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(54) LOCALLY-UPDATED INTERACTIVE PROGRAM GUIDE

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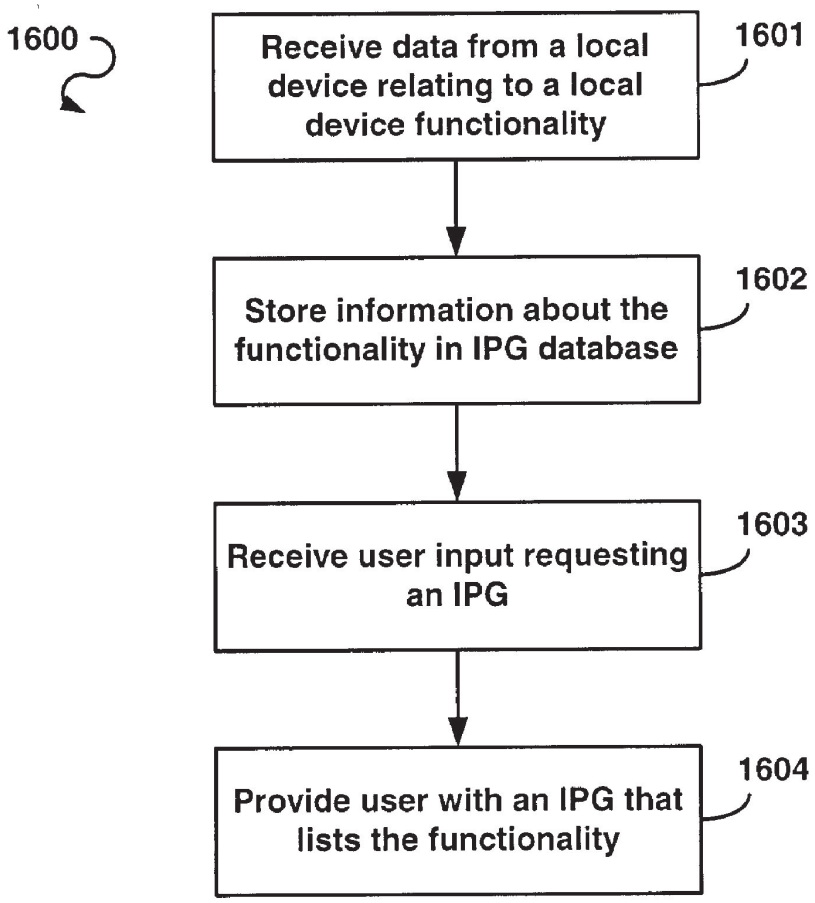
(57) ABSTRACT

A method for providing an interactive program guide (IPG) includes receiving from a user a request for an IPG, and providing the user with an IPG that includes listings that were received by a digital home communication terminal (DHCT) via a subscriber television network, as well as other listings that were not received by the DHCT via the subscriber television network.



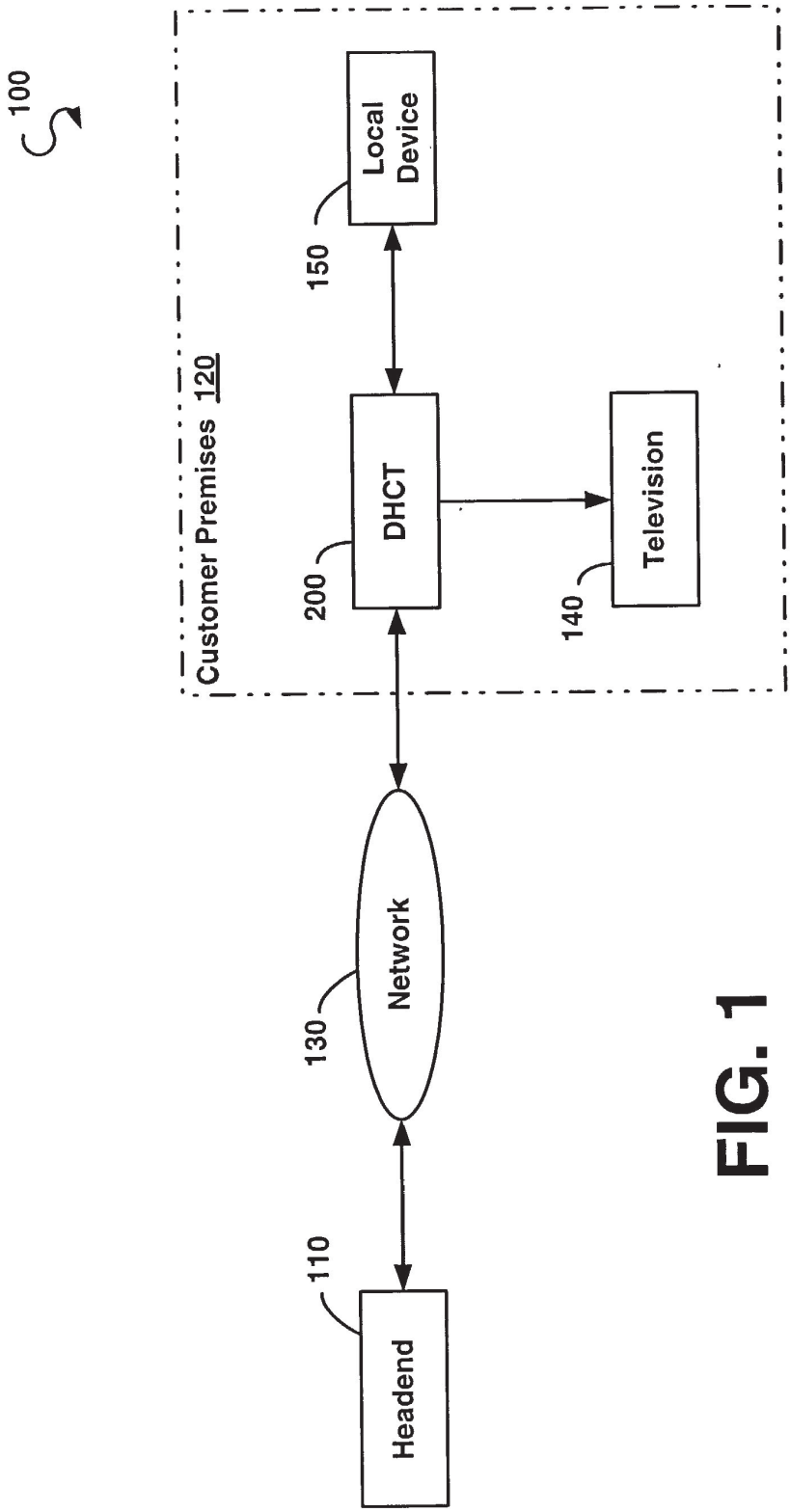

100
Customer Premises 120
Local Device
150
DHCT
200
Television
140
Network
130
Headend
110

FIG. 1

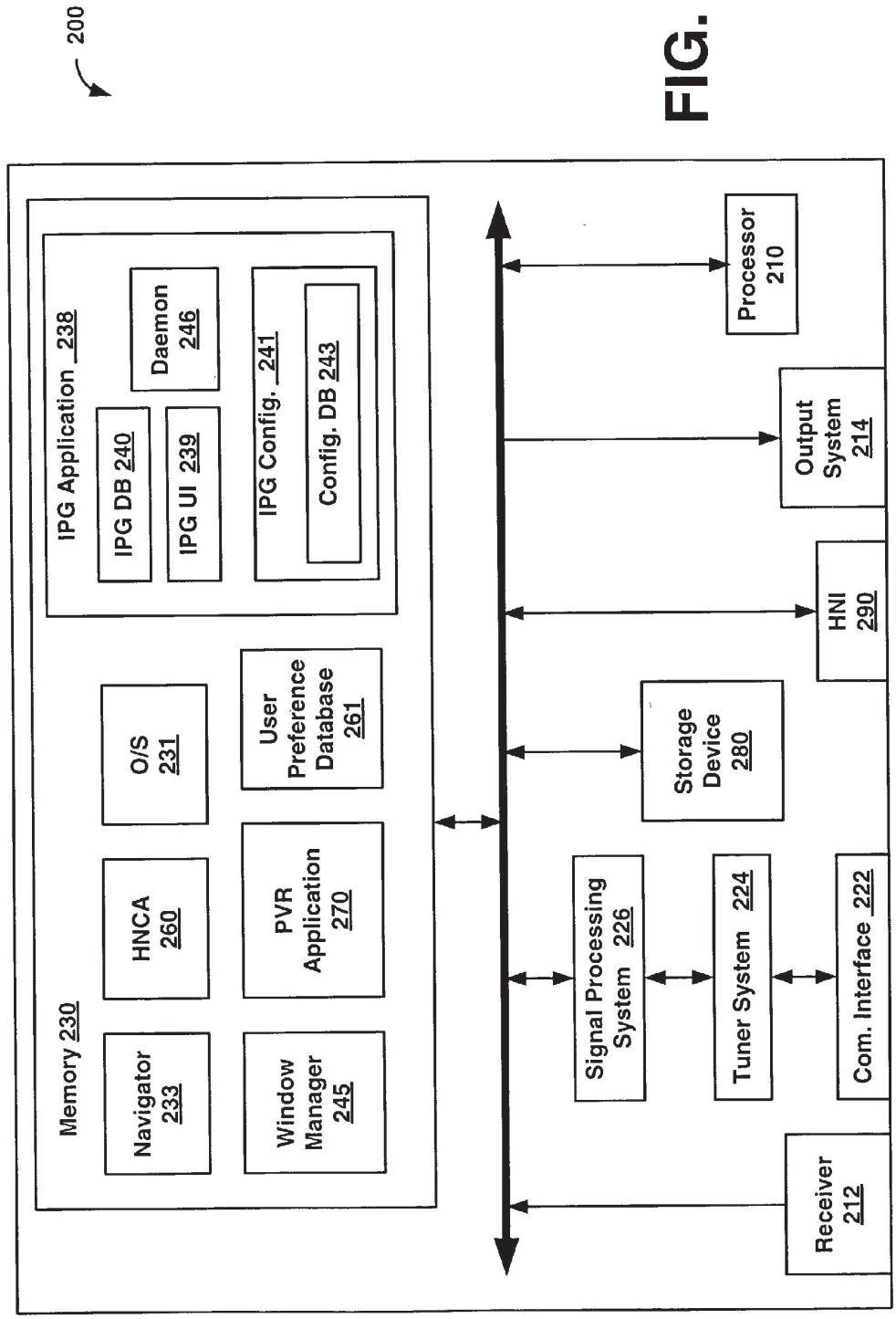

200
Memory 230
IPG Application 238
IPG DB 240
IPG UI 239
Daemon 246
IPG Config. 241
Config. DB 243
O/S 231
User Preference Database 261
HNCA 260
PVR Application 270
Navigator 233
Window Manager 245
Processor 210
Output System 214
HNI 290
Storage Device 280
Signal Processing System 226
Tuner System 224
Com. Interface 222
Receiver 212

