

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
2 March 2006 (02.03.2006)

PCT

(10) International Publication Number
WO 2006/022706 A2

(51) International Patent Classification:
H04N 7/16 (2006.01)

(21) International Application Number:
PCT/US2004/026033

(22) International Filing Date: 10 August 2004 (10.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant (for all designated States except US): **THOMSON LICENSING S.A.** [FR/FR]; 46 Quai A. Le Gallo, F-92100 Boulogne-Billancourt (FR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LIU, Xiaodong** [US/US]; 12523 Pebble Knoll Way, Carmel, Indiana 46033 (US). **TAO, Rong** [CN/US]; 9263 College Drive, Apt. A, Indianapolis, Indiana 46240 (US).

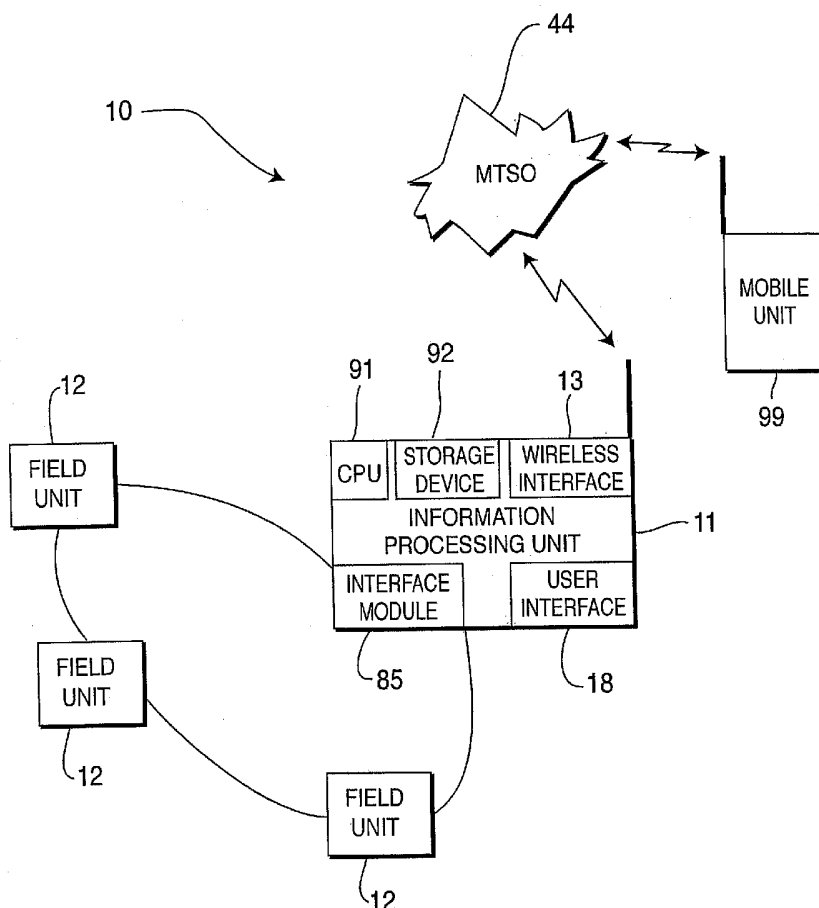
(74) Agents: **TRIPOLI, Joseph, S.** et al.; Thomson Licensing Inc., Two Independence Way, Suite 200, Princeton, NJ 08540 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: BROADBAND HOME INFORMATION CENTER



(57) Abstract: There is provided a home information center for communicating with a mobile unit associated with a user. An information processing unit (11) receives audio and video signals, forwards the audio and video signals to a consumer device, receives information requests from the mobile unit, and forwards information collected in response to the information requests to the mobile unit. A plurality of field units (12), connected to the information processing unit, collect the information from a plurality of sources proximate to the plurality of field units in response to the information requests, and provide the information to the information processing unit for forwarding to the mobile unit.



Published:

— without international search report and to be republished
upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

BROADBAND HOME INFORMATION CENTER

FIELD OF THE INVENTION

The present invention generally relates to media processing and, more particularly, to a broadband home information center.

BACKGROUND OF THE INVENTION

Set top boxes such as, for example, Digital Subscriber Line (DSL) set top boxes, cable television set top boxes, and satellite set top boxes, are becoming more prevalent in homes, with families typically having at least one such box and, in many cases, more than one. Given the variety of different types of networks that can be made to interface with a set top box, individuals can obtain ever-increasing amounts of information and data services from different service providers.

While some set top boxes include a home control network interface of one form or another (e.g., X10), any applications implemented across such networks have typically been limited to simply facilitating the control of an electronic device located within the home (e.g., turn on/off lamp, stereo, etc.) while the user is at home.

Until recently, the majority of set top boxes have been limited to passively receiving information from dedicated service providers. However, a very small number of applications are currently available which are capable of pulling, on-demand, information requested by a mobile user and delivering that information to the mobile user. Further, these few applications typically deliver information from the "outside world" (e.g., through a service provider) to the user, and seldom can provide the user with information that is, for example, solely within the control of the user. Such information could include, for example, information resident on an electronic device (e.g., a computer or other electronic device) located within the home or office of the user, such as the name, address, or birth date of a friend or acquaintance, an inventory of the food within the user's refrigerator, and so forth.

Accordingly, it would be desirable and highly advantageous to have a method and apparatus that allow a mobile user to receive, on-demand, certain types of information that correspond to the mobile user, and further to control electronic devices within the user's home (or other location) while the user is mobile and remote

from the home (or other location), such method and apparatus preferably being non-dependent upon any service providers but being able to meet the user's needs with respect to device control.

5

SUMMARY OF THE INVENTION

The problems stated above, as well as other related problems of the prior art, are solved by the present invention, which is directed to a home information center.

According to an aspect of the present invention, there is provided a home information center for communicating with a mobile unit associated with a user. An information processing unit receives audio and video signals, forwards the audio and video signals to a consumer device, receives information requests from the mobile unit, and forwards information collected in response to the information requests to the mobile unit. A plurality of field units, connected to the information processing unit, collect the information from a plurality of sources proximate to the plurality of field units in response to the information requests, and provide the information to the information processing unit for forwarding to the mobile unit.

According to another aspect of the present invention, in a set top box for receiving audio and video signals, there is provided a method for exchanging information between the set top box and a mobile unit corresponding to a user. Field units proximate and connected to the set top box are provided for collecting information in response to information requests issued from the mobile unit. The information requests issued from the mobile unit are received. Data corresponding to the information requests is forwarded to the field units to enable the field units to collect the information specified by the information requests. The information collected by the field units is received and forwarded to the mobile unit.

