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(54) Title: CUSTOMIZED ELECTRONIC PROGRAMMING GUIDE

(57) Abstract: A customizable electronic programming guide (CEPG) is hosted on a residential gateway. The CEPG includes user-defined folders that may be populated with other folders (i.e., sub-folders), program identifiers, or both. Electronic programming guide data arrive at the residential gateway in a standard form and are reformatted by the residential gateway for display according to the user-defined folders and sub-folders. In some embodiments, the CEPG is accessible by multiple set-top boxes that are communicatively coupled to the residential gateway. For ease of configuration, the residential gateway may provide access to a locally- hosted configuration web page.

CUSTOMIZED ELECTRONIC PROGRAMMING GUIDE

BACKGROUND

Field of the Disclosure

[0001] The present disclosure relates to the field of television service, and more particularly to a customized electronic programming guide.

Description of the Related Art

[0002] Users of television services are often provided with an electronic programming guide (EPG) that displays available programming. In some EPGs, available programming is listed according to channels that are shown in numerical order. Some EPGs allow users to select certain channels to be added to "favorites" lists.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] FIG. 1 is a high-level view of a multimedia programming network;

[0004] FIG. 2A is a block diagram of a client configuration for use in a multimedia programming network;

[0005] FIG. 2B is a block diagram of an embodied residential gateway configured to provide a customized electronic programming guide;

[0006] FIG. 3 is a block diagram of a set-top box for use with a client of a multimedia programming network;

[0007] FIG. 4 is an example graphical user interface useful for classifying program identifiers; and

[0008] FIG. 5 is a functional flow chart of representative operations in an embodied method of providing a customized electronic programming guide.

DESCRIPTION OF THE EMBODIMENT(S)

[0009] In one aspect, a customizable electronic programming guide (CEPG) is hosted on a residential gateway. The CEPG includes user-defined folders that may be populated with other folders (i.e., sub-folders), channel identifiers, or both. EPG guide data arrives at the residential gateway and is reformatted by the residential gateway for display according to the user-defined folders and sub-folders. In some embodiments, the CEPG is accessible by multiple set-top boxes that are communicatively coupled to the residential gateway. For ease of configuration, the residential gateway may provide access to a locally-hosted configuration web page.

[0010] In one aspect of the present specification, a user subscribes to a service, such as television service, provided over a multimedia programming network. A service provider may provide access to the network over various media such as cable, digital cable, satellite, and Internet protocol television (IPTV). The service provider provides a programming stream, including multimedia content and EPG data. EPG data may be received by an end-user device and parsed into channels. Each channel may correspond to an individual network available through the television service. For example, data representing programming available on networks such as ABC, CBS, NBC, and others may all be parsed into separate channels. A user may then be enabled to classify programming according to a hierarchical classification scheme. For example, at the top level of the hierarchy, the user may define the classes FAMILY, COMEDY, NEWS, EDUCATION, MOVIES, and RELIGIOUS. The user may then define sub-classes. For example, under the MOVIES class, the user may define the sub-classes DOMESTIC and FOREIGN. The number of hierarchical levels of classes may be limited to a discrete number, or further sub-classification may be enabled to any arbitrary number of levels. In some embodiments, classes at a hierarchical level may be graphically represented with folders, and sub-classes may be represented as sub-folders.

[0011] Once the user has defined a hierarchical classification scheme, the user can begin populating the classes. For example, in one embodiment, a graphical user interface (GUI) may be provided that presents a view of folders and sub-folders representing the classification hierarchy, and another view with a list of all available channels, each of which is identified by a

channel identifier. The channel identifier may include a channel number, channel name, and/or channel call letters. The user may then be enabled to recognize desired channels by their channel identifiers and classify some or all of the channels by moving them to folders and sub-folders.

[0012] In some embodiments, the residential gateway, which enables communication between end-user devices and the multimedia programming network, provides the CEPG. This allows the CEPG to be configured and accessed on multiple set-top boxes, because each is connected to the residential gateway. The residential gateway may also be enabled with Internet protocol (IP) networking capabilities. In some embodiments, an IP-enabled residential gateway hosts an interactive web page over a wired or wireless home network. The interactive web page allows a user to define folders and sub-folders of programs, and to populate those folders and sub-folders with desired channels for each. In other embodiments, the residential gateway also provides a firewall connected to the Internet, and allows a user to access the interactive web page from any Internet connection. In this case, it may also be desirable to authenticate the user before allowing access to the interactive web page.