FIG. 2

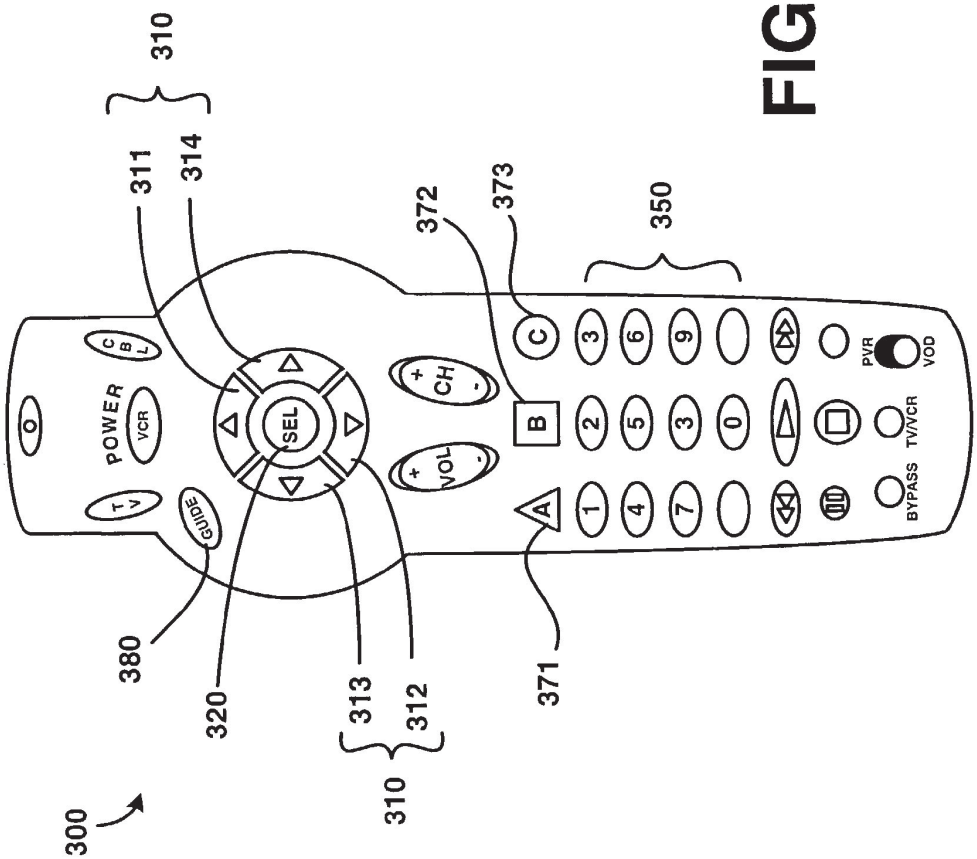
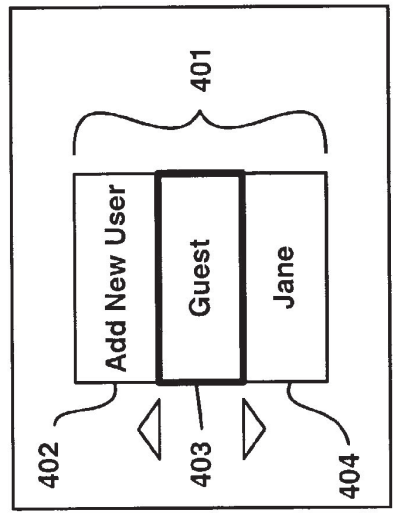
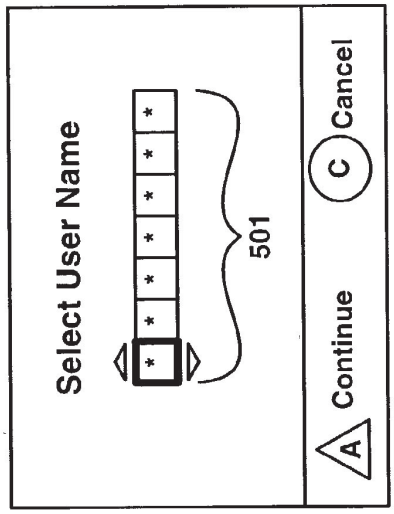

300
310
311
314
372
373
350
380
320
313
312
310
371
POWER
VCR
TV
GUIDE
SEL
CH
VOL
A
B
C
1
2
3
4
5
6
7
0
3
9
PVR
VOD
TV/VCR
BYPASS

FIG. 3



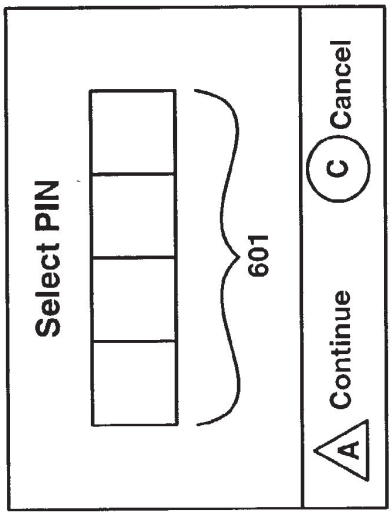
400

FIG. 4



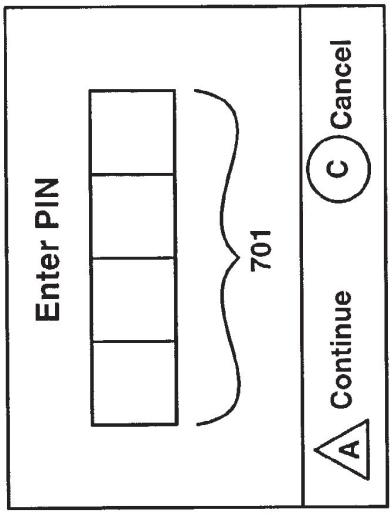
500

FIG. 5



600

FIG. 6



700

FIG. 7

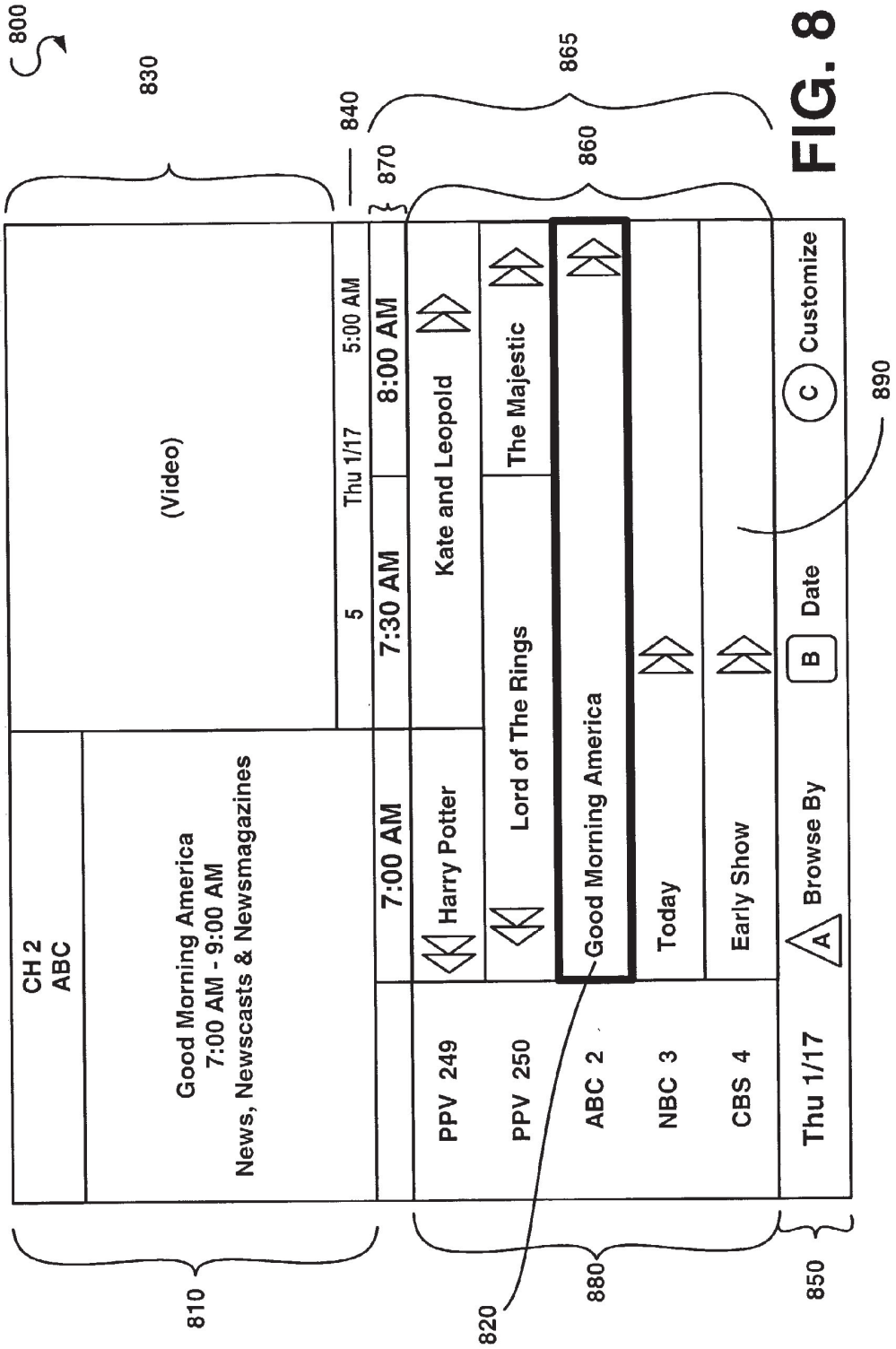

800
830
840
865
860
870
(Video)
5
Thu 1/17
5:00 AM
8:00 AM
7:30 AM
7:00 AM
Kate and Leopold
The Majestic
Lord of The Rings
Harry Potter
Good Morning America
Today
Early Show
CH 2
ABC
Good Morning America
7:00 AM - 9:00 AM
News, Newscasts & Newsmagazines
PPV 249
PPV 250
ABC 2
NBC 3
CBS 4
Thu 1/17
A
Browse By
B
Date
C
Customize
890
810
820
880
850

FIG. 8

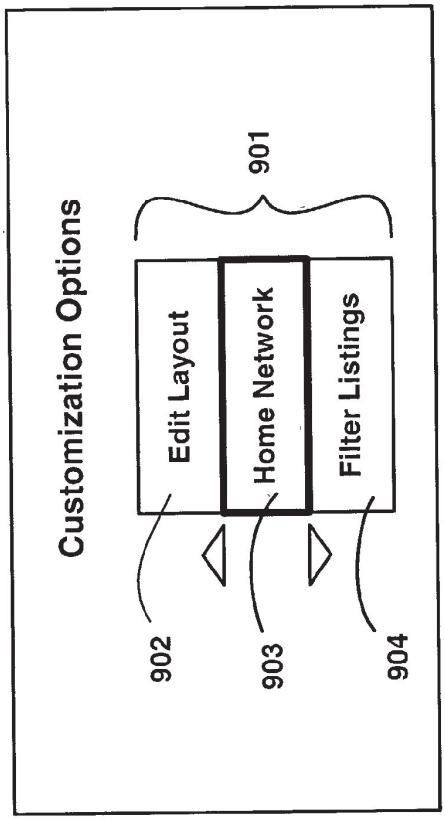

Customization Options
Edit Layout
Home Network
Filter Listings
901
902
903
904
900