These and other aspects, features and advantages of the present invention will become apparent from the following detailed description of preferred embodiments, which is to be read in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a home information center to which the present invention may be applied, according to an illustrative embodiment of the present invention;

FIG. 2 is a block diagram illustrating the interface module 85 of FIG. 1, according to an illustrative embodiment of the present invention;

FIG. 3 is a block diagram illustrating a system architecture 300 for a storage device 326 for use by the home information center 10, according to an illustrative embodiment of the present invention;

FIG. 4 is a block diagram further illustrating the information processing unit 11 of FIG. 1, according to an illustrative embodiment of the present invention;

FIG. 5 is a diagram illustrating a software stack 500 for a home information center, according to an illustrative embodiment of the present invention;

FIG. 6 is a flow diagram illustrating a method, corresponding to a set top box, for exchanging information between the set top box and a mobile unit corresponding to a user, according to an illustrative embodiment of the present invention; and

FIG. 7 is a flow diagram illustrating a method, corresponding to a set top box, for exchanging information between the set top box and a mobile unit corresponding to a user, according to an illustrative embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is directed to a home information center capable of exchanging information with a mobile unit associated with a user. Advantageously, the present invention allows for the mobile unit to receive information from a plurality of sources throughout the user's home (or other environment) when the mobile unit is carried by the user and the user is remote from home. Moreover, the present invention allows the user to utilize the mobile unit in a remote information gathering mode when the user is remote from the mobile unit but local to a home unit within the user's home.

It is to be appreciated that the home information center according to the present invention is advantageously capable of interfacing with any type of network including, but not limited to cable, wireless, Digital Subscriber Line (DSL), and so forth. Moreover, it is to be appreciated that the home information center according to the present invention may be implemented as a set top box typically found in many homes. However, the present invention is not limited to implementations that include a set top box and, thus, other types of electronic devices may also be used in various

other implementations of the present invention. For example, it is to be appreciated that the present invention is applicable to any system that delivers broadband services including data transmission over telephones, set top boxes, computers, satellite links, and so forth.

5 It is to be understood that the present invention may be implemented in various forms of hardware, software, firmware, special purpose processors, or a combination thereof. Preferably, the present invention is implemented as a combination of hardware and software. Moreover, the software is preferably implemented as an application program tangibly embodied on a program storage device. The application
10 program may be uploaded to, and executed by, a machine comprising any suitable architecture. Preferably, the machine is implemented on a computer platform having hardware such as one or more central processing units (CPU), a random access memory (RAM), and input/output (I/O) interface(s). The computer platform also includes an operating system and microinstruction code. The various processes and
15 functions described herein may either be part of the microinstruction code or part of the application program (or a combination thereof) that is executed via the operating system. In addition, various other peripheral devices may be connected to the computer platform such as an additional data storage device and a printing device.

 It is to be further understood that, because some of the constituent system
20 components and method steps depicted in the accompanying Figures are preferably implemented in software, the actual connections between the system components (or the process steps) may differ depending upon the manner in which the present invention is programmed. Given the teachings herein, one of ordinary skill in the related art will be able to contemplate these and similar implementations or
25 configurations of the present invention.

 The present invention advantageously provides a home information center capable of executing applications for satisfying a user's information needs. The present invention is particularly suited at providing user-centric information, although non-user-centric information may also be provided by the present invention. As used
30 herein, the phrase "user-centric information" refers to information that corresponds to or is associated with the user in some way. For example, user-centric information could include telephone numbers, addresses, birthdates, and so forth of the user's

friends, family, or acquaintances. Moreover, user-centric information could correspond to any information relating to the user and his or her home such as, for example, an inventory of the items in the user's refrigerator, whether a home alarm has been triggered, and so forth. This is in contrast to non-user-centric information
5 which may be generic information not necessarily associated with the user such as sport scores, news, magazine articles, and so forth.

The types of applications that will be executed by the home information center according to the present invention are typically, but not necessarily, non-real-time in nature and have a low data rate. However, real-time high data rate applications may
10 be executed by the home information center. Thus, the data source could be a real-time data source such as a service provider, or could be generated at the user's home. One of the primary advantages of these applications is that they can serve the user's needs while the user is on the road or on the move.

FIG. 1 is a block diagram of a home information center 10 to which the present
15 invention may be applied, according to an illustrative embodiment of the present invention. The home information center 10 includes an information processing unit 11 and multiple field units 12.

The information processing unit 11 includes a wireless interface 13, a user interface 18, and an interface module 85. The wireless interface 13 allows for
20 communications between the information processing unit 11 and a mobile unit 99. The user interface 18 allows for communications between the information processing unit 11 and a user that is local with respect to the information processing unit. The interface module 85 allows for communications between the information processing unit 11 and the multiple field units 12. It is to be appreciated that the user interface 18
25 and the interface module 85 may be implemented to operate wirelessly, with wires, or a combination thereof. Wireless communications from a user to the user interface 18 may be made through use a remote control (not shown). Moreover, it is to be appreciated that the wireless interface 13, the user interface 18, and the interface module 85 may be implemented as a single interface or other variation while still
30 maintaining the spirit and scope of the present invention.

Information processing unit further includes at least one processor (also referred to herein as Central Processing Unit (CPU)) 91 and at least one storage

device 92. It is to be appreciated that the mobile unit 99, and possibly some or all of the field units will include at least one processor and corresponding memory (not shown). It is to be further appreciated that while the storage device 92 is shown in FIG. 1 as part of the information processing unit 11, in other embodiments of the present invention the storage device may be connected to, but not part of, the information processing unit. An implementation where the storage device 92 is connected to, but not part of, the information processing unit 11 is shown and described with respect to FIG. 3.

The information processing unit 11, among other things, is capable of receiving audio and video signals and forwarding these signals to a consumer device such as, but not limited to, a television, a Compact Disk (CD) recorder, a Digital Versatile Disk (DVD) recorder, a stereo receiver, and so forth. The audio and video signals may be provided to the consumer device via the interface module 85. As an example, the information processing unit 11 may be implemented as a Digital Subscriber Line (DSL) set top box, a cable television set top box, a satellite television set top box, and so forth. In such a case, the set top box will be enhanced with respect to conventional set top boxes by virtue of, for example, its interactions with the multiple field units 12 and the mobile unit 99 through the above interfaces, as described herein.

The user interface 18 can include, but is not limited to, a keyboard or keypad, a display, a microphone and a speaker. In the case of a microphone, the user interface 18 (or the information processing unit 11) may also include speech recognition technology for decoding speech commands and queries provided by a user.

The mobile unit 99 may be, but is not limited to, a cellular telephone, a Personal Digital Assistant, a laptop computer, and so forth.

The field units 12 collect information from sources such as, for example, other electronic devices located throughout the home of a user. The other electronic devices include, but are not limited to, computers, refrigerators, alarms, heating/cooling systems, and so forth. The field units 12 can be connected to the information processing unit 11 via one or more types of networks and corresponding network interfaces (included in the interface module 85). These networks may be wired, wireless, and/or a combination thereof. Moreover, the network topology between the information processing unit 11 and the field units 12 may be, for example,

bus, star, or token ring types of networks, or any combination thereof. Moreover, the network topology may employ wireless technologies such as, for example, BLUETOOTH. It is to be appreciated that the present invention is not limited to any particular type of network topology and, thus, any network topology may be advantageously utilized by the present invention, while maintaining the spirit and scope of the present invention.

The present invention allows for the field units 12 to collect information for forwarding to the mobile user. The field units may be used to collecting user-centric information or non-user-centric information, depending on the needs of a particular user. According to an illustrative embodiment of the present invention, the field units 12 are located within the user's home, and are coupled to each other and to the information processing unit 11 via a Home Area Network (HAN). However, it is to be appreciated that the field units 12 may be located within some other location pertaining to the user such as the user's office and so forth. The HAN may interface with the information processing unit via the interface module 85. The information processing unit 11 is the master node in the HAN. Once the information processing unit 11 receives a valid request from a user, the information processing unit 11 will send the requested information to the mobile unit 99 of the user via the wireless interface 13.