[0013] A CEPG will now be described with more particular reference to the attached drawings. Hereafter, details are set forth by way of example to facilitate discussion of the disclosed subject matter. It should be apparent to a person of ordinary skill in the field, however, that the disclosed embodiments are exemplary and not exhaustive of all possible embodiments. Throughout this disclosure, a hyphenated form of a reference numeral refers to a specific instance of an element and the un-hyphenated form of the reference numeral refers to the element generically or collectively. Thus, for example, widget 102-1 refers to an instance of a widget class, which may be referred to collectively as widgets 102 and any one of which may be referred to generically as a widget 102.

[0014] FIG. 1 illustrates a multimedia programming network **100**. The network may receive programming from a plurality of sources, including a local broadcast **142**, a national headend **140**, or a video-on-demand (VOD) server **144**. Programming from these various sources is collected by a regional office **130** operated by the multimedia programming service provider. The regional office **130** includes a multimedia acquisition resource **134**, which is adapted to

acquire the multimedia data. The multimedia acquisition resource **134** may then provide a consolidated multimedia stream to a multimedia delivery server **132**. Alternatively, multimedia acquisition resource **134** may be an IPTV server, in which case it may provide only requested content on demand to multimedia delivery server **132**. Multimedia delivery server **132** encodes the multimedia content within encoder **138**, to provide encoded stream **137**. Encoded stream **137** is delivered to access network **120**, which may include delivery media such as broadcast, cable, digital cable, satellite, IPTV or fiber optic cables. Access network **120** delivers the encoded multimedia stream **137** to client **110**, which may be operated by a user of the multimedia programming network.

[0015] FIG. 2A illustrates client **110** in more detail. Encoded stream **137** is received by residential gateway **202**. It should be understood that the term residential gateway **202** describes the function of the device, but is not intended to limit it to a particular type of device or specific item of hardware. Rather, residential gateway **202** may be any device that acts as the access point for client **110** in communicating with access network **120**. The residential gateway may include instructions for creating and providing CEPG **230**. It may then provide CEPG **230** to a set-top box **206**. As is shown, a plurality of set-top boxes may receive the CEPG **230** from the residential gateway. Each set top box includes logic that accepts user input **212** from a device such as a remote control or from front panel buttons. Upon receiving user input **212**, set-top box **206** may tune to a particular channel, decode the multimedia data for that channel, and provide a native-format multimedia stream **208** to a display device **210** such as a television. The native-format multimedia stream **208** may be in a commonly-used native format, such as phase alternating line (PAL) or national television system committee (NTSC), that is useful on display device **210**. Set-top box **206** may also enable the user to manipulate the CEPG **230** and then provide the CEPG **230** back to the residential gateway **202**. In this manner, any set-top box **206** will have access to the CEPG **230**, regardless of which one created it.

[0016] The residential gateway **202** may be connected to a number of devices adapted to communicate with it. For example, it may be in communication with a home computer **220**, a wireless router **204**, and a firewall **214**. The home computer **220** and firewall **214** may be

adapted to interface with residential gateway **202** either through a wired network connection **224**, or through wireless router **204**. In one embodiment, the residential gateway **202** provides an interactive web page that can be accessed through wired network connection **224** or through wireless router **204**. The interactive web page may provide a GUI **400** (FIG. 4) for configuring the CEPG **230**. The interactive web page may be provided on a private network address such as the 10.x.x.x block or the 192.168.x.x block in Internet protocol version 4. Firewall **214** may also be configured to provide access to the Internet **222**. In this context, firewall **214** may be broadly understood to represent any device or capability that connects the local network to the Internet **222**. In some embodiments, firewall **214** will require user authentication before allowing a user to access the interactive web page.

