positioning system (GPS) receiver, and wherein the second receiver comprises a wireless local area network transceiver and/or a public land mobile network transceiver.

34. The mobile terminal of any of the claims 21-33, wherein the controller is further configured to automatically perform an internet search for the channel list for the current location of the mobile terminal responsive to determination of the positioning information.

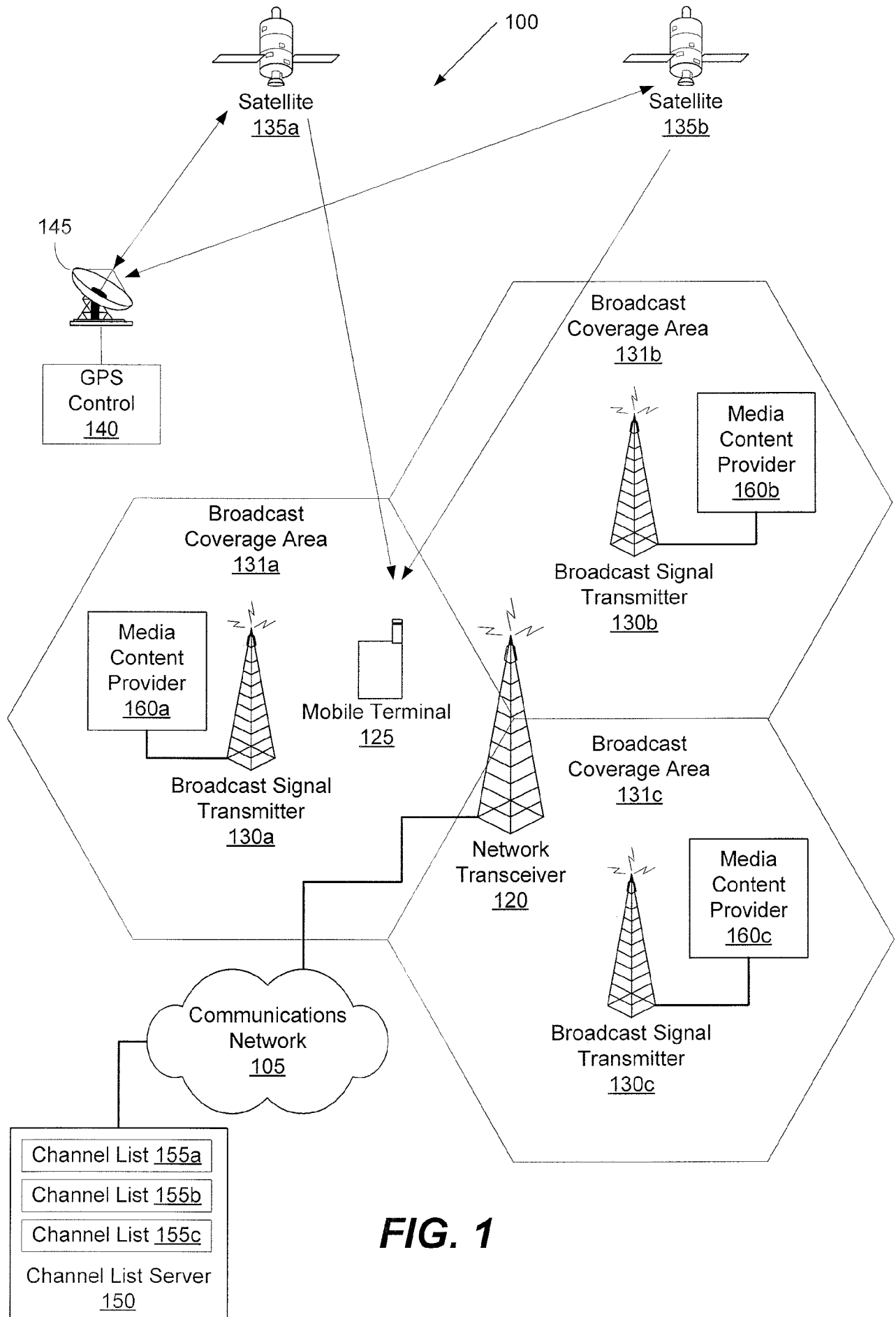
35. The mobile terminal of any of the claims 21-34, wherein the positioning information identifies a cell in a network corresponding to the current location of the mobile terminal, and wherein the channel list comprises at least one channel having a geographic coverage area corresponding to the identified cell.