The information could be stored in the field unit 12 or simply collected by the field unit 12 which would then forward the information to the information processing unit 11. A field unit 12 could be, but is not limited to, a smart bar code reader with a HAN interface mounted on a smart refrigerator. Equipped with a specialized software stack, this type of field unit 12 can provide the user's food inventory information to the information processing unit 11. Once the user requests the information, the user can call-in via the mobile unit 99 and the home information center 10 will deliver the information to the user.

Another type of field unit 12 could be mounted on a user's Personal Computer (PC) to transfer the user's personal files to the user via the HAN and the home information center's wireless interface 13 when the user is mobile and remote from his or her home.

The field unit 12 can be connected to a home security system. In such a case, the home information center 10 can send an alarm indication to the mobile unit 99 of the user to inform the user that his or her home alarm has been tripped.

It is to be appreciated that a field unit 12 could be implemented as, but not
5 limited to, a bar code reader, an interface (e.g., USB, FIREWIRE, etc.), an imaging device, a mini-computer, and so forth.

Advantageously, it is to be appreciated that the present invention may also be utilized such that the information flow is reversed in that the home information center 10 can allow a user that is currently at home to monitor his or her mobile belongings
10 via the remote mobile unit 99. Under this scenario, the remote mobile unit 199 can be considered to be a mobile field unit. For example, given that some mobile telephones and Personal Digital Assistants (PDAs) now come with imaging hardware and software for capturing and transmitting image data, the mobile unit 99 (if implemented as a mobile telephone, PDA, or any other type of mobile device capable of capturing
15 and transmitting images) can be used to take images from a remote location and to transmit the images back the home information center for viewing by the user. Requests for information can be input to the information processing unit 11 via the user interface 18 of the information processing unit 11.

Moreover, it is to be further appreciated that the present invention can be
20 utilized such that information that originates from a broadcast service provider can be relayed to the remote mobile unit 99 using the data handling and format converting capabilities of the home information center 10. Thus, the present invention advantageously allows for the combining of T-commerce with M-commerce.

The home information center 10 can be connected to a broadcast type network
25 such as cable, DSL, or a satellite front end. At the same time, the set top box can be connected to the aforementioned Home Area Network (HAN) for information collection (e.g., user-centric information) or information data routing.

The wireless interface 13 connects the HAN to a mobile network corresponding to the remote mobile unit 99. The wireless interface 13 should include the necessary
30 hardware and software stack to support Code Division Multiple Access (CDMA), Global System for Mobile Communication/General Packet Radio Service

(GSM/GPRS) protocol, or any other communication protocol user by the mobile unit 199.

FIG. 2 is a block diagram illustrating the interface module 85 of FIG. 1, according to an illustrative embodiment of the present invention.

5 Interface module 85 permits data flow from one type of network to another. Interface module 85 preferably includes a Digital Signal Processing (DSP) based subsystem that performs medium access control (MAC) level gating, packet de-packetization and re-packetization substantially or completely independent of a system's main CPU.

10 Interface module 85 includes connections 101-106 to a head-end (not shown) or other network. Connections 101-106 provide two-way communication between interface module 185 and provider networks (e.g., connections 101-103) and interface module 85 and local networks (e.g., home networks, and so forth, on connections 104-16). Advantageously, connections 101-106 can receive information
15 in different MAC formats. As a result, interface module 85 provides a versatile physical layer interface that may be employed for interfacing with a plurality of network PHY layers.

 Connections 101-16 connect to correlated register blocks 107-112 corresponding to specific types of physical port PHY interfaces. These interfaces are
20 illustratively depicted as an ATM PHY port 107, Universal Serial Bus (USB) PHY port 108, an ADSL PHY port 109, a powerline PHY port 110 for a powerline home network, a home phoneline network alliance (HPNA) PHY port 111 and an Ethernet PHY port 112. These blocks are collectively referred to as a network interface PHY control block 114. For each PHY control block 114, there is a MAC address-gating block 116,
25 which will transform MAC addresses from one type of network to another. PHY control block 114 manages conversions of different MAC formats for both input and output operations between interface module 85 and provider side networks through blocks 107-109 in block 113 and between interface module 85 and user-side networks (e.g., a home network) through blocks 110-112 in block 115.

30 Gating block 116 manages addressing/multiplexing content received and sent over connection networks. Input and output gating is performed at the MAC level. Gating block 116 works in conjunction with a MAC level filtering block 118, which

filters the MAC address for any incoming packets from different types of networks and provides the proper MAC address to the outgoing packets to different types of networks. Once packets are appropriately routed to the proper destinations, processing of the packet content is performed.

5 After the MAC level gating layer 116, packets are routed to an application data packet de-packetization and re-packetization block 120. For incoming packets, block 120 performs Digital Signal Processing (DSP) to remove packet headers, and decipher data and control signals. For outgoing packets, headers are added with routing/address information to provide for packet delivery destinations. In block 122,
10 before data enters the de-packetization and re-packetization block 120, there is an optional data path permitting a host backend system to store the raw data from the network to a system's random access memory (RAM) or hard drive memory location. Also, the stored raw data may be streamed out to a network by Direct Memory Access (DMA) in block 124. This option is useful for hard drive based applications.

15 Block 122 includes a pass through 123, which permits the direct routing of packets of information through interface module 85 if the information in the header or data content of the packet is not to be used by interface module 85.

 A presentation level transport demultiplexing block 127 delivers the correlated data coming from the different types of networks to different applications running on a
20 network system's main CPU (e.g., processor 91 of information processing unit 110) or other processor(s) capable of running applications. By employing interrupt signaling 129, application/presentation level 127 directs data/control signals to and from memory locations 128 to initiate and/or maintain applications running on a system processor(s). A data filter array 130 may be employed to direct application data and
25 control signals to appropriate applications for the transport demultiplexing functions of block 127. Outgoing data and control signals in block 132 from system CPU's or other processors are packetized and gated to appropriate networks. The system CPUs are preferably located within information processing unit 11.

 By employing the interface module 85 in accordance with the present
30 invention, a system CPU is less burdened with packet and data management in a multi-network system. These management functions make a CPU inefficient particularly for systems with multi-network capable consumer products. In

conventional systems, a large amount of CPU time and a large amount of software executed in the system's main CPU are needed to accomplish the data routing from one type of network to another.

Interface module 85 advantageously redistributes multiplexing and demultiplexing tasks away from a system processor. This permits the system CPU or other processor(s) to concentrate on other tasks such as video display, graphic rendering, web browsing, and so forth. In addition, by employing a universal broadband interface, a plurality of different types of networks can be supported by a device or network. Interface module 85 may be expandable for future broadband home consumer appliances. Interface module 85 may include ATM PHY or other type of head-end interface capabilities.