[0017] FIG. 2B illustrates in more detail a residential gateway **202** configured to provide a CEPG. The residential gateway **202** includes a processor **250A**, which may be a central processor unit (CPU), application-specific integrated circuit (ASIC), field-programmable gate array (FPGA) or other programmable logic device. The processor **250A** interfaces with a system bus **226A**. As shown, system bus **226A** provides communication between various components of the residential gateway **202**. The processor **250A** is configured to access storage **208A**, which may be a hard disk, solid-state storage, or other storage medium. A multimedia network interface **210A** provides an interface with the encoded stream **137** from the service provider. Multimedia network interface **210A** may be internal to residential gateway **202**, or may be an external peripheral. A web server **240A** is provided as a hardware or software component in some embodiments that is enabled to create and transmit web pages, as well as process input received on web pages. An IP network interface **230A** is configured to route web pages served by web server **240A** to network devices. In some embodiments, web pages may be routed to home computer **220** and wireless router **204** (to which a home computer may be communicatively coupled). This configuration may allow a user to configure a CEPG through graphical means on a web browser. Furthermore, in some embodiments, a firewall **214** may be provided, which interfaces to Internet **222**. This may make the interactive web page accessible to any node of the Internet **222**. Local media interface **220A** is configured to communicate with

a set-top box **206** (FIG. 2A) and other local interface devices. Local media interface **220A** provides both an encoded multimedia stream **222A** and the CEPG **230**. The residential gateway **202** may receive user input **212** and provide it to the processor **250A** as configuration input. Configuration input instructs the processor **250A** to create or update the CEPG **230**. Configuration input may originate from a remote control, an interactive web page, or any other device or means adapted to act as a user interface.

[0018] FIG. 3 illustrates a set-top box **206** configured for use with a CEPG **230**. As shown, set-top box **206** is provided with a processor **302**, which may be any of the types of devices discussed regarding residential gateway processor **250A** (FIG. 2B). In some embodiments, the functionality of processor **302** may be provided by the same physical hardware as residential gateway processor **250A** (FIG. 2B), though this is not required. As shown, processor **302** is communicatively coupled to storage **308**. In some embodiments, storage **308** may be provided by the same physical device as residential gateway storage **208A** (FIG. 2B), though this is not required. The processor **302** is connected to a bus **326**, which may also be provided by the same hardware as residential gateway bus **226A** (FIG. 2B). Bus **326** provides a logical connection to residential gateway **202** for receiving encoded multimedia stream **222A** and CEPG **230**. The processor **250A** may receive user input **212**, which in some embodiments may also include inputs to GUI **400** (FIG. 4). In some embodiments, and in particular with those that use multiplexed multimedia signals, processor **302** controls a tuner **306**, which selects the desired content from among the entire available stream. The tuner **306** then provides control signals **330** to demultiplexer (DEMUX) **314**. Decoder **316** decodes the encoded multimedia stream **222A** into the proper format. DEMUX **314** provides the encoded audio and video data, as well as control signals, to decoder **316**. In other embodiments, such as those providing IPTV, only the desired content is provided in encoded multimedia stream **222A**, which may render the use of a tuner **306** and DEMUX **314** unnecessary. In these examples, the multimedia data stream may be provided directly to decoder **316**. Decoder **316** may decode the stream into NTSC or PAL streams, suitable for use on display **210**, which may be a television, a monitor, or any other

means of providing visual and audio output or any analogous service. In some embodiments, the CEPG **230** will also be shown on display **210**, possibly in response to user input **212**.

[0019] FIG. 4 illustrates an example GUI **400** in which classes of programming are represented by selectable icons such as folders and subclasses are represented by selectable icons such as subfolders. As shown, GUI **400** includes top-level classes **401** including MOVIES **401-1** and NEWS **401-2**. These top-level classes may have been manually specified by a user, provided as suggestions when the user first uses the software, or be provided as part of a template that the user may select as a starting point. The class MOVIES **401-1** is further subdivided into two sub-classes: AMERICAN **402-1** and FOREIGN **402-2**. Likewise, the NEWS class **401-2** is divided into LOCAL **402-3**, NATIONAL **402-4**, and INTERNATIONAL **402-5** subclasses. Hereafter, a colon will be used as a delimiter between classes and sub-classes for simplified notation (for example, the subclass LOCAL under the class NEWS will be denoted by NEWS:LOCAL). Also seen in this figure is that several channels **403** have been assigned to the NEWS:NATIONAL class **402-4**. In some embodiments, the subclasses **402** may be further divided at lower levels. For example, a user may divide the NEWS:NATIONAL class into NEWS:NATIONAL:CONSERVATIVE and NEWS:NATIONAL:LIBERAL to classify programs according to the user's impression of the programs' political leanings. Users wanting extreme granularity of classification may define even more levels of subclasses, just as a user of a computer file system is able to create many levels of subfolders under a given folder. Each of the channels **403** may be a program identifier that the user can select and manipulate in the process of creating a hierarchical classification scheme.