FIG. 9

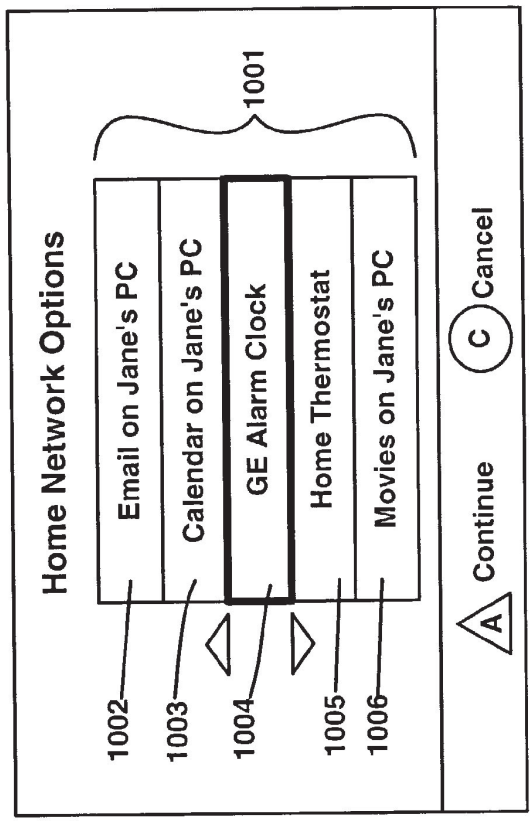

Home Network Options
Email on Jane's PC
Calendar on Jane's PC
GE Alarm Clock
Home Thermostat
Movies on Jane's PC
1001
1002
1003
1004
1005
1006
Continue
A
Cancel
C
1000

FIG. 10

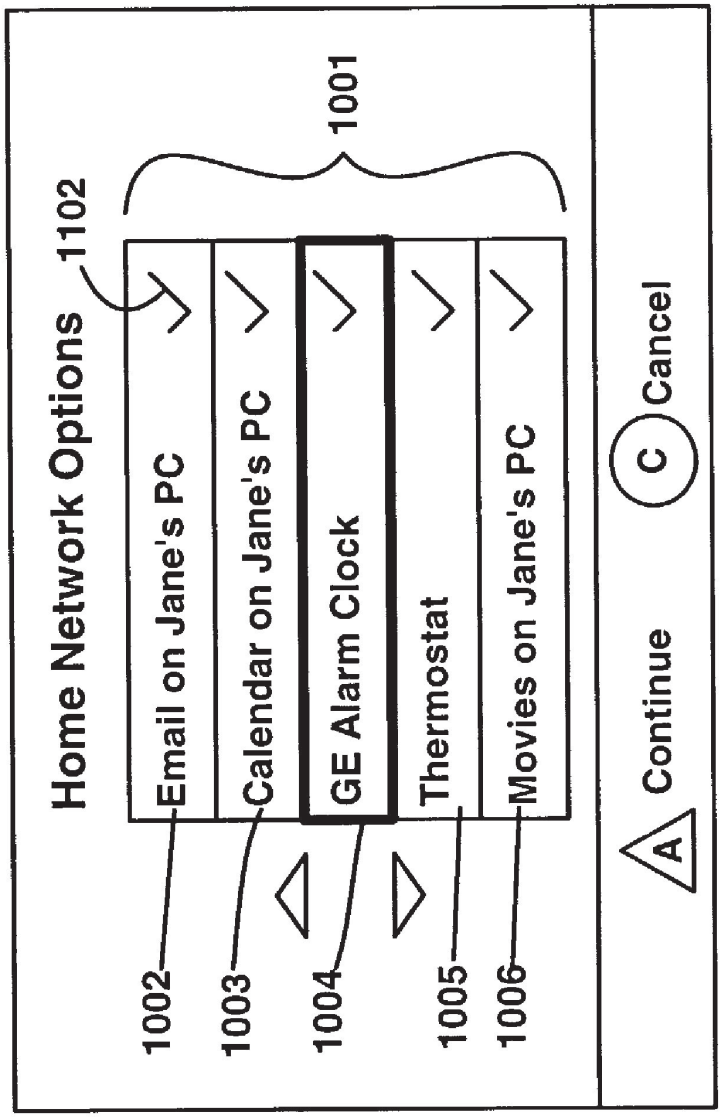

1100
Home Network Options
1102
1001
Email on Jane's PC
Calendar on Jane's PC
GE Alarm Clock
Thermostat
Movies on Jane's PC
1002
1003
1004
1005
1006
A
Continue
C
Cancel

FIG. 11

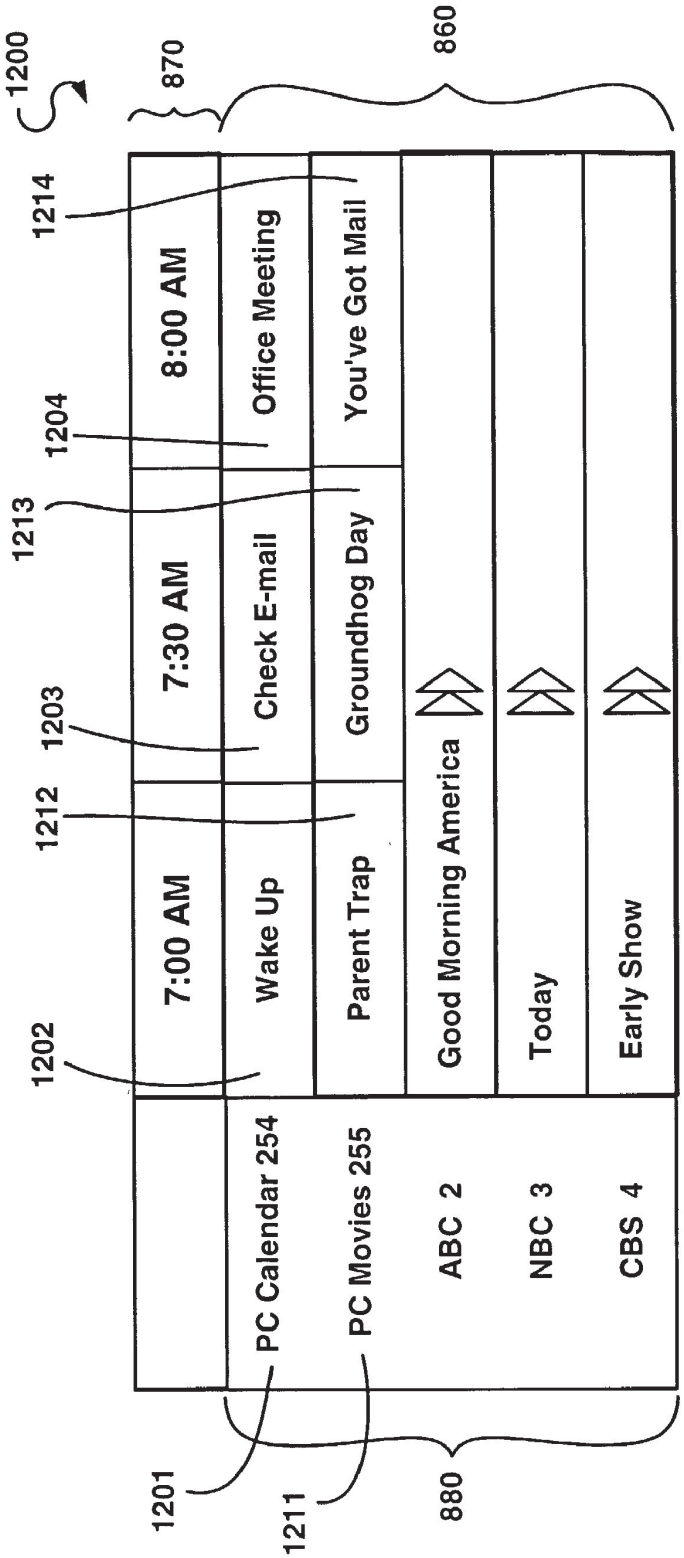

1200
870
860
1214
1204
1213
1203
1212
1202
8:00 AM
7:30 AM
7:00 AM
Office Meeting
Check E-mail
Wake Up
You've Got Mail
Groundhog Day
Parent Trap
Good Morning America
Today
Early Show
PC Calendar 254
PC Movies 255
ABC 2
NBC 3
CBS 4
1201
1211
880