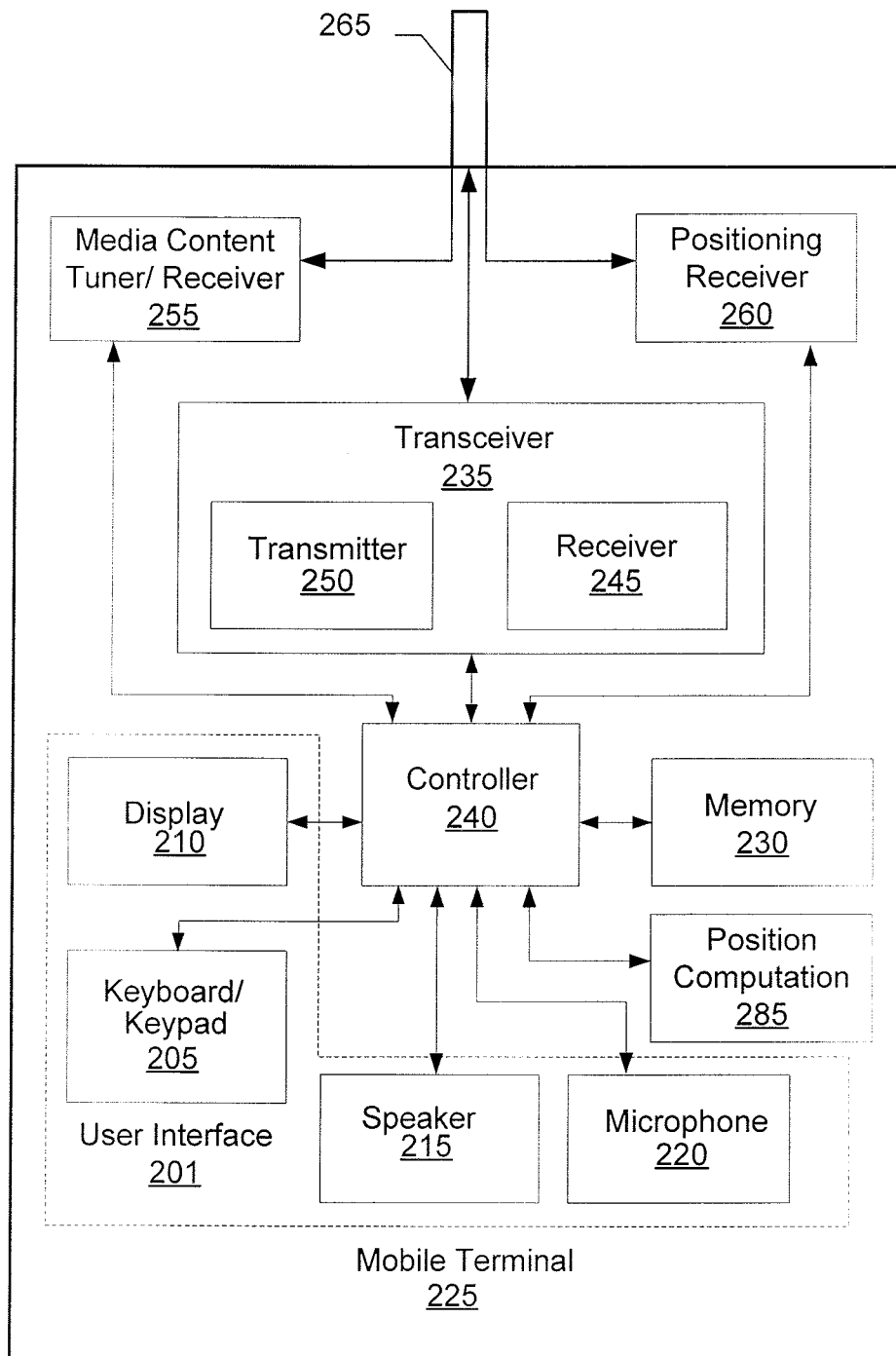
36. The mobile terminal of any of the claims 21-35, wherein the positioning information identifies a country code corresponding to the current location of the mobile terminal, and wherein the channel list comprises at least one channel having a broadcast frequency corresponding to a frequency band associated with the country code.