[0020] As disclosed, GUI **400** may provide the primary means by which a user interacts with the CEPG **230** and may provide two distinct functions. First, GUI **400** may be useful for creating and updating the CEPG **230**. Second, GUI **400** may be useful for displaying and enabling the user to use the CEPG **230**. In some contexts, GUI **400** may be provided as a number of separate GUIs. For example, in some embodiments, a GUI provided to home computer **220** as an interactive web page may be used to create and update the CEPG **230**, while a separate GUI

provided on display **210** may be used to enable the user to select programming while watching television.

[0021] In some embodiments, the program identifiers may be individual multimedia programs rather than channels **403**. So GUI **400** may display not only the channels **403**, but also a selection of the programs that will be provided on the channels **403**. A user may then select and classify individual programs. For example, a user may find that LAW & ORDER, BOSTON LEGAL, CHEERS, THE TONIGHT SHOW, and GOOD MORNING AMERICA are available on one or more channels. The user may then classify LAW & ORDER and BOSTON LEGAL as DRAMA:LEGAL, CHEERS as COMEDY:SITCOM, THE TONIGHT SHOW as COMEDY:VARIETY, and GOOD MORNING AMERICA as NEWS:MORNING (these programs are referred to hereafter as classified programs). The processor **250A** of the residential gateway **202** may then be adapted to scan all available channels and find any instances of the classified programs. When the user then selects the class DRAMA:LEGAL, any instances of LAW & ORDER and BOSTON LEGAL will be displayed, regardless of which channel they are being shown on. Similarly, if the user is interested in seeing different perspectives on the day's news, he may expand NEWS:NATIONAL:CONSERVATIVE and NEWS:NATIONAL:LIBERAL and collapse others. He will then be able to see what "conservative" and "liberal" news programs are available and select one.

[0022] As the user interacts with GUI **400**, the folders representing classes may be collapsed and expanded in a manner similar to folders and subfolders in common computer file management software. Collapsing and expanding folders allows the user to view only the programming that interests him at the moment. For example, if the user is interested only in seeing what legal dramas are on right now, he may expand the DRAMA:LEGAL class and collapse all others.

[0023] FIG. 5 is a flow chart describing the operation of a CEPG **230** (FIG. 2A). In block **502**, EPG data is received. EPG data is parsed to extract available channels or programs in block **504**. The available channels or programs are displayed in block **506**, which may be done through one of the GUI means discussed above. User input is received in step **508**, which may be received through any method described above. As the user manipulates icons and provides other input,

the CEPG **230** (FIG. 2A) is updated accordingly. For example, classes or subclasses may be created and program identifiers may be assigned to certain classes or subclasses, or a user may manipulate an already-formed CEPG **230** to find a program. In some instances, block **508** may result in creation or modification of CEPG **230**. In block **510**, the GUI is updated to reflect any changes resulting from the input. In block **512**, the CEPG is stored as described above. In block **514**, the CEPG **230** (FIG. 2A) is provided to the set-top box for display to and use by the user.

[0024] While the disclosed systems may be described in connection with one or more embodiments, it is not intended to limit the subject matter of the claims to the particular forms set forth. On the contrary, it is intended to cover such alternatives, modifications and equivalents as may be included within the spirit and scope of the subject matter as defined by the appended claims.

WHAT IS CLAIMED IS:

1. An apparatus for providing a customized electronic programming guide (CEPG), the apparatus comprising:

a processor communicatively coupled to a hardware interface for receiving electronic programming guide (EPG) data from a multimedia programming network, wherein the EPG data includes a plurality of program identifiers;

wherein the processor is adapted to receive configuration input for arranging a portion of the plurality of program identifiers in a hierarchical structure within the CEPG; and

wherein the configuration input includes instructions to result in the CEPG.