FIG. 3 is a block diagram illustrating a system architecture 300 for a storage device 326 for use by the home information center 10, according to an illustrative embodiment of the present invention. In the illustrative embodiment of FIG. 3, the storage device 326 is connected to, but not part of, the information processing unit 11. The architecture 300 of FIG. 3 allows for efficient use of available memory resources typically found in a home or office. The storage device 326 replaces hard drives (or other memory devices) in the information processing unit 11 of the home information center 10 (such as storage device 91 in FIG. 1) by utilizing existing storage capacity on, for example, a Personal Computer (PC). By making a connection to the PC, the home information center 10, for example, would be more economically attractive to potential purchasers or subscribers. The interface module 85 may be used to connect the home information center 10 to a PC.

The architecture 300 may be part of a Digital Subscriber Line (DSL) network, cable network, satellite network, and so forth, which may integrate voice, data, and video services.

In one embodiment, the information processing unit 11 may include a set top box for a cable, DSL, satellite, or other type of network. The information processing unit may include data ordering hardware/software 316 and data flow controls 318. Data flow controls 318 may be employed, for example, in an application such as video-on-demand, for rewinding, fast-forwarding, pausing, etc., an ordered video.

Advantageously, the information processing unit 11 does not need to provide memory storage capabilities, although the information processing unit 11 may include such storage capabilities (e.g., storage device 91 in FIG. 1). The information processing unit 11 includes an interface port 320. Interface port 320 may include a
5 coaxial connector, 1394 FIREWIRE or other high-speed connection interface/wire 322.

Interface module 85 connects information processing unit 11 to a mass storage device 326 located at the customer's premises. Mass storage device 326 preferably includes a personal computer, although a database or other storage system may be
10 employed. Mass storage device 326 preferably includes processing capabilities so that software programs can be run thereon. Mass storage device 326 may include an operating system 328 on which an interface program/protocol is implemented. Protocol 330 is employed to permit communication between information processing unit 11 and storage device 326. Protocol 330 works with a home networking
15 technology, such as Home Phoneline Networking Alliance (HPNA) or a similar type of interface included in interface module 85, to provide an interface to hard drive(s) or storage devices on mass storage device 326. The hard drive(s) is used to store applications and/or data from information processing unit 11 (e.g., video, plug-ins, etc.) instead of employing a hard drive (or other memory device such as storage
20 device 91 in FIG. 1) on the information processing unit 11 itself.

Use of a hard drive on storage device 326 also enables a data provider serving information processing unit 11 to provide applications that support operating systems that are not present on information processing unit 11. For example, information processing unit 11 may utilize an embedded Linux Operating System (OS), but the
25 user may own a Window's PC. In this case, the data provider can supply WINDOW's based applications without having to include this OS on the information processing unit 11. A similar example can be made for any OS that may be used by the user.

Current implementations of hard drives often place them within a Personal Video Recorder (PVR) or set top box itself and not on a separate PC. The
30 disadvantage in this is the increased cost of the device and the limitation of applications to those written for the specific OS provided by the device.

The present invention permits the hard drive to be located on a separate storage device 326, e.g., a PC, connected to the information processing unit 11, preferably though an HPNA or a similar type of interface included in interface module 85.

5 In one embodiment, installation of storage device 326 may include the installer setting up a specific partition 332 of the hard drive(s) of the user's PC for the data needed for the system. Data on this partition may be made unavailable to the user. Only the information processing unit 11 would be able to read and write to this partition. Only after the user removes the information processing unit 11 and
10 reformats the partition (removing all data currently present on the partition) would that portion of the hard drive become available once more.

 In addition, the user's PC should be protected from outside users of the information processing unit's 11 data path. As part of the installation, software may be installed on the PC to facilitate interfacing with the information processing unit 11.
15 Copy protection may be needed to protect data sent to and stored on the hard drive, especially video data. This data can be encrypted while located on the PC's hard drive and only encrypted within information processing unit 11 to prevent unauthorized copying of the data.

 To this end, information processing unit 11 may include an
20 encryption/decryption program 334 to encrypt data sent to mass storage device 326 and decrypt the data for viewing and usage. The encryption process may preferably be performed by employing keys or codes not known to the end user but known by the data provider. In this way, the data provider can monitor usage and control access to the underlying data. The data provider may therefore be able to erase data from the
25 designated areas of the hard drive of storage device 326 or limit the number of accesses to a given file. In addition, a video or file can "time out" so that an additional fee can be charged for the video if a user desires to view the video or file again after the time out period. By limiting access to the data files while resident on the storage device 326, users may be billed for access to the files since the files can only be
30 accessed after decryption in information processing unit 11.

 A network control system (NCS) 350 may be provided as part of the data provider's network 352. Network 352 may be a DSL network, a cable network, a

satellite network, or any other type of network. In one embodiment, NCS 350 manages the content in the storage device 326. The NCS 350 or the information processing unit 11 provides a termination point for the signaling that controls the access to the content on storage device 326 by setting up and tearing down virtual
5 circuits based on users access rights and requests. In addition, NCS 350 or information processing unit 11 also provides functions for permitting a user to control the content flow (e.g., functions such as pause, stop, play, advance, reverse, etc.) in much the same way as traditional VCR functionalities. NCS 350 also provides information on customer activity for billing purposes.

10 An output device 356 is coupled to information processing unit 11. Output device 356 employs a data stream stored on storage device or directly sent from network 352 through information processing unit 11. Output device 356 may include a television, a personal computer, a display or any other device that can employ data received over a network. In one embodiment, storage device 326 functions as a
15 buffer to adjust bandwidth requirements of the system during viewing of a video stream, for example.

FIG. 4 is a block diagram further illustrating the information processing unit 11 of FIG. 1, according to an illustrative embodiment of the present invention. The information processing unit 11 includes a processor 91. The wireless interface 13 of
20 the information processing unit 11 includes an antenna 405, a baseband processor 410, an up/down converter 420, a power amplifier 430, and a Voltage Controlled Oscillator (VCO) 440. A baseband network interface 450 is connected to the processor 91 and to baseband networks (not shown). Peripheral Component Interconnect (PCI) busses 499 (or any other connection means) may be used to
25 connect the information processing unit 11 to the baseband network interface 450, the baseband network interface 450 to baseband networks, and the information processing unit 11 to the baseband processor 410.

The wireless interface should be configured to convert a data packet having a Mandatory Access Control (MAC) address corresponding to the home information
30 center 10 to the proper format for a mobile network data packet. Since data packets that traverse wireless links are typically of a low data rate, the wireless interface 13

should be able to handle the data format conversion without expending high computation power.

Thus, in one embodiment of the present invention, the home information center 10 will have two types of network interfaces. One interface (baseband network interface 450) is for all the baseband networks, and the other interface (wireless interface 13) is for the mobile wireless network. For the stationary baseband networks, different devices on different networks will be on different MAC addresses and, thereafter, different subnet addresses for networking and communication purposes.

The baseband processor 410 in the wireless interface 13 will convert the baseband data flow to Radio Frequency (RF) signals for radio frequency channel communication. This provides a gateway to route the data from the mobile unit 99 to the home baseband data domain. The communication link between the home information center 10 and the mobile unit 99 is through the existing Mobile Telephone Switching Office (MTSO) 44, as shown in Fig.1.