FIG. 12

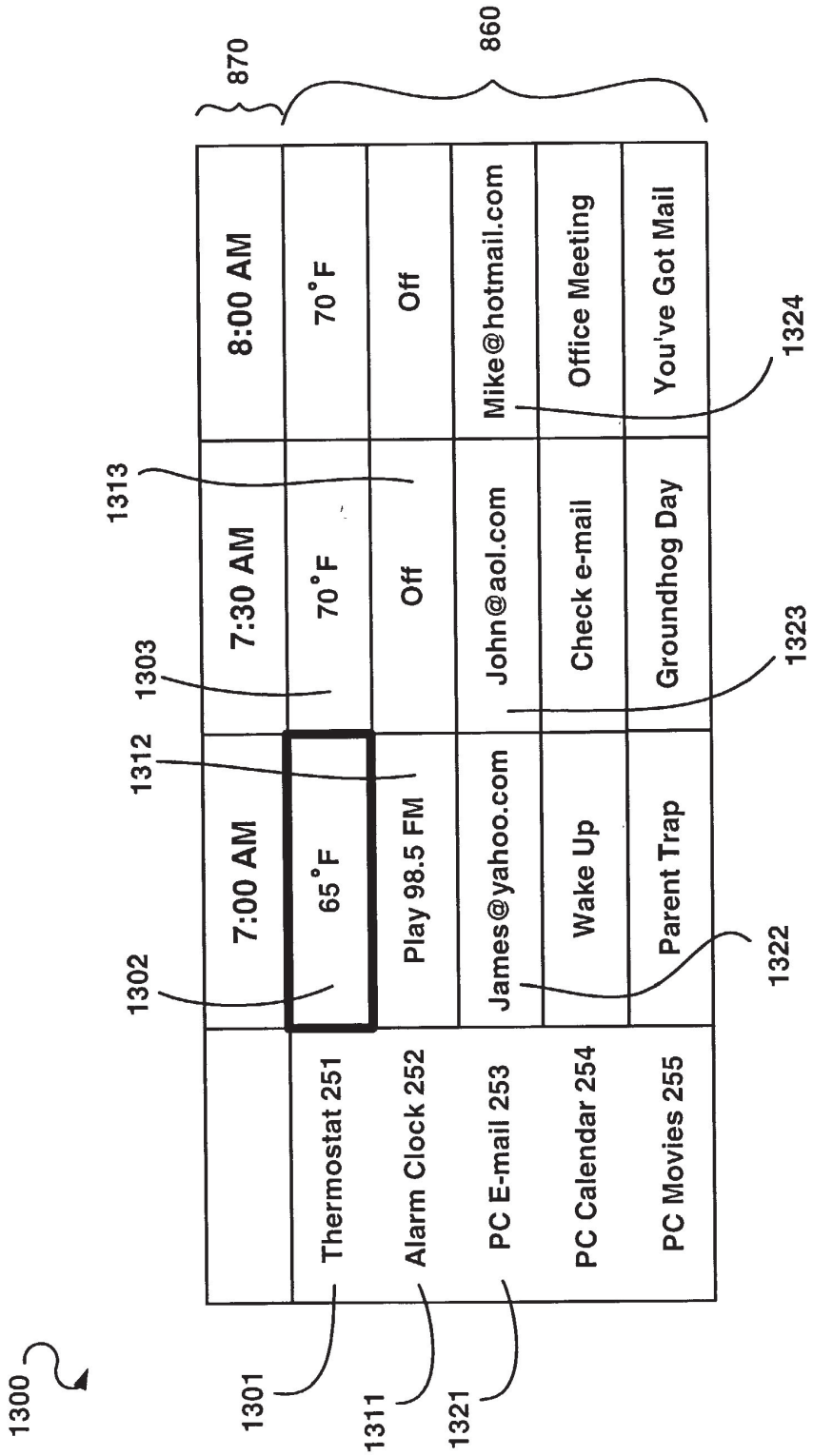
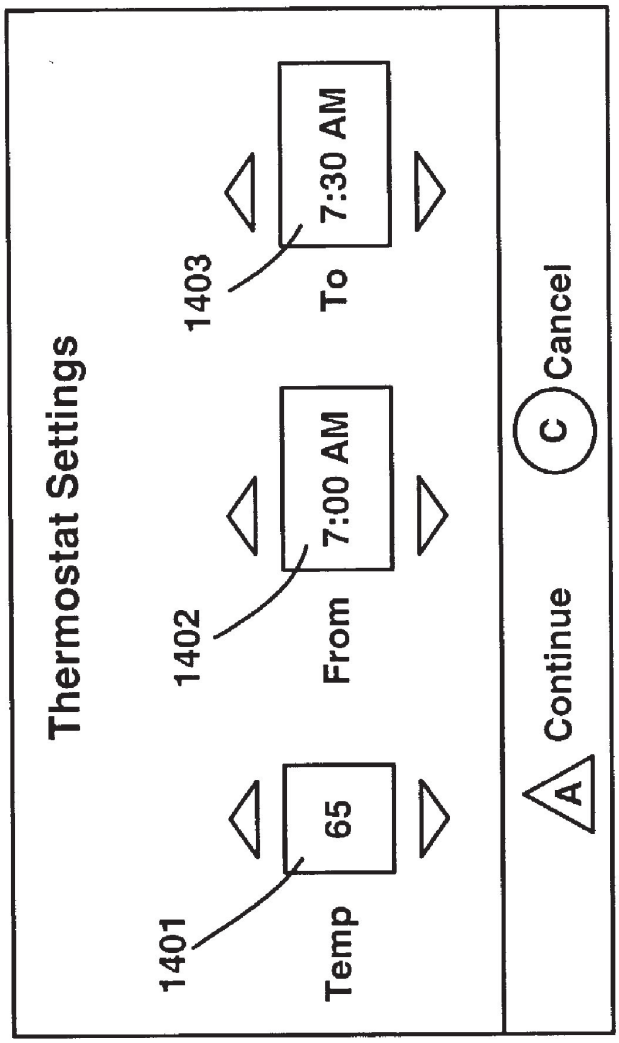

1300
870
860
1301
1311
1321
1302
1312
1303
1313
1322
1323
1324
Thermostat 251
Alarm Clock 252
PC E-mail 253
PC Calendar 254
PC Movies 255
7:00 AM
65 °F
Play 98.5 FM
James@yahoo.com
Wake Up
Parent Trap
7:30 AM
70 °F
Off
John@aol.com
Check e-mail
Groundhog Day
8:00 AM
70 °F
Off
Mike@hotmail.com
Office Meeting
You've Got Mail

FIG. 13


Thermostat Settings
1401
Temp
65
1402
From
7:00 AM
1403
To
7:30 AM
A
Continue
C
Cancel

1400

FIG. 14

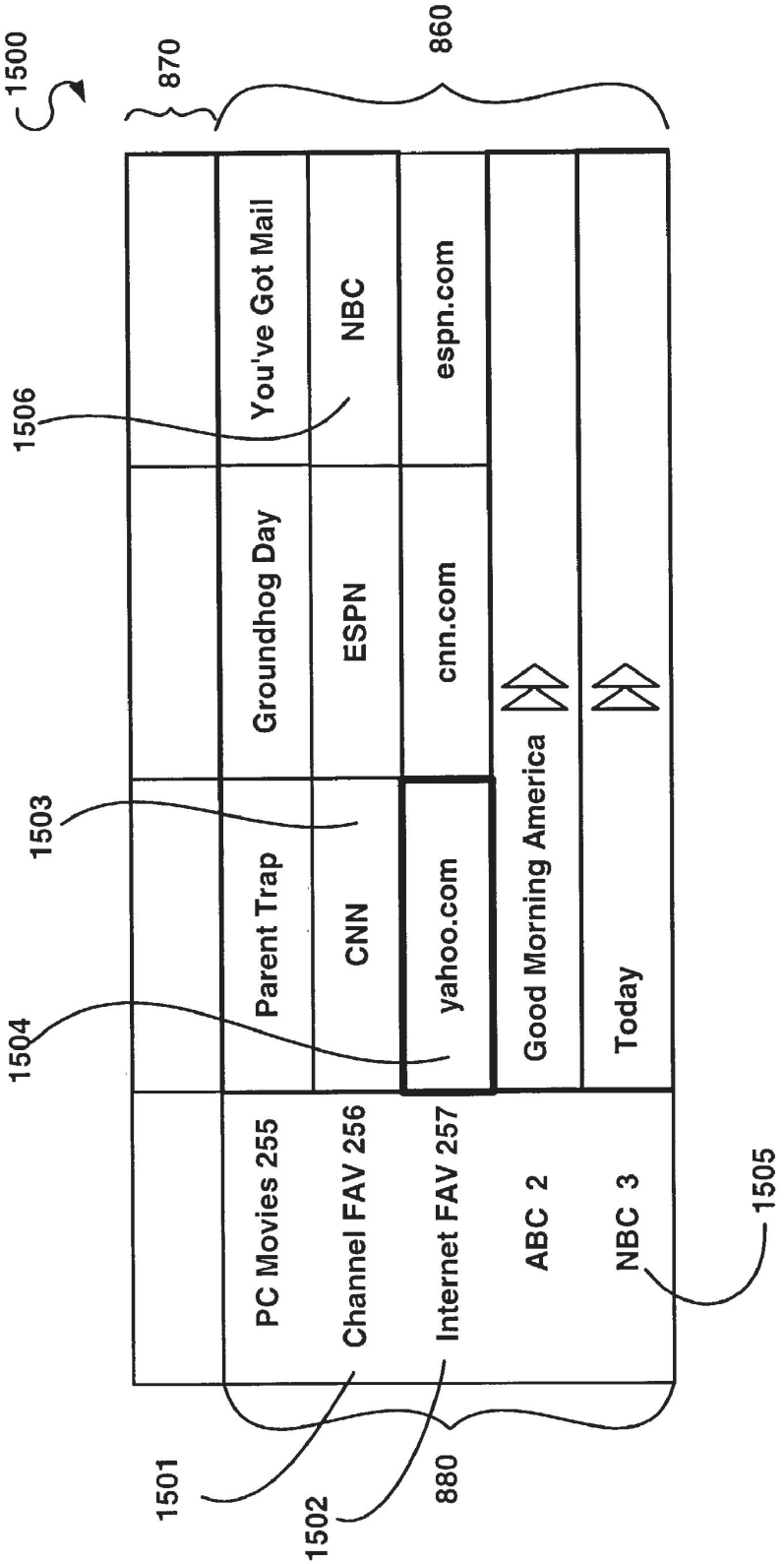

1500
870
860
1506
1503
1504
1501
1502
880
1505
PC Movies 255
Channel FAV 256
Internet FAV 257
ABC 2
NBC 3
Parent Trap
CNN
yahoo.com
Good Morning America
Today
Groundhog Day
ESPN
cnn.com
You've Got Mail
NBC
espn.com

FIG. 15

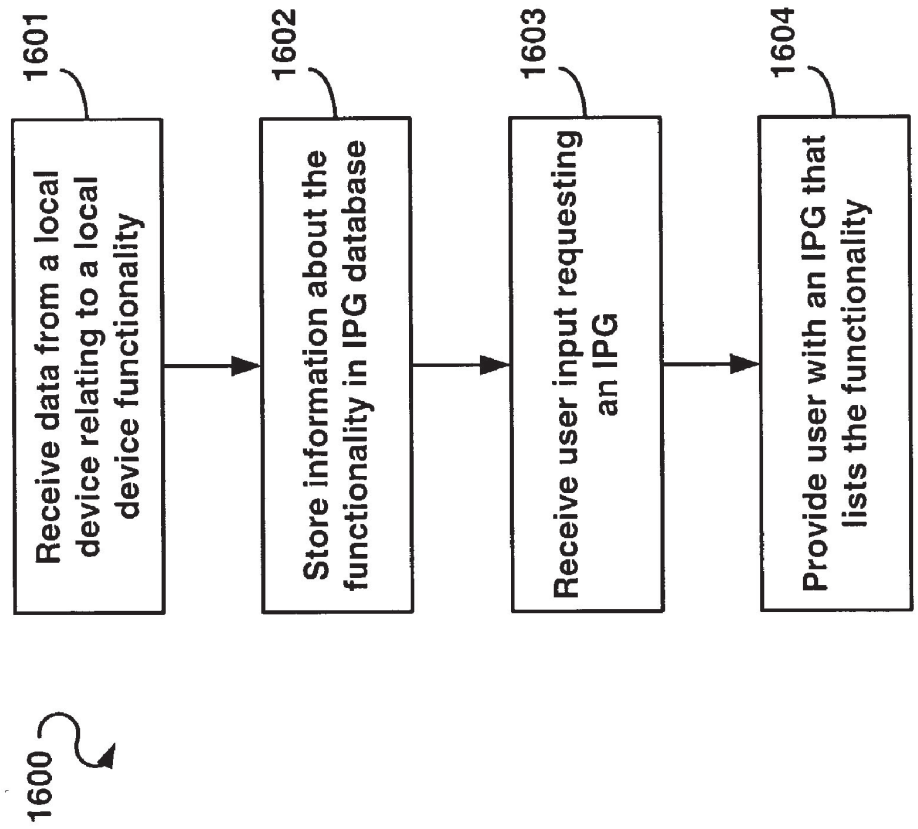

1600
1601
Receive data from a local device relating to a local device functionality
1602
Store information about the functionality in IPG database
1603
Receive user input requesting an IPG
1604
Provide user with an IPG that lists the functionality

FIG. 16

LOCALLY-UPDATED INTERACTIVE PROGRAM GUIDE

FIELD OF THE INVENTION

[0001] This invention relates in general to television systems, and more particularly, to the field of electronic program guides.