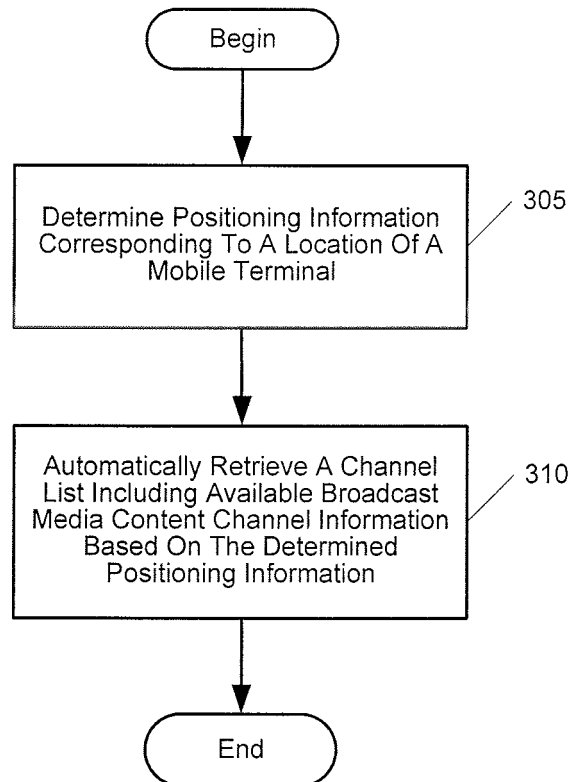
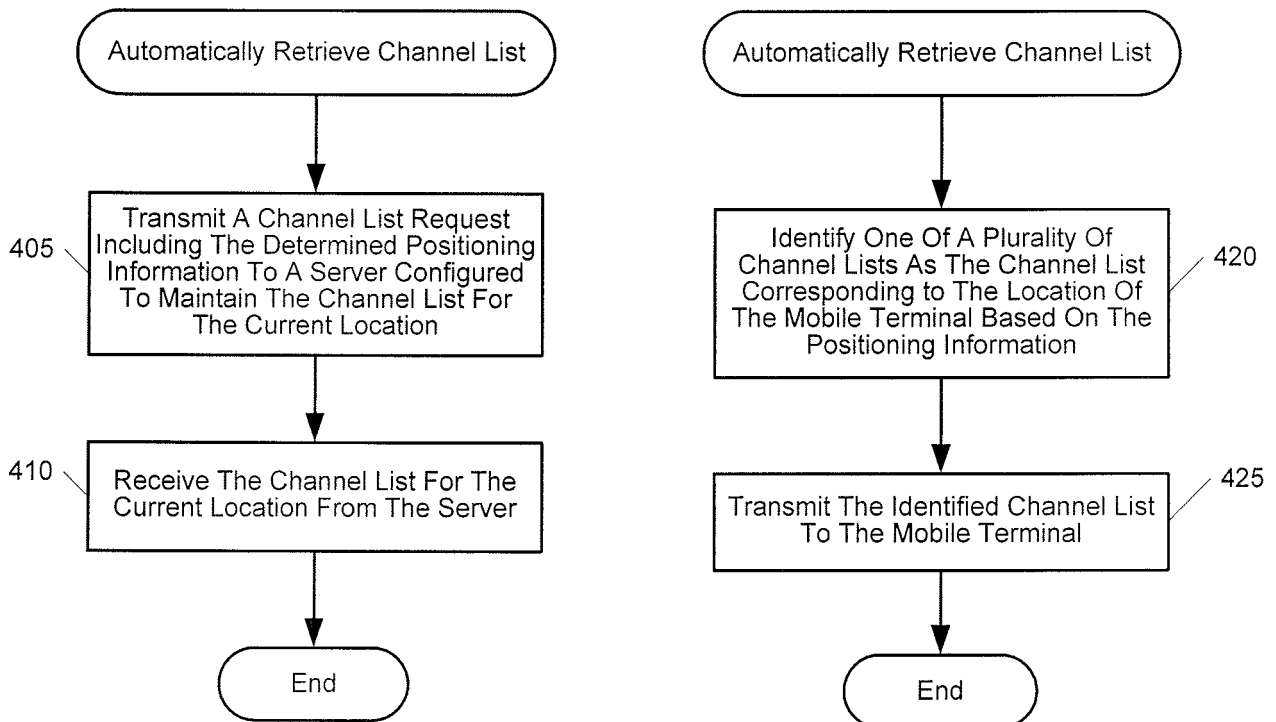
37. The mobile terminal of any of the claims 21-36, wherein the controller is configured to receive a plurality of positioning signals via the receiver, calculate ranging measurements based on the plurality of positioning signals, and determine the positioning information based on the ranging measurements.

38. A system for providing access to broadcast media content, the system comprising:

a server configured to determine positioning information corresponding to a current location of a mobile terminal and automatically retrieve a channel list comprising available broadcast media content channel information for the current location of the mobile terminal based on the positioning information.