According to an illustrative embodiment of the present invention, BLUETOOTH Security system is used to allow only the authorized mobile user to access the data generated in the HAN environment.

FIG. 5 is a diagram illustrating a software stack 500 for a home information center, according to an illustrative embodiment of the present invention. The software stack 500 may be employed in a home information center designed from the ground up in accordance with the present invention, or in a home information center implemented using an existing set top box. The software stack 500 includes the following portions: set top transport protocols 505, Wireless Access Protocol (WAP) 510, set top middleware & application 515, Mobile Information Device Profile (MIDP) 520, Short Message Service (SMS) 525, Mail User Agent (MUA) 530, Mail Transfer Agent (MTA) 535, Mail Delivery Agent (MDA) 540, Interactive Mail Access Protocol (IMAP) 545, others 550, e-mail 555, user request to WAP service translation 560, set top box & home information center applications 565.

According to an illustrative embodiment of the present invention, application requests from the remote user may be translated into one of the following two categories of WAP services: short message and e-mail. The requested data will be

translated either into a short message or an e-mail message depending upon the nature of the requested data.

If the requested data is only about a few hundred bytes long, then the data will be put into the short message format. If the requested data is a still image or a large
5 file, then the requested data will be sent to the remote user as an email attachment.

Of course, the present invention is not limited to these two categories of WAP services and, thus, other services may also be employed in accordance with the present invention, while maintaining the spirit and scope of the present invention. With the incorporation of JAVA 2 MICRO EDITION, the application can also generate
10 complex graphic information on a display of the remote mobile unit 199.

FIG. 6 is a flow diagram illustrating a method, corresponding to a set top box, for exchanging information between the set top box and a mobile unit corresponding to a user, according to an illustrative embodiment of the present invention. The set top box, at the least, receives audio and video signals, which are generally forwarded
15 to a consumer device such as, for example, a television. It is to be appreciated that the set top box shown and described with respect to FIG. 6 may be replaced by the information processing unit 11 shown and described with respect to FIG. 1, while maintaining the spirit and scope of the present invention.

Field units are provided proximate and connected to the set top box for
20 collecting information in response to information requests issued from the mobile unit (step 605). The information requests issued from the mobile unit are received by the set top box (step 610). Data corresponding to the information requests is forwarded from the set top box to the field units to enable the field units to collect the information specified by the information requests (step 615). The information collected by the
25 field units is received by the set top box (step 620) and forwarded to the mobile unit (step 625).

FIG. 7 is a flow diagram illustrating a method, corresponding to a set top box, for exchanging information between the set top box and a mobile unit corresponding to a user, according to an illustrative embodiment of the present invention. The set
30 top box, at the least, receives audio and video signals, which are generally forwarded to a consumer device such as, for example, a television. It is to be appreciated that the set top box shown and described with respect to FIG. 7 may be replaced by the

information processing unit 11 shown and described with respect to FIG. 1, while maintaining the spirit and scope of the present invention.

User inputs corresponding to other information requests for other information that is potentially collectable by the mobile unit are received when the mobile unit is remote from the user (step 730). Data corresponding to the other information requests is forwarded to the mobile unit to enable the mobile unit to collect the other information specified by the other information requests (step 735). The other information collected by the mobile unit is received by the step top box (step 740) and provided to the user while the user is remote from the mobile unit (step 745). The other information may be provided to the user through the set top box via, for example, the user interface.

It is to be appreciated that the methods of both FIGs. 6 and 7 may be practiced by a single set top box and/or information processing unit and, thus, are not mutually exclusive but rather intended to be supplemental in aiding the user in fulfilling his or her information needs.

Although the illustrative embodiments have been described herein with reference to the accompanying drawings, it is to be understood that the present invention is not limited to those precise embodiments, and that various other changes and modifications may be affected therein by one of ordinary skill in the related art without departing from the scope or spirit of the invention. All such changes and modifications are intended to be included within the scope of the invention as defined by the appended claims.

CLAIMS

1. A home information center for communicating with a mobile unit associated with a user, the home information center comprising:

5 an information processing unit (11) for receiving audio and video signals, for forwarding the audio and video signals to a consumer device, for receiving information requests from the mobile unit, and for forwarding information collected in response to the information requests to the mobile unit; and

10 a plurality of field units (12), connected to said information processing unit, for collecting the information from a plurality of sources proximate to the plurality of field units in response to the information requests, and for providing the information to said information processing unit for forwarding to the mobile unit.

15 2. The home information center of claim 1, wherein said information processing unit further comprises a user interface (18), and wherein said information processing unit receives other information requests from the user via the user interface when the user that is local with respect to the information processing unit but remote with respect to the mobile unit, forwards the other information requests to the mobile unit for use by the mobile unit to collect any information corresponding to the
20 information requests, and receives the information from the mobile unit so as to provide the information to the user.

25 3. The home information center of claim 1, wherein said information processing unit (11) receives the information from a broadcast service in response to the requests for information, and relays the information to the remote mobile unit.

4. The home information center of claim 1, wherein said information processing unit (11) receives the information requests from the mobile unit and forwards the information to the mobile unit using Wireless Application Protocol (WAP).

5. The home information center of claim 1, wherein the information requests are received by said information processing unit as one of a Short Message Service (SMS) message and an electronic-mail (e-mail) message.

5 6. The home information center of claim 1, wherein said information processing unit (11) translates the information to one of a Short Message Service (SMS) message and an electronic-mail (e-mail) message prior to forwarding the information to the mobile unit.

10 7. The home information center of claim 1, wherein said information processing unit (11) comprises a wireless interface for receiving the information requests from the mobile unit and for forwarding the information to the mobile unit.

15 8. The home information center of claim 7, further comprising at least one network and network interface (85) for connecting said information processing unit to said plurality of field units, wherein said at least one network comprises at least one baseband network and said information processing unit comprises a baseband processor for converting baseband signals to radio frequency signals for transmission to the mobile unit.

20 9. The home information center of claim 1, wherein said information processing unit (11) is further for receiving and processing signals corresponding to at least one of Digital Subscriber Line (DSL), cable television, and satellite television.

25 10. The home information center of claim 1, wherein said information processing unit (11) is one of a Digital Subscriber Line (DSL) set top box, a cable television set top box, and a satellite television set top box.

30 11. The home information center of claim 1, wherein said information processing unit (11) converts data packets having Mandatory Access Control (MAC) addresses corresponding to a local area network that includes the information

processing unit to a format corresponding to a wireless network that includes the mobile unit.

12. The home information center of claim 1, wherein the mobile unit (99) is
5 one of a cellular telephone, a Personal Digital Assistant (PDA), and a laptop computer.

13. The home information center of claim 1, wherein at least one of the plurality of field units (12) is a bar code reader.

10

14. The home information center of claim 1, wherein the bar code reader is for reading bar codes of items placed within a smart refrigerator.

15. The home information center of claim 1, further comprising an interface
15 module (85) for connecting the information processing unit to a computer having a memory device therein so that the information processing unit can utilize the memory device of the computer.

16. In a set top box for receiving audio and video signals, a method for
20 exchanging information between the set top box and a mobile unit corresponding to a user, the method comprising the steps of:

providing (605) field units proximate and connected to the set top box for collecting information in response to information requests issued from the mobile unit;

receiving (610) the information requests issued from the mobile unit;

25 forwarding (615) data corresponding to the information requests to the field units to enable the field units to collect the information specified by the information requests;

receiving (620) the information collected by the field units; and

forwarding (625) the information to the mobile unit.