2. The apparatus of claim 1, wherein the apparatus is a residential gateway, wherein the residential gateway hosts the CEPG.

3. The apparatus of claim 2, wherein the configuration input specifies a hierarchical structure for arranging the EPG data to result in the CEPG.

4. The apparatus of claim 3, wherein the hierarchical structure includes a plurality of class icons and a plurality of subclass icons, wherein the configuration input specifies a portion of the subclass icons for associating within one or more of the plurality of class icons.

5. The apparatus of claim 4, wherein the configuration input further specifies a portion of the program identifiers for associating within one or more of the subclass icons.

6. The apparatus of claim 5, wherein the configuration input further specifies a portion of the program identifiers for associating within one or more of the class icons.

7. The apparatus of claim 6, wherein the program identifiers are selectable icons.

8. The apparatus of claim 7, wherein the CEPG is configured according to a template hosted by the residential gateway.

9. The apparatus of claim 8, wherein the configuration input is received through an interactive web page hosted by the residential gateway.

10. The apparatus of claim 9, wherein the interactive web page is accessible through the multimedia service provider network.

11. The apparatus of claim 10, wherein the residential gateway is adapted for communication with a plurality of set-top boxes, wherein the CEPG is accessible by the plurality of set-top boxes.

12. A software program stored on one or more computer readable media, the software program comprising instructions to:

receive electronic programming guide (EPG) data;

present the EPG data to a user;

receive from the user commands to classify the EPG data;

classify the EPG data in a hierarchical structure according to the commands from the user to result in classified EPG data; and

present the classified EPG data to the user.

13. The software program of claim 12 wherein the instructions to receive commands include instructions to:

provide an interactive web page; and

collect the commands from the user through the interactive web page.

14. The software program of claim 12 wherein:

the instructions to present the EPG data to a user include instructions to:

present a plurality of program identifiers received with the EPG data;

present a first portion of the plurality of program identifiers within a first class at a first hierarchical level; and

present a second portion of the plurality of program identifiers within a second class at a second hierarchical level.

15. The software program of claim 14 further comprising instructions to:

enable the user to define a subclass at a hierarchical level subordinate to the first class.

16. The software program of claim 15 wherein:

the first hierarchical level is graphically represented by a folder; and

the subordinate hierarchical level is graphically represented by a sub-folder.

17. A method of creating a customized electronic programming guide (CEPG) comprising:

receiving electronic programming guide (EPG) data;

receiving user input;

in accordance with the user input, classifying a program identifier to create a programming class; and

storing the programming class on a residential gateway.

18. The method of claim 17 wherein receiving input instructions comprises:

providing a graphical user interface configured to be hosted on a set-top box; and

receiving input values directed from a remote control device to the set-top box.

19. The method of claim 17 wherein receiving input instructions comprises:

providing an interactive web page configured to be hosted on the residential gateway and provided over a network; and

collecting input values from the interactive web page.

20. The method of claim 19 wherein the interactive web page is provided over an Internet connection.

21. A customizable electronic programming guide (CEPG) service for a user of a multimedia programming service, the service comprising:

enabling a residential gateway to receive electronic programming guide (EPG) data;

causing the residential gateway to provide the EPG data;

enabling a user to manipulate the EPG data into classes;

storing the classes on a storage device; and

enabling the user to view the classes.

22. The service of claim 21 wherein causing the residential gateway to display the EPG data comprises providing the data to an interactive web page.

23. The service of claim 22 wherein the interactive web page is hosted on a local network.

24. The service of claim 23 wherein the local network is a wireless network.

25. The service of claim 21 wherein causing the residential gateway to display the EPG data comprises providing the data as a graphical user interface configured for use through a set-top box.