BACKGROUND OF THE INVENTION

[0002] Cable television systems are now capable of providing many services in addition to analog broadcast video. In implementing enhanced programming, the home communication terminal ("HCT"), otherwise known as the settop box, has become an important computing device for accessing various video services. In addition to supporting traditional analog broadcast video functionality, digital HCTs (or "DHCTs") now also support an increasing number of two-way digital services such as video-on-demand.

[0003] A DHCT is typically connected to a cable or satellite television network and includes hardware and software necessary to provide various services and functionality. Some of the software executed by a DHCT can be downloaded and/or updated via the cable television network. Each DHCT also typically includes a processor, communication components and memory, and is connected to a television or other display device. While many conventional DHCTs are stand-alone devices that are externally connected to a television, a DHCT and/or its functionality may be integrated into a television or other device, as will be appreciated by those of ordinary skill in the art.

[0004] Many DHCTs provide users with television program information via electronic program guides (EPGs). Some EPGs automatically scroll through television channel listings to present program information that corresponds to respective channels and time periods. Other EPGs, also known as interactive program guides (IPGs), allow a user to scroll through and/or search available program information by providing input commands via a remote control device. As many DHCT users spend substantial amounts of time watching television and browsing through IPG listings, they have become very adept and comfortable at using IPGs. However, IPGs are often underutilized in conventional systems. Therefore, there exists a need to expand IPG functionality to provide users with easy and convenient systems and methods for accessing desired information.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The invention can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, emphasis instead being placed upon clearly illustrating the principles of the present invention. In the drawings, like reference numerals designate corresponding parts throughout the several views.

[0006] **FIG. 1** is a block diagram depicting a non-limiting example of a subscriber television system.

[0007] **FIG. 2** is a block diagram depicting a non-limiting example of selected components of the DHCT depicted in **FIG. 1**.

[0008] **FIG. 3** depicts a non-limiting example of a remote control device that may be used to provide user input to the DHCT depicted in **FIG. 2**.

[0009] **FIG. 4** depicts a non-limiting example of a user selection screen that may be presented to a user after the user turns on the DHCT and/or after the user requests an IPG.

[0010] **FIG. 5** depicts a non-limiting example of a name entry screen that may be presented to a user after the user selects the "Add New User" option depicted in **FIG. 4**.

[0011] **FIG. 6** depicts a non-limiting example of a Personal Identification Number (PIN) selection screen that may be presented to a user after the user selects a user name via the name entry screen depicted in **FIG. 5**.

[0012] **FIG. 7** depicts a non-limiting example of a PIN entry screen that may be presented to a user after the user selects a user name via the name entry screen depicted in **FIG. 5**.

[0013] **FIG. 8** depicts a non-limiting example of an IPG screen that illustrates an initial program guide arrangement in a time format.

[0014] **FIG. 9** depicts a non-limiting example of a customization options screen that may be presented to a user after the user activates the "C" key on the remote control device depicted in **FIG. 3**.

[0015] **FIG. 10** depicts a non-limiting example of a Home Network Options screen that may be presented to a user after the user selects the "Home Network" option via the customization options screen depicted in **FIG. 9**.

[0016] **FIG. 11** depicts a non-limiting example of a Home Network Options screen that may be presented to a user after the user selects options available via the Home Network Options screen depicted in **FIG. 10**.

[0017] **FIG. 12** depicts a non-limiting example of an IPG grid that may be presented to a user after the user confirms the selection made via the Home Network Options screen depicted in **FIG. 11**.

[0018] **FIG. 13** depicts a non-limiting example of an IPG grid that may be presented to a user after the user scrolls up the IPG grid depicted in **FIG. 12**.

[0019] **FIG. 14** depicts a non-limiting example of a thermostat settings screen that may be presented to a user in response to a user selecting the functionality instance listing while being presented with the IPG grid depicted in **FIG. 13**.

[0020] **FIG. 15** depicts a non-limiting example of an IPG grid that may be presented to a user by the DHCT depicted in **FIG. 2**.

[0021] **FIG. 16** is a flow chart depicting a non-limiting example of a method for providing an IPG in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Preferred embodiments of the present invention will be herein described in the context of a digital home communication terminal (DHCT) that is coupled to a subscriber television system (STS). In accordance with one implementation, the DHCT provides a user with a locally updated interactive program guide (IPG) that contains television presentation listings that were received by the DHCT via the STS, as well as other listings that were not received via the STS. These other listings may be based on data

provided by user input or by a local device. The local device may be, for example, a personal computer (PC), a consumer electronics device, or a home appliance, among others. If the local device is a PC, then the IPG may, for example, include listings that correspond to a functionality provided by a software program that is running on the PC.

[0023] Below is a detailed description of the accompanying figures (FIGS. **1-16**), which illustrate a preferred embodiment of the present invention: FIGS. **1-3** illustrate examples of system components that may be used to help provide a locally-updated IPG; FIGS. **4-7**, **9-11**, and **14** illustrate examples of user interface (UI) screens related to locally-updated IPGs; **FIGS. 8, 12**, **13**, and **15** illustrate examples of locally-updated IPGs; and **FIG. 16** illustrates an exemplary method for implementing a locally-updated IPG. Note that all examples given herein are intended to be non-limiting, and are provided in order to help convey the scope of the invention. Therefore, the invention, which may be embodied in many different forms, should not be construed as limited to the examples set forth herein.

[0024] **FIG. 1** is a block diagram depicting a non-limiting example of a subscriber television system (STS) **100**. In this example, the STS **100** includes a headend **110** and a DHCT **200** that are coupled via a communications network **130**. The DHCT **200** is typically situated at a customer premises **120** and may be a stand-alone unit or integrated into another device such as, for example, a television **140**. The customer premises **120** may be a residence or place of business, among others. The DHCT **200** receives signals (video, audio and/or other data) from the headend **110** through the network **130** and provides reverse information to the headend **110** through the network **130**. The network **130** may be any suitable means for communicating television services data including, for example, a cable television network or a satellite communication network, among others. The headend **110** may include one or more server devices (not shown) for providing video, audio, textual data, and/or software programming to local devices such as DHCT **200**. The headend **110** and the DHCT **200** cooperate to provide a user with television services via the television **140**. The television services may include, for example, broadcast television services, cable television services, premium television services, video-on-demand (VOD) services, and/or pay-per-view (PPV) services.

[0025] A local device **150** capable of communicating with the DHCT **200** is also located at the customer premises **120**. The local device **150** provides one or more functionalities to a user and may be for example, a desktop computer, a notebook computer, a personal digital assistant (PDA), a thermostat, an alarm clock, a home security system, a kitchen appliance, a lamp, a light fixture, a television, an audio player, a video cassette recorder (VCR), a digital video disc (DVD) player, and a home appliance, among others. Information about a functionality provided by the local device **150** is transmitted from the local device **150** to the DHCT **200** where it is effectively stored in IPG database **240**. The DHCT **200** subsequently provides this information to a user as part of an interactive program guide (IPG) that is presented via the television **140**, as illustrated, for example, in **FIGS. 12, 13**, and **15**.

[0026] Examples of how a DHCT **200** may discover a local device **150** include the following scenarios, among others:

[0027] 1) The DHCT **200** acts as a source of IP addresses using a Dynamic Host Configuration Protocol (DHCP). This approach may involve a local device **150** contacting the DHCT **200** to obtain an IP address.

[0028] 2) The DHCT **200** may synchronize with a local device **150** (e.g., a computer) that supports plug-and-play operation.

[0029] 3) One or more local devices **150** are specifically programmed to contact the DHCT **200** to register themselves with it.

[0030] 4) The DHCT **200** is informed of the existence of a local device **150** via information provided by user input. The DHCT **200** uses this information to contact the local device **150**.

[0031] Preferably, once the DHCT **200** is aware of the existence of a local device **150**, then the two units may communicate using a suitable communications protocol. The DHCT **200**, in one embodiment, may query the local device **150** about the latter's capabilities. Furthermore, the DHCT **200** may use information received from the local device **150** to compose a user-interface screen for providing instructions to the local device **150**. In one embodiment, the DHCT **200** communicates with the local device **150** using one or more residential networking standard such as, for example, Bluetooth, CAL, CEBus, Convergence, emNET, HAVi, HomePNA, HomePlug, HomeRF, Jini, LonWorks, UPnP, **802.11**A, **802.11**B, **802.11**G, **802.15.3** and VESA, among others.

[0032] **FIG. 2** is a block diagram illustrating a non-limiting example of selected components of a DHCT **200**. The DHCT **200** comprises a communications interface **222** for receiving video, audio and other data from the headend **110 (FIG. 1)**, and for providing reverse information to the headend **110**. The DHCT **200** further includes at least one processor **210** for controlling operations of the DHCT **200**, an output system **214** for driving a display device (e.g., a television **140**), and a tuner system **224**. The tuner system **224** tunes to a particular television service to be displayed via the television **140** and sends and receives various types of data to/from the headend **110**. The tuner system includes in one implementation, an out-of-band tuner for bi-directional quadrature phase shift keying (QPSK) data communication and a quadrature amplitude modulation (QAM) tuner for receiving television signals. A receiver **212** receives user inputs that are provided via an input device such as, for example, a transmitter with buttons or keys located on the exterior of the terminal, a hand-held remote control device, or a keyboard.

[0033] A home network communications application (HNCA) **260** communicates with a local device **150** via a home network interface (HNI) **290**. The HNI **290** acts as an interface for transmitting and/or receiving data to/from a local device **150**. The HNI **290** may comprise, for example, a USB (Universal Serial Bus) connector, an Ethernet port, an IEEE-1394 connection, a serial port, a parallel port, a wireless radio frequency (RF) interface, a telephone line interface, a power line interface, a coaxial cable interface, and/or an infra-red (IR) interface, among others. In one possible implementation, the HNI **290** may be coupled to a local device via an Ethernet hub. A driver for the HNI **290**

may be included in the operating system (O/S) **231** or may otherwise be stored in memory **230**.