17. The method of claim 16, further comprising the steps of:

receiving (730) user inputs corresponding to other information requests for other information that is potentially collectable by the mobile unit when the mobile unit is remote from the user;

5 forwarding (735) data corresponding to the other information requests to the mobile unit to enable the mobile unit to collect the other information specified by the other information requests;

receiving (740) the other information collected by the mobile unit; and

10 providing (745) the other information to the user while the user is remote from the mobile unit.

18. The method of claim 16, further comprising the steps of:

receiving at least a portion of the information from a broadcast service in response to the requests for information; and

15 relaying the at least a portion of the information received from the broadcast service to the mobile unit.

19. The method of claim 16, wherein said steps of receiving the information requests from the mobile unit and forwarding the information to the mobile unit are

20 performed using Wireless Application Protocol (WAP).

20. The method of claim 16, wherein the information requests are received from the mobile unit as one of a Short Message Service (SMS) message and an electronic-mail (e-mail) message.

25

21. The method of claim 16, wherein said step of forwarding the information to the mobile unit comprises the step of translating the information to one of a Short Message Service (SMS) message and an electronic-mail (e-mail) message prior to forwarding the information to the mobile unit.

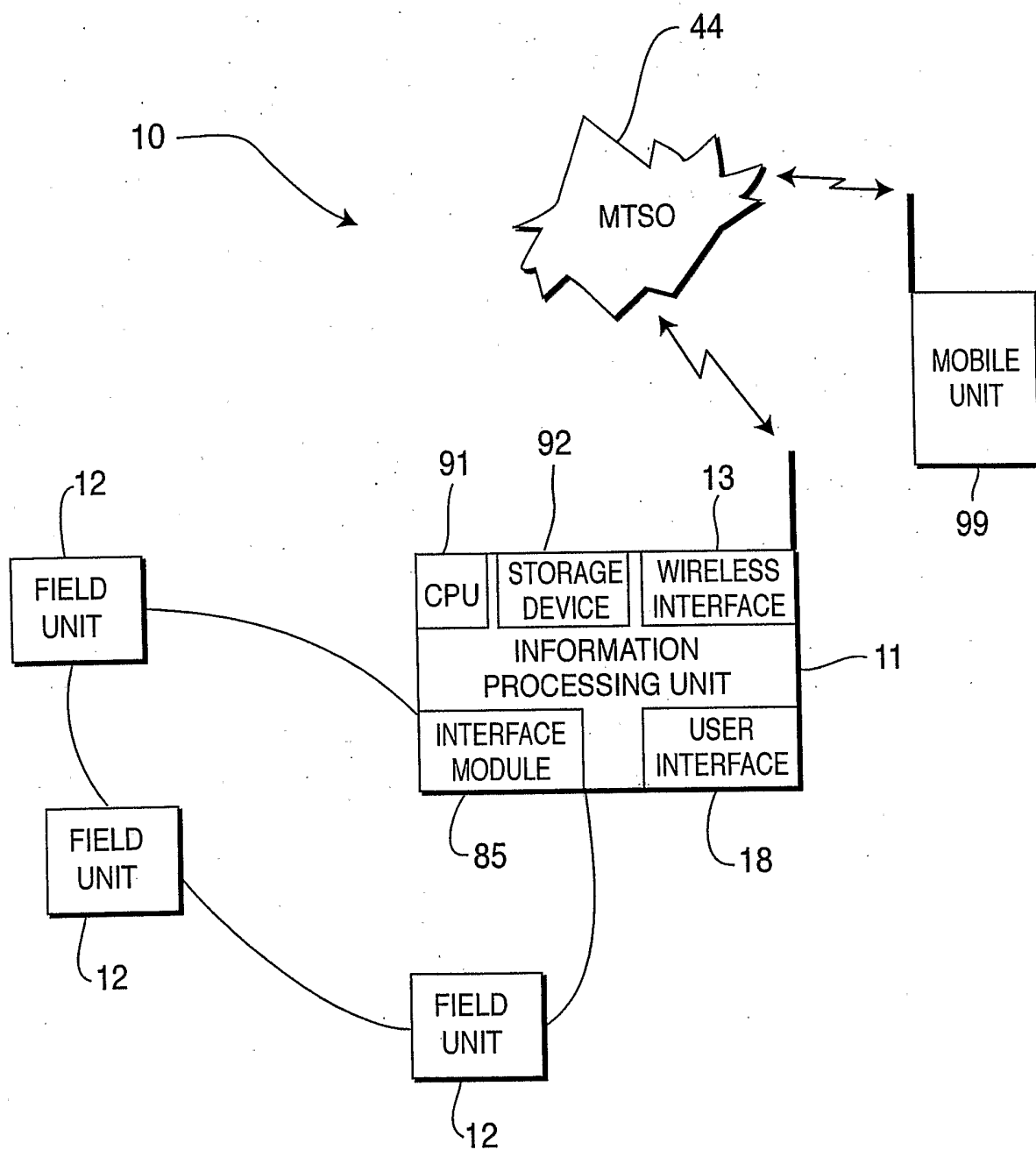
22. The method of claim 16, wherein said step of forwarding the information to the mobile unit further comprises the step of converting baseband signals to radio frequency signals for transmission to the mobile unit.