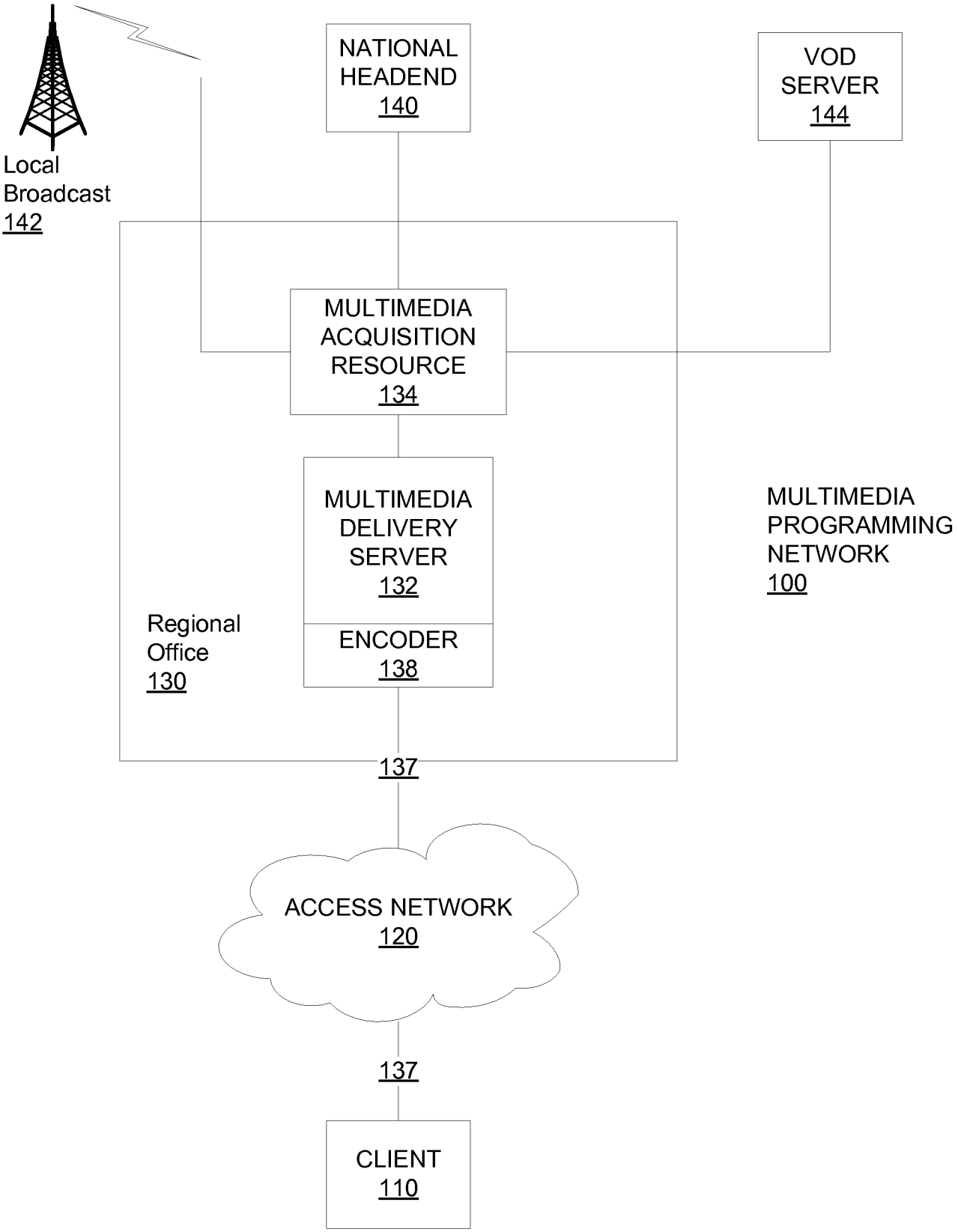
NATIONAL HEADEND 140
VOD SERVER 144
Local Broadcast 142
MULTIMEDIA ACQUISITION RESOURCE 134
MULTIMEDIA DELIVERY SERVER 132
ENCODER 138
Regional Office 130
MULTIMEDIA PROGRAMMING NETWORK 100
137
ACCESS NETWORK 120
137
CLIENT 110