[**0034**] Memory **230**, which may include volatile and/or non-volatile memory, stores one or more programmed software applications, herein referred to as applications, which contain instructions that may be executed by the processor **210** under the auspices of the operating system **231**. Data required as input by an application is stored in memory **230** and read by processor **210** from memory **230** as need be during the course of the application's execution. Input data for an application may be data stored in memory **230** by a secondary application or other source, either internal or external to the DHCT **200**, or may be data that was created with the application at the time it was generated as a software application program. Data transmitted by the headend **110** may be received via the communications interface **222**, whereas user input may be received from an input device via receiver **212**. Data generated by an application is stored in memory **230** by processor **210** during the course of the application's execution. Availability, location and amount of data generated by one application for consumption by another application is communicated by messages through the services of the operating system **231**.

[**0035**] The IPG application **238** displays a program guide to the user and populates the guide with information about television functionalities. The IPG **238** includes an IPG user interface module **239** component that creates an IPG for presentation to the user. The IPG user interface module **239** accesses configuration settings stored in an IPG configuration module **241** to implement an appropriate configuration for the IPG. The IPG configuration module **241** includes a configuration database **243** for storing a plurality of IPG configurations. The IPG user interface module **239** populates the IPG with information contained in an IPG database **240**. The IPG database **240** contains data files corresponding to current and future services and/or functionalities that are or will be available via the DHCT **200** and/or other local devices.

[**0036**] Based on the configuration information stored in the IPG configuration module **241**, the IPG user interface module **239** utilizes the window manager **245** and other graphics utilities provided by the operating system **231** to render an IPG on the television **140**. The window manager **245**, which may also be part of the operating system **231**, contains functionality for allocating screen areas and managing screen use among multiple applications. The operating system **231** provides primitives to the IPG user interface module **239** in order to help render images on the television **140** (**FIG. 1**).

[**0037**] As a window is generated on a display device, the IPG user interface **239** registers with the window manager **245** in order to receive particular user input commands that may be required for selecting options provided by the newly-created window. The IPG **238** also contains a daemon application **246** that forwards IPG data received from the headend **110** or the local device **150** to the IPG database **240**. Such IPG data may include information about services and functionalities that are provided by the DHCT **200** and/or the local device **150**.

[**0038**] A PVR application **270**, in cooperation with an appropriate device driver, may effect the storage of a video stream that is received from a local device **150** in a storage device **280**. The PVR application **270** may also effect the retrieval and presentation of a video stream including the provision of trick mode functionality such as fast forward, rewind, and pause.

[**0039**] The IPG application **238**, the HNCA **260**, the PVR application **270**, and all other applications executed by the resources of the DHCT **200** comprise executable instructions for implementing logical functions. The applications can be embodied in any computer-readable medium for use by or in connection with an instruction execution system. The instruction execution system may be, for example, a computer-based system, a processor-containing system, or any other system capable of executing instructions. In the context of this document, a "computer-readable medium" can be any means that can contain, store, communicate, propagate, or transport the program for use by or in connection with the instruction execution system, apparatus, or device. The computer readable medium can be, for example, but is not limited to, an electronic, solid-state, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, device, or propagation medium, either internal to the DHCT **200** or externally connected to the DHCT **200** via one or more communication ports or network interfaces. More specific examples (a non-exhaustive list) of the computer-readable medium would include the following: an electrical connection (electronic) having one or more wires, a portable computer diskette (magnetic), a hard drive storage device (magnetic), a random access memory (RAM) (solid-state device), a read-only memory (ROM) (solid-state device), an erasable programmable read-only memory (EPROM or Flash memory) (multiple devices), an optical fiber (optical), and a portable compact disc read-only memory (CDROM) (optical). Note that the computer-readable medium could even be paper or another suitable medium upon which the program is printed, as the program can be electronically captured, via for instance optical scanning of the paper or other medium, then compiled, interpreted or otherwise processed in a suitable manner if necessary, and then stored in a computer memory.

[**0040**] **FIG. 3** depicts a non-limiting example of a remote control device **300** that may be used to provide user input to the DHCT **200**. The remote control device **300** described herein is merely illustrative and should not be construed as implying any limitations upon the scope of the present invention. Four arrow keys **310** are provided including an up arrow key **311**, a down arrow key **312**, a left arrow key **313**, and a right arrow key **314**. The arrow keys **310** can be used to scroll through on-screen options and/or to highlight an on-screen option, whereas the select key **320** may be used to select a currently highlighted option. The guide key **380** may be used to access a television program guide such as, for example, IPG screen **800** (**FIG. 8**). The function of the "A" key **371**, the "B" key **372**, and the "C" key **373** varies depending on the screen being presented to a user at the time of a key's activation. In one embodiment, the "A" key **371** can be used to access a browse-by list for requesting an IPG screen that contains a subset of service instances falling under a user selected browse-by category such as, for example, comedy, drama, action/adventure, sports, etc.; the "B" key **372** can be used to request an IPG screen containing service listings for a user selected date; and the "C" key **373** can be used to initiate a process for customizing an IPG.

[0041] In an alternative embodiment of the invention, different and/or additional systems and methods of providing user input may be used including, for example, a remote control device having different keys and/or key layouts, a keyboard device, a mouse, a voice activated input system, a touch-screen display, etc. The invention described herein is not limited by the type of device used to provide user input.

[0042] **FIG. 4** depicts a non-limiting example of a user selection screen **400** that may be presented to a user by the IPG application **238** (**FIG. 2**) after the user turns on the DHCT **200** and/or after the user requests an IPG. A user may request an IPG by, for example, activating the Guide key **380** (**FIG. 3**). The user selection screen **400** has a user selection list **401** that includes one or more options for identifying the user. In the current example, the user selection list **401** includes the following options: "Add New User"**402**, "Guest"**403**, and "Jane"**404**. The Add New User option **402** may be used to create a new profile for a user. The Guest option **403** may be used to avoid specifically identifying the user. The Jane option **404** corresponds to a previously created user profile. A user profile may be stored in, for example, the user preference database **261** (**FIG. 2**).

[0043] **FIG. 5** depicts a non-limiting example of a name entry screen **500** that may be presented to a user by the IPG application **238** (**FIG. 2**) after the user selects the Add New User option **402** (**FIG. 4**). The name entry screen **500** includes name entry fields **501** that may be used to enter a user name. In one implementation, a user may enter a user name by using the left and right arrow keys **313** and **314** (**FIG. 3**) to highlight a desired entry field, and the up and down arrow keys **311** and **312** (**FIG. 3**) to scroll to a desired character in the highlighted entry field. In another implementation, another input device such as, for example, a keyboard may be used to input a user name. After the user has entered a desired user name, the user may activate the "A" key **371** (**FIG. 3**) to proceed to a subsequent screen.

[0044] **FIG. 6** depicts a non-limiting example of a Personal Identification Number (PIN) selection screen **600** that may be presented to a user by the IPG application **238** (**FIG. 2**) after the user selects a user name via the name entry screen **500** (**FIG. 5**). The PIN selection screen **600** includes PIN entry fields **601** that may be used to enter a user PIN. In one implementation, a user may enter a user PIN by using the number pad **350** on the remote control device **300** (**FIG. 3**). The PIN that is selected by the user is stored in the user preference database **261** (**FIG. 2**) and is associated with the user name that was entered by the user via the name entry screen **500**. The next time that a user wants to sign-in, the user identifies a desired user name via the user selection screen **400** (**FIG. 4**) and then enters a corresponding PIN via a PIN entry screen **700** (**FIG. 7**).

[0045] **FIG. 7** depicts a non-limiting example of a PIN entry screen **700** that may be presented to a user by the IPG application **238** (**FIG. 2**) after the user selects a user name via the name entry screen **500** (**FIG. 5**). The PIN entry screen **700** includes PIN entry fields **701** that may be used to enter a user PIN. In one implementation, a user may enter a user PIN by using the number pad **350** on the remote control device **300** (**FIG. 3**). The PIN that is entered by the user is then compared with the PIN corresponding to the user name identified by the user. If the PINs are determined to be identical, then the user is signed-in under the user name. If the PINs are not identical, then the user is asked to re-renter the PIN. Once the user is signed-in, then customized DHCT **200** settings that were implemented during previous sessions when the user was signed-in are restored. Customized DHCT **200** settings that may be restored include, for example, settings for determining the content and/or layout of an IPG.

[0046] **FIG. 8** depicts a non-limiting example of an IPG screen **800** that illustrates an initial program guide arrangement in a time format. IPG screen **800** may be presented by IPG application **238** in response to user input that may be provided via, for example, the activation of the guide key **380** (**FIG. 3**). IPG application **238** works in cooperation with window manager **245** to present a user with IPG screens that are formatted in accordance with IPG configuration data that is stored in configuration database **243**. Furthermore, an IPG application **238** may retrieve information from IPG database **240** as needed for presentation via an IPG screen. The top left portion of IPG screen **800** is a detailed focus area **810** that includes detailed information for a currently highlighted functionality instance listing which, in the current example, is the Good Morning America listing **820**. The detailed functionality instance listing information may include channel number, functionality name (e.g., ABC), functionality instance listing name (e.g., Good Morning America), functionality instance listing description, functionality instance listing duration, and/or any episode information or rating.

[0047] Video corresponding to the television channel to which the DHCT **200** is currently tuned (for which audio may also be playing, and which typically corresponds to a television presentation occupying the full screen before the user is presented with IPG screen **800**) is displayed in a video area **830**. Immediately below the video area **830** is an information banner **840** for displaying the television channel number corresponding to the television channel to which the DHCT **200** is currently tuned (e.g., **5**), the current day and date (e.g., Thursday, January 17), and the current time (e.g., 5:00 a.m.).

[0048] An IPG grid **865** includes a main listing display area **860**, a time area **870**, and a functionality identification area **880**. The main listing display area **860** contains listings of functionality instances that correspond to respective television functionalities identified in functionality identification area **880** and that, in some cases, are or will be available during the time periods listed in the time area **870**. The functionality identification area **880** includes a vertical list of television functionalities organized sequentially from top to bottom by increasing television channel number (except for the highest numbered television functionality which is typically listed immediately above the lowest numbered television functionality). In one embodiment, the arrow buttons **310** (**FIG. 3**) can be used to scroll through the main listing display area **860** and to highlight a desired functionality instance listing. As a user scrolls in time across a calendar day boundary, the day and date indications displayed in various areas are updated.

[0049] Though other implementations are contemplated within the scope of the present invention, when the IPG application is first activated by the user, the lowest numbered television functionality is typically centered in the functionality identification area **880**. In this non-limiting example,

the lowest numbered television functionality in the functionality identification area **880** is ABC (channel number 2). Continuing with this non-limiting example, the left-most time column in the main listing display area **860** includes titles of functionality instance listings scheduled to be available about two hours into the future with the middle title in the column being highlighted and corresponding to the lowest numbered television functionality. Therefore, in this example, the Good Morning America listing **820**, which is scheduled to be provided via ABC (channel number 2), is highlighted. It should be noted that the current functionality instance listing shown in video area **830** and referenced in information banner **840**, corresponds to the currently tuned television channel (channel number 5), and not to the channel corresponding to the currently highlighted functionality instance listing **820**. The bottom area **850** of IPG screen **800** indicates the selected day for which functionality instance listing data is being displayed as well as information about the current functions of the "A", "B", and "C" keys on the remote control **300**. In an alternative embodiment, an IPG screen may have fewer, additional, and/or different components and may have a different layout. For example, an IPG screen might not include a detailed focus area **810**, a video area **830**, an information banner **840**, and/or a bottom area **850**.