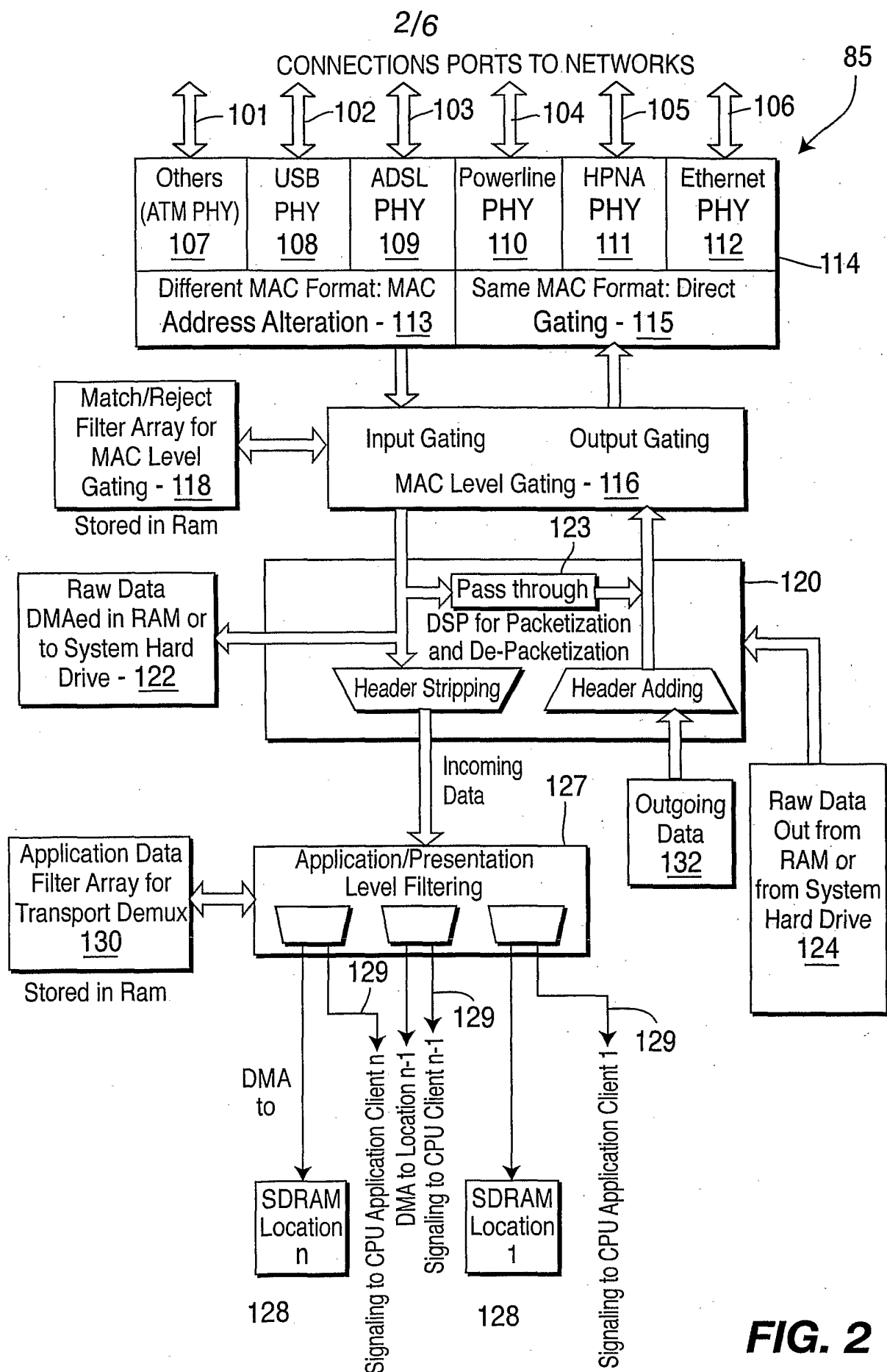
5 23. The method of claim 16, wherein the audio and video signals correspond to at least one of Digital Subscriber Line (DSL), cable television, and satellite television.

10 24. The method of claim 16, wherein the mobile unit is one of a cellular telephone, a Personal Digital Assistant (PDA), and a laptop computer.

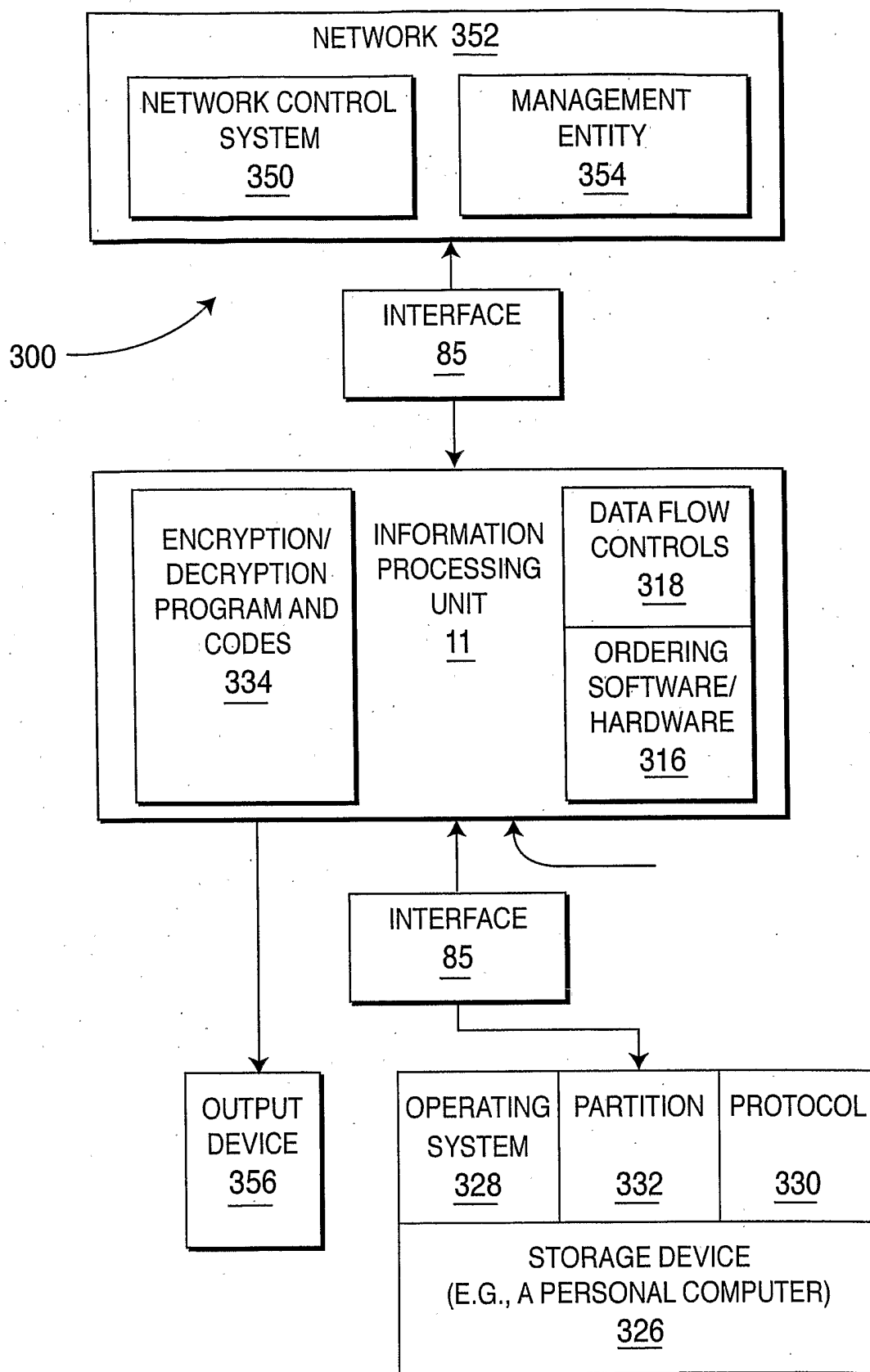
15 25. The method of claim 16, wherein at least one of said field units is a bar code reader, and said step of receiving the information collected by the field units comprises the step of receiving bar code information from the at least one of said field units, the bar code information corresponding to items placed within a smart refrigerator.