**FIG. 1**

**FIG. 2**

**FIG. 3****FIG. 4A****FIG. 4B**

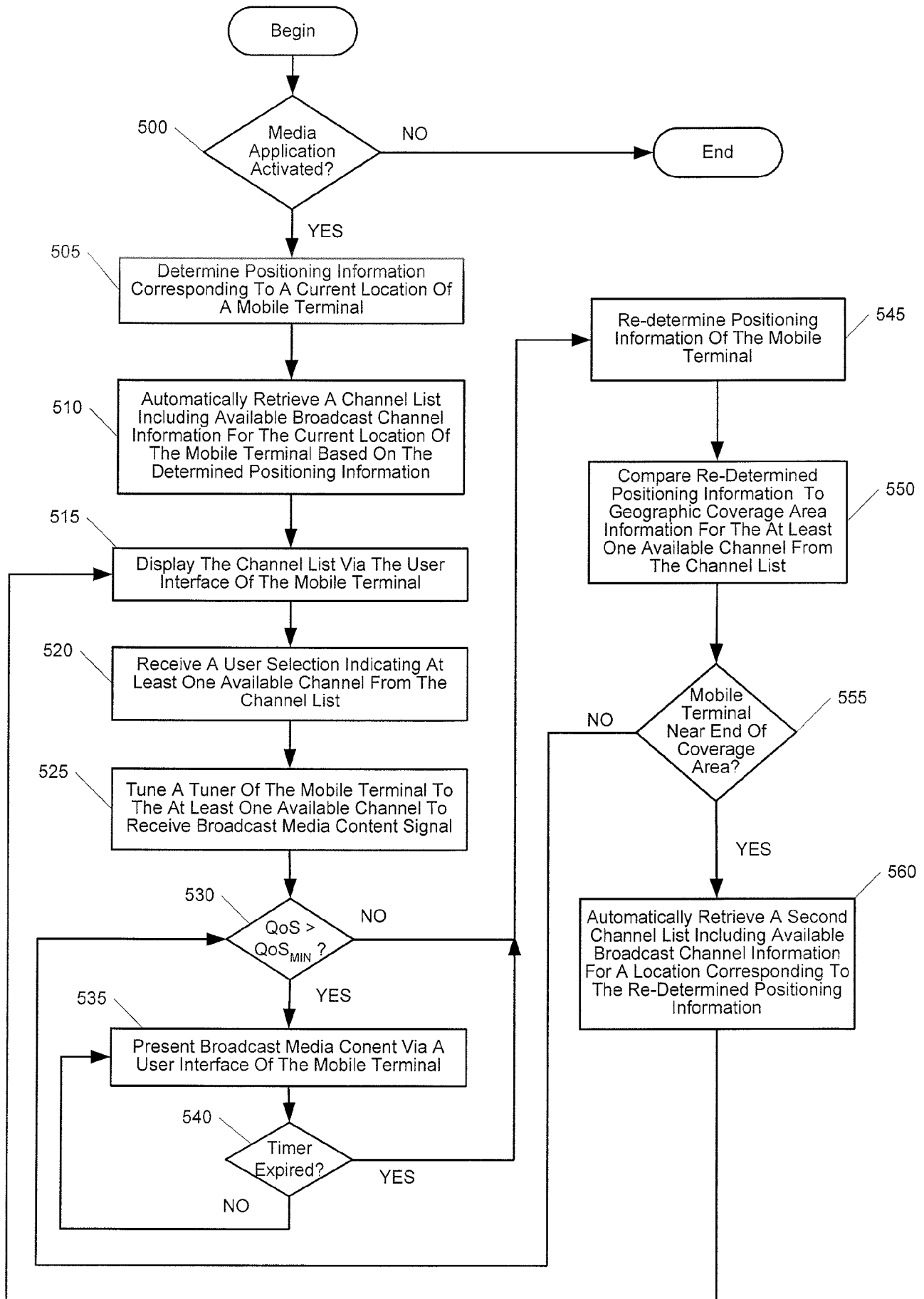


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2007/051432

A. CLASSIFICATION OF SUBJECT MATTER

INV. H04H1/00

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)

H04H H03J

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| X | US 2003/040272 A1 (LELIEVRE CHARLES [US] ET AL) 27 February 2003 (2003-02-27) paragraphs [0008], [0018], [0033] - [0051]; figures 1,3 | 1-38 |
| X | US 6 728 531 B1 (LEE JEFFREY S [US] ET AL) 27 April 2004 (2004-04-27) column 6, lines 60-67 column 8, line 27 - column 9, line 66 column 11, line 5 - column 12, line 49 column 14, lines 3-59 | 1,7,12 |



Further documents are listed in the continuation of Box C.



See patent family annex.

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O document referring to an oral disclosure, use, exhibition or other means

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T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

8 document member of the same patent family

Date of the actual completion of the international search

13 July 2007

Date of mailing of the international search report

23/07/2007

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Van Hoorick, Jan

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2007/051432

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
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| US 2003040272 | A1 | 27-02-2003 | NONE | |
| US 6728531 | B1 | 27-04-2004 | AU WO | 7600600 A 0122249 A1 |
| | | | | 24-04-2001 29-03-2001 |