[**0050**] **FIG. 9** depicts a non-limiting example of a customization options screen **900** that may be presented by the IPG application **238** (**FIG. 2**). The customization options screen may be presented to a user in response to the activation of the "C" key **373** (**FIG. 3**) during the presentation of the IPG screen **800** (**FIG. 8**). The customization options screen **900** has a customization options list **901** that includes one or more options for modifying the content or layout of an IPG screen. In the current example, the customization options list **901** includes the following options: an "Edit Layout" option **902**, a "Home Network" option **903**, and a "Filter Listings" option **904**. The "Edit Layout" option **902** may be selected in order to edit the layout of an IPG screen. The "Home Network" option **903** may be selected in order to add functionality instance listings corresponding to a device located at a customer premises **120** (**FIG. 1**). The "Filter Listings" option **904** may be selected to limit the listings provided via an IPG based on user determined settings.

[**0051**] **FIG. 10** depicts a non-limiting example of a Home Network Options screen **1000** that may be presented by the IPG application **238** (**FIG. 2**) to a user after the user selects the "Home Network" option **903** via the customization options screen **900** (**FIG. 9**). The Home Network Options screen **1000** has a home network options list **1001** that includes one or more options for modifying the content or layout of an IPG screen. In the current example, the home network options list **1001** includes the following options: "Email on Jane's PC" option **1002**, "Calendar on Jane's PC" option **1003**, "GE Alarm Clock" option **1004**, "Home Thermostat" option **1005**, and "Movies on Jane's PC" option **1006**. The "Email on Jane's PC" option **1002** corresponds to a functionality that allows access to e-mail messages via a local computer. The "Calendar on Jane's PC" option **1003** corresponds to a functionality that allows access to an electronic calendar via a local computer. The "GE Alarm Clock" option **1004** corresponds to a functionality provided by a local alarm clock. The "Home Thermostat" option **1005** corresponds to a functionality provided by the a local thermostat. The "Movies on Jane's PC" option **1006** corresponds to movies or portions thereof that are accessible via a local computer.

[**0052**] Each of the options **1002-1006** corresponds to a functionality that is offered by a local device that is capable of communicating with the DHCT **200** (**FIG. 1**). Information displayed via the Home Network Options screen **1000** may be retrieved from IPG database **240** where it may have been stored by the HNCA **260** upon being received by the DHCT **200** from a local device **150**. Such information may be received from a local device **150** in response to a query by the HNCA **260** or may be periodically broadcast by the local device **150** over a home network to which the local device **150** and DHCT **200** are coupled. As used herein, the term "local," when used in reference to a device or apparatus, means located at the same customer premises as the DHCT **200**. A user may select an option from the options list **1001** in order to request that the functionality identified by the selected option be listed in an IPG. An option that is selected by a user is identified as having been selected via, for example, a distinctive icon and/or background color. In one embodiment a selected option is identified via a check mark icon that is displayed in the same field as the selected option, as illustrated in the example shown in **FIG. 11**.

[**0053**] In one embodiment of the invention, the functionalities that are listed via the Home Network Options screen **1000** are customized based on the specific user that is currently signed-in for the DHCT **200**. Therefore, in the current example, the Home Network Options screen **1000** is presented to a person who is signed-in using the user name "Jane."

[**0054**] **FIG. 11** depicts a non-limiting example of a Home Network Options screen **1100** that may be presented to a user after the user selects options **1002-1006** via the Home Network Options screen **1000** depicted in **FIG. 10**. Each of the options **1002-1006** is identified as having been selected via a check mark icon **1102** that is displayed in the same field as the option. A user may un-select a selected option by highlighting the option using an arrow key **310** (**FIG. 3**) and by activating the select key **320** while the option is highlighted. After the user has completed his selections from the Home Network Options screen **1100**, the user may confirm the selections via, for example, the "A" key **371** (**FIG. 3**). The selections made by the user are stored in a user preference database **261** (**FIG. 2**) and are used by the IPG application **238** (**FIG. 2**) in determining whether a functionality is to be listed in an IPG.

[**0055**] **FIG. 12** depicts a non-limiting example of an IPG grid **1200** that may be presented to a user after the user confirms the selection made via the Home Network Options screen **1100** (**FIG. 1**). The IPG grid **1200** may be presented as part of an IPG that includes additional components as illustrated, for example, in **FIG. 8**. IPG grid **1200** identifies PC functionalities **1201** and **1211** that are available via a local computer. Functionality instance listings that correspond to the "PC Calendar" functionality **1201** (which has an assigned channel number 254) include, in this example, "Wake Up"**1202**, "Check E-mail"**1203**, and "Office Meeting"**1204**. Functionality instance listings that correspond to the "PC Movies" functionality **1211** (channel 255) include, in this example, "Parent Trap"**1212**, "Groundhog Day"**1213**, and "You've Got Mail"**1214**. The PC Calendar functionality

instance listings **1202-1204** correspond to entries in an electronic calendar contained in a local PC. Similarly, the PC Movies functionality instance listings **1212-1214** correspond to movies that are available via a local PC.

[**0056**] The PC Calendar functionality instance listings **1202-1204** have respective time characteristics that are represented by the corresponding time entries in the time area **870**. The PC Movies functionality instance listings **1212-1214**, on the other hand, do not have such time characteristics, even though the listings **1212-1214** may be displayed below respective time entries. In one embodiment, time entries in the time area **870** are not displayed when one of the functionality instance listings **1212-1214** is highlighted.

[**0057**] A user may request a functionality instance (e.g., a movie), or additional information pertaining to a functionality instance (e.g., a calendar entry) by selecting a corresponding functionality instance listing. A user selection may be effected via a remote control device such as, for example, the remote control **300** (**FIG. 3**). In response to the selection of a functionality instance listing, the IPG application **238** and/or another application may provide the user with the additional information or content identified by the selected listing. Such additional information or content may have been previously received and stored by the DHCT **200** or may be requested from the local device **150** by the HNCA **260** in response to the user selection.

[**0058**] If a user selects a functionality instance corresponding to a movie that is stored on the local device **150**, then the HNCA **260** may request such movie from the local device **150**. When the DHCT **200** receives a video stream corresponding to the requested movie, then the PVR application **270**, in cooperation with an appropriate device driver, may effect the storage of the video stream in the storage device **280**. The PVR application **270** may also effect the retrieval and presentation of the requested movie including the provision of trick mode functionality such as fast forward, rewind, and pause.

[**0059**] Data identifying PC functionality instance listings may be imported by the HNCA **260** (**FIG. 2**) from a local device **150** using a suitable messaging protocol. The local device **150** may include software for selecting, assembling, formatting, and transmitting relevant data to the DHCT **200**. As a non-limiting example, among others, if the local device **150** is a PC, then it may include Microsoft Exchange Server software for transmitting calendar and e-mail instance listings to the HNCA **260**, which may include an Exchange client.

[**0060**] **FIG. 13** depicts a non-limiting example of an IPG grid **1300** that may be presented to a user after the user scrolls up the IPG grid **1200** (**FIG. 12**). A user may scroll up an IPG grid by activating, for example, the up arrow key **311** (**FIG. 3**). In this example, the functionality listings "Thermostat"**1301**, "Alarm Clock"**1311**, and "PC E-mail"**1321** are included in the IPG grid **1300**. In the current example, functionality instance listings that correspond to the Thermostat functionality **1301** include "65° F."**1302** and "70° F."**1303**; functionality instance listings that correspond to the Alarm Clock functionality **1311** include "Play **98.5** FM"**1312** and "Off"**1313**; and functionality instance listings that correspond to the PC E-mail functionality **1321** include "james@yahoo.com"**1322**, "john@aol.com"**1323**, and "mike@hotmail.com"**1324**. The thermostat functionality instance listings **1302** and **1303** identify the temperature settings that a local thermostat is scheduled to have during half-hour time periods beginning at 7:00 a.m. and 7:30 a.m., respectively. Similarly, the alarm clock functionality instance listings **1312** and **1313** identify the alarm clock settings for the half-hour time periods beginning and 7:00 a.m. and 7:30 a.m., respectively. The PC E-mail functionality instance listings **1322-1324** identify e-mail addresses of respective senders of e-mail messages that are available via a local device **150**. The PC E-mail functionality instance listings **1322-1324** do not have time characteristics that are represented by the time entries in the time area **870**. Therefore, in one embodiment, time entries in the time area **870** are not displayed when one of the functionality instance listings **1322-1324** is highlighted.

[**0061**] In accordance with one embodiment of the invention, a user may view data corresponding to a functionality instance (e.g. an e-mail message) by selecting the corresponding functionality instance listing. In accordance with another embodiment of the invention, a user may request a screen for modifying a functionality instance setting by selecting the corresponding functionality instance listing.

[**0062**] **FIG. 14** depicts a non-limiting example of a thermostat settings screen **1400** that may be presented to a user in response to a user selecting the functionality instance listing **1302** while being presented with the IPG grid **1300** (**FIG. 13**). The thermostat settings screen **1400** includes a temperature setting field **1401** and time settings fields **1402** and **1403**. The temperature setting field **1401** may be used to specify a temperature setting for a local thermostat, whereas the time settings fields **1402** and **1403** may be used to specify a beginning and end, respectively, of a time window during which the temperature setting is to be in effect. After the desired thermostat settings are selected by a user, the user may then confirm the setting by activating, for example, the "A" key **371** (**FIG. 3**). After the thermostat settings are confirmed by a user, they are communicated by the DHCT **200** to the local thermostat using a suitable messaging protocol. The local thermostat, implements the settings upon receiving them from the DHCT **200**. A user may also be able to modify settings pertaining to other functionalities such as, for example, the alarm clock functionality **1311**, by selecting a corresponding functionality instance listing.

[**0063**] **FIG. 15** depicts a non-limiting example of an IPG grid **1500** that lists a favorite channels functionality **1501** and a favorite internet sites functionality **1502**. The favorite channels functionality **1501** and the favorite internet sites functionality **1502** are provided using favorites data stored in the user preference database **261** (**FIG. 2**). Alternatively, the favorites data may be downloaded from a local device **150** (**FIG. 1**). As a non-limiting example, favorites data that are downloaded from a PC may include a list of favorite web-sites that are stored in PC memory by an Internet browser. The favorites data may be based on preferences expressed by a user or based on an analysis of functionalities provided to a user over a period of time. A user may request a functionality instance by selecting a corresponding listing (e.g., the CNN listing **1503** or the yahoo.com listing **1504**). Note that a functionality listing and a functionality instance listing may correspond to the same entity. As a non-limiting example, the NBC functionality listing **1505** and the NBC functionality instance listing **1506** both correspond to NBC.