1/6

**FIG. 1**



3/6

**FIG. 3**

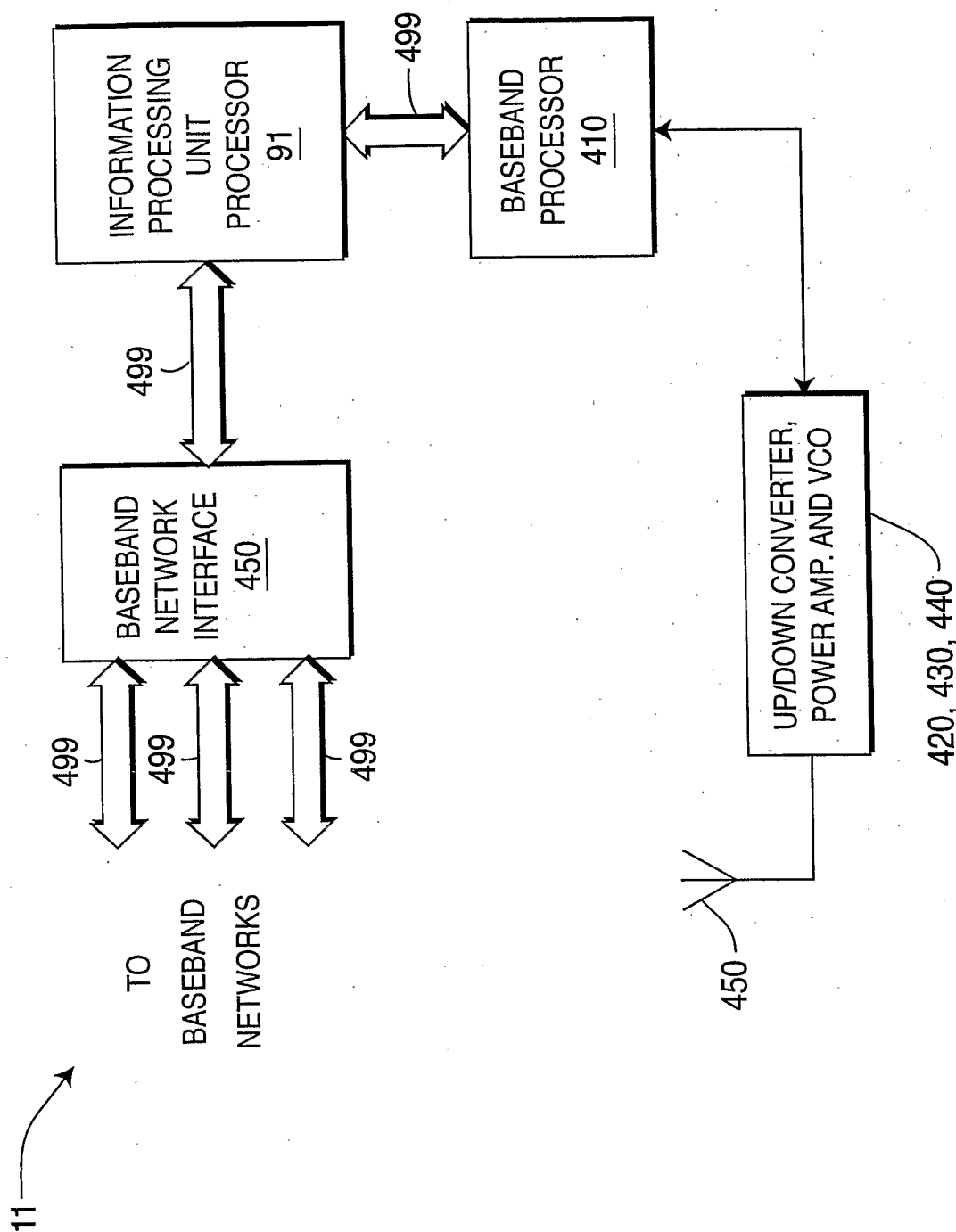


FIG. 4

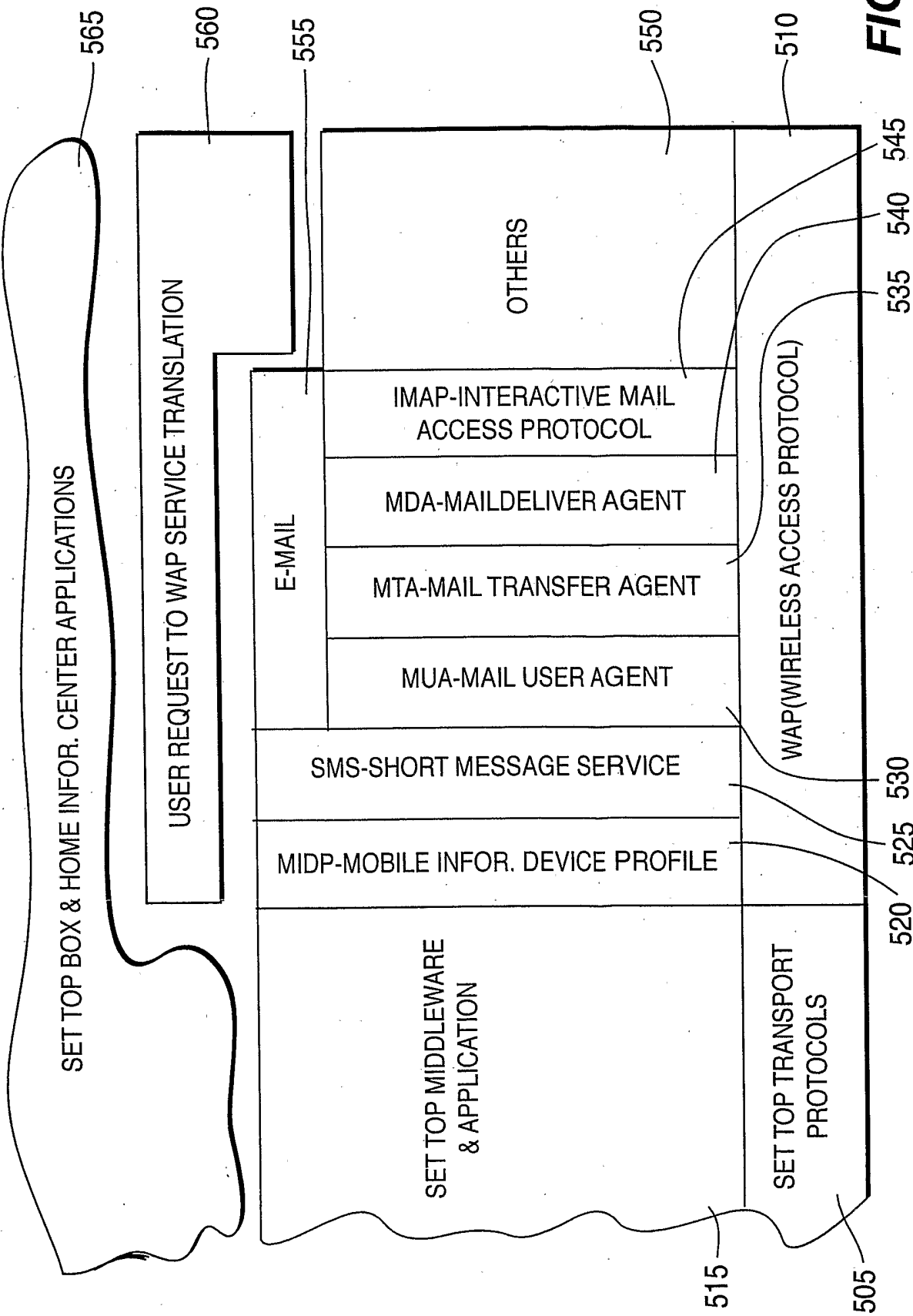


FIG. 5

6/6