[0064] **FIG. 16** is a flow chart depicting a non-limiting example of a method for providing an IPG in accordance with one embodiment of the present invention. In step **1601**, the DHCT **200** (**FIG. 1**) receives data from a local device **150** (**FIG. 1**) relating to a functionality that is provided by the local device **150**. After receiving the data from the local device **150**, the DHCT **200** stores the data in a designated file or database such as, for example, in IPG database **240**, as indicated in step **1602**. In step **1603**, the DHCT **200** receives user input requesting an IPG. The user input may be provided via, for example, the guide key **380** (**FIG. 3**). In response to receiving the user input, the DHCT **200** provides in step **1604** an IPG that lists the functionality implicated in step **1601**. The IPG that is provided by the DHCT **200** may also include listings of television presentations that are scheduled to be broadcast within a certain time period. Depending on the particular implementation, a user may be required to scroll through the IPG in order to view a functionality listing corresponding to a desired functionality. In one embodiment, whether a functionality is listed in an IPG is based on user preference settings stored in the user preference database **261** (**FIG. 2**).

[0065] Any blocks or steps shown in **FIG. 16** represent modules, segments, or portions of code which include one or more executable instructions for implementing specific logical functions or steps in a process. In an alternative implementation the functions or steps depicted in the flowchart may be executed out of order from that shown or discussed, including substantially concurrently or in reverse order, depending on the functionality involved, as would be understood by those reasonably skilled in the art.

[0066] The functionality provided by the method illustrated in **FIG. 16**, can also be implemented through hardware (e.g., an application specific integrated circuit (ASIC) and supporting circuitry). Each implementation may have a perceived advantage, however. For example, hardware enjoys a speed and, arguably, a reliability advantage over software because hardware testing and verification methods are currently more advanced than software verification methods. On the other hand, software can be less expensive than customized hardware and offers greater flexibility in adding or modifying product features.

[0067] The functionality provided by the method illustrated in **FIG. 16**, can be embodied in any computer-readable medium for use by or in connection with a computer-related system (e.g., an embedded system such as a modem) or method. In this context of this document, a computer-readable medium is an electronic, magnetic, optical, semiconductor, or other physical device or means that can contain or store a computer program or data for use by or in connection with a computer-related system or method. Also, the computer program or data may be transferred to another computer-readable medium by any suitable process such as by scanning the computer-readable medium. Thus, the computer-readable medium could be paper or other suitable medium upon which the computer program can be printed, scanned with an optical scanner, and transferred into the computer's memory or storage.

[0068] It should be emphasized that the above-described embodiments of the present invention, particularly any "preferred embodiments", are merely possible examples, among others, of the implementations, setting forth a clear understanding of the principles of the invention. Many variations and modifications may be made to the above-described embodiments of the invention without departing substantially from the principles of the invention. All such modifications and variations are intended to be included herein within the scope of the disclosure and present invention and protected by the following claims. In addition, the scope of the present invention includes embodying the functionality of the preferred embodiments of the present invention in logic embodied in hardware and/or software-configured mediums.

What is claimed is:

1. A method for providing an interactive program guide (IPG) via a digital home communication terminal (DHCT) located at a customer premises, the method comprising steps of:

receiving a first plurality of listings by the DHCT via a subscriber television network; and

providing a user with an IPG that includes the first plurality of listings in addition to a second plurality of listings that were not received by the DHCT via the subscriber television network.

2. The method of claim 1, further comprising:

prior to providing the user with the IPG, receiving user input requesting the IPG.

3. The method of claim 1, wherein the second plurality of listings is determined, at least in part, based on a user identity.

4. The method of claim 1, wherein the second plurality of listings have time characteristics that are described by respective time listings contained in the IPG.

5. The method of claim 1, wherein the second plurality of listings do not have time characteristics that are described by respective time listings contained in the IPG.

6. The method of claim 1, wherein the subscriber television network is one of a cable television network or a satellite television network.

7. The method of claim 1, wherein the first plurality of listings identify television presentations.

8. The method of claim 1, wherein the DHCT is a television set-top terminal.

9. The method of claim 1, wherein the IPG comprises a grid having plurality of time listings and a plurality of functionality listings.

10. The method of claim 1, wherein the second plurality of listings are received from a local device that is located at the customer premises.

11. The method of claim 10, wherein the second plurality of listings correspond to a functionality that is provided by at least one local device.

12. The method of claim 11, wherein the at least one local device is at least one of a thermostat, an alarm clock, a home security system, a kitchen appliance, an audio player, a video player, a lamp, a light fixture, a television, a video cassette recorder (VCR), a digital video disc (DVD) player, and a home appliance.

13. The method of claim 11, wherein the local device is a computer.

14. The method of claim 13, wherein the computer is one of a personal digital assistant (PDA), a laptop computer, a desktop computer, or a multi-function mobile telephone.

15. The method of claim 13, wherein the functionality is one of an electronic calendar functionality, an e-mail functionality, or a video data provisioning functionality.

16. The method of claim 15, wherein the functionality provides access to information stored on the computer.

17. A method for providing an interactive program guide (IPG) via a digital home communication terminal (DHCT) located at a customer premises, the method comprising steps of:

discovering the existence of a local device located at the customer premises;

requesting functionality information from the local device;

receiving the functionality information from the local device; and

providing a user with an IPG that includes the functionality information;

wherein the IPG further includes listings for television presentations that are to be received via a subscriber television network.

18. A method for providing an interactive program guide (IPG) via a digital home communication terminal (DHCT) located at a customer premises, the method comprising steps of:

receiving a first plurality of listings by the DHCT via a subscriber television network;

receiving a second plurality of listings by the DHCT from a local device that is located at the customer premises, wherein the second plurality of listings correspond to a functionality that is provided by the local device; and

providing a user with an IPG that includes the first plurality of listings and the second plurality of listings.

19. The method of claim 18, further comprising:

prior to providing the user with the IPG, receiving user input requesting the IPG.

20. The DHCT of claim 18, further comprising:

receiving a plurality of listings by the DHCT from a plurality of local devices located at the customer premises.

21. The method of claim 18, wherein the second plurality of listings is determined, at least in part, based on a user identity.

22. The DHCT of claim 18, wherein the local device is one of a computer, a thermostat, an alarm clock, a home security system, a kitchen appliance, an audio player, a video player, or a home appliance.

23. A Digital Home Communication Terminal (DHCT) located at a customer premises, the DHCT comprising:

a first communications interface that receives a first plurality of listings via a subscriber television network;

logic configured to provide a user with an interactive program guide (IPG) that includes the first plurality of listings in addition to a second plurality of listings that were not received via the subscriber television network.

24. The DHCT of claim 23, wherein the second plurality of listings have time characteristics that are described by respective time listings contained in the IPG.

25. The DHCT of claim 23, wherein the subscriber television network is one of a cable television network or a satellite television network.

26. The DHCT of claim 23, wherein the first plurality of listings identify television presentations.

27. The DHCT of claim 23, wherein the DHCT is a television set-top terminal.

28. The DHCT of claim 23, wherein the IPG comprises a grid having a row of time listings and column of functionality listings.

29. The DHCT of claim 23, wherein the second plurality of listings are received from a local device that is located at the customer premises.

30. The DHCT of claim 29, wherein the second plurality of listings correspond to a functionality that is provided by the local device.

31. The DHCT of claim 30, wherein the local device is one of a thermostat, an alarm clock, a home security system, a kitchen appliance, an audio player, a video player, or a home appliance.

32. The DHCT of claim 30, wherein the local device is a computer.

33. The DHCT of claim 32, wherein the functionality is one of an electronic calendar functionality, an e-mail functionality, or a video data provisioning functionality.

34. A Digital Home Communication Terminal (DHCT) located at a customer premises, the DHCT comprising:

a first communications interface that receives a first plurality of listings via a subscriber television network;

a second communications interface that receives a second plurality of listings from a local device located at the customer premises; and

logic configured to provide a user with an interactive program guide (IPG) that includes the first plurality of listings and the second plurality of listings.

35. The DHCT of claim 34, further comprising:

a third communications interface that receives a third plurality of listings from a local device located at the customer premises.

36. The DHCT of claim 34, wherein the local device is one of a computer, a thermostat, an alarm clock, a home security system, a kitchen appliance, an audio player, a video player, or a home appliance.

37. A method for providing an interactive program guide (IPG), the method comprising steps of:

receiving at a digital home communication terminal (DHCT) functionality information from a local device, wherein the DHCT and the local device are located at a customer premises, and wherein the functionality information is related to a functionality provided by the local device;

receiving from a user a request for an interactive program guide; and

providing the user with an interactive program guide that lists the functionality provided by the local device.

38. The method of claim 37, wherein the functionality provided by the local device is not provided via a television.

39. The method of claim 37, wherein the local device is a computer.

40. The method of claim 39, wherein the functionality is one of an electronic calendar functionality, an e-mail functionality, or a video data provisioning functionality.

41. The method of claim 37, wherein the program guide also lists a television functionality that is capable of being provided by the DHCT.

42. The method of claim 37, wherein the local device is one of a thermostat, an alarm clock, a home security system, a kitchen appliance, an audio player, a video player, or a home appliance.

43. The method of claim 37, further comprising:

receiving user input requesting that a functionality instance be provided by the local device; and

responsive to receiving the user input, transmitting to the local device a message requesting that the functionality instance be provided.

44. A Digital Home Communication Terminal (DHCT) located at a customer premises, the DHCT comprising:

a communications interface that receives functionality information from a local device located at the customer premises, wherein the functionality information is related to a functionality that is provided by the local device; and

logic configured to provide a user with a program guide that lists the functionality provided by the local device.

45. The DHCT of claim 44, wherein the functionality provided by the local device is not provided via a television.

46. The DHCT of claim 44, wherein the local device is a computer.

47. The DHCT of claim 46, wherein the functionality is one of an electronic calendar functionality, an e-mail functionality, or a video data provisioning functionality.

48. The DHCT of claim 44, wherein the program guide also lists a television functionality that is capable of being provided by the DHCT.

49. The DHCT of claim 44, wherein the local device is one of a thermostat, an alarm clock, a home security system, a kitchen appliance, an audio player, a video player, or a home appliance.

50. A method for providing an interactive program guide (IPG) via a digital home communication terminal (DHCT) located at a customer premises, the method comprising:

receiving a first plurality of listings by the DHCT via a subscriber television network;

receiving from a user a request for an IPG;

providing the user with an IPG that includes the first plurality of listings in addition to a second plurality of listings that were not received by the DHCT via the subscriber television network;

wherein the subscriber television network is one of a cable television network or a satellite television network;

wherein the first plurality of listings identify television presentations;

wherein the DHCT is a television set-top terminal;

wherein the IPG comprises a grid having plurality of time listings and a plurality of functionality listings;

wherein the second plurality of listings are received from a local device that is located at the customer premises;

wherein the second plurality of listings correspond to a functionality that is provided by the local device; and

wherein the local device is one of a computer, a thermostat, an alarm clock, a home security system, a kitchen appliance, an audio player, a video player, or a home appliance.

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