FIG. 1

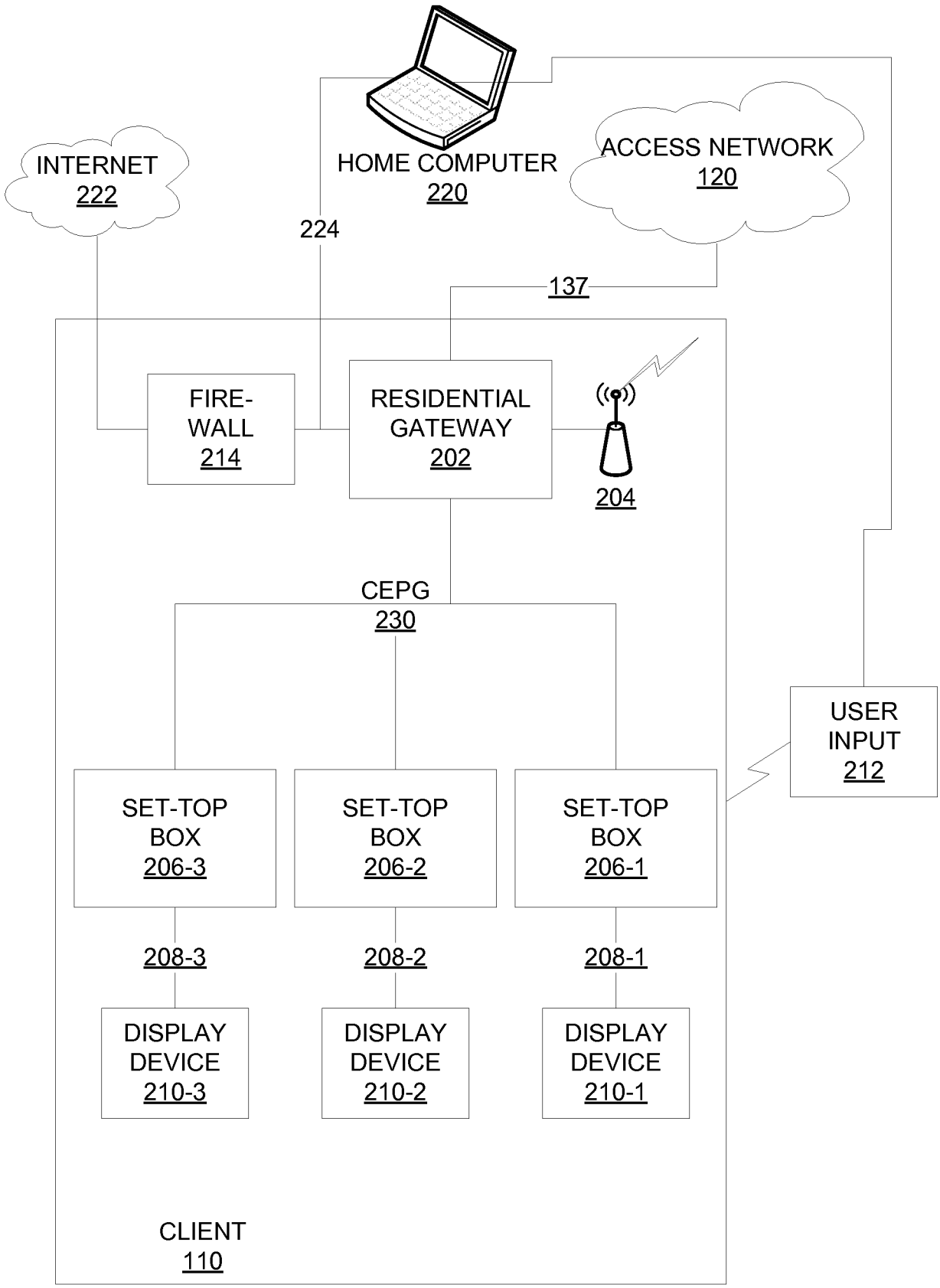
INTERNET
222
HOME COMPUTER
220
ACCESS NETWORK
120
224
137
FIRE-
WALL
214
RESIDENTIAL
GATEWAY
202
204
CEPG
230
USER
INPUT
212
SET-TOP
BOX
206-3
SET-TOP
BOX
206-2
SET-TOP
BOX
206-1
208-3
208-2
208-1
DISPLAY
DEVICE
210-3
DISPLAY
DEVICE
210-2
DISPLAY
DEVICE
210-1
CLIENT
110

FIG. 2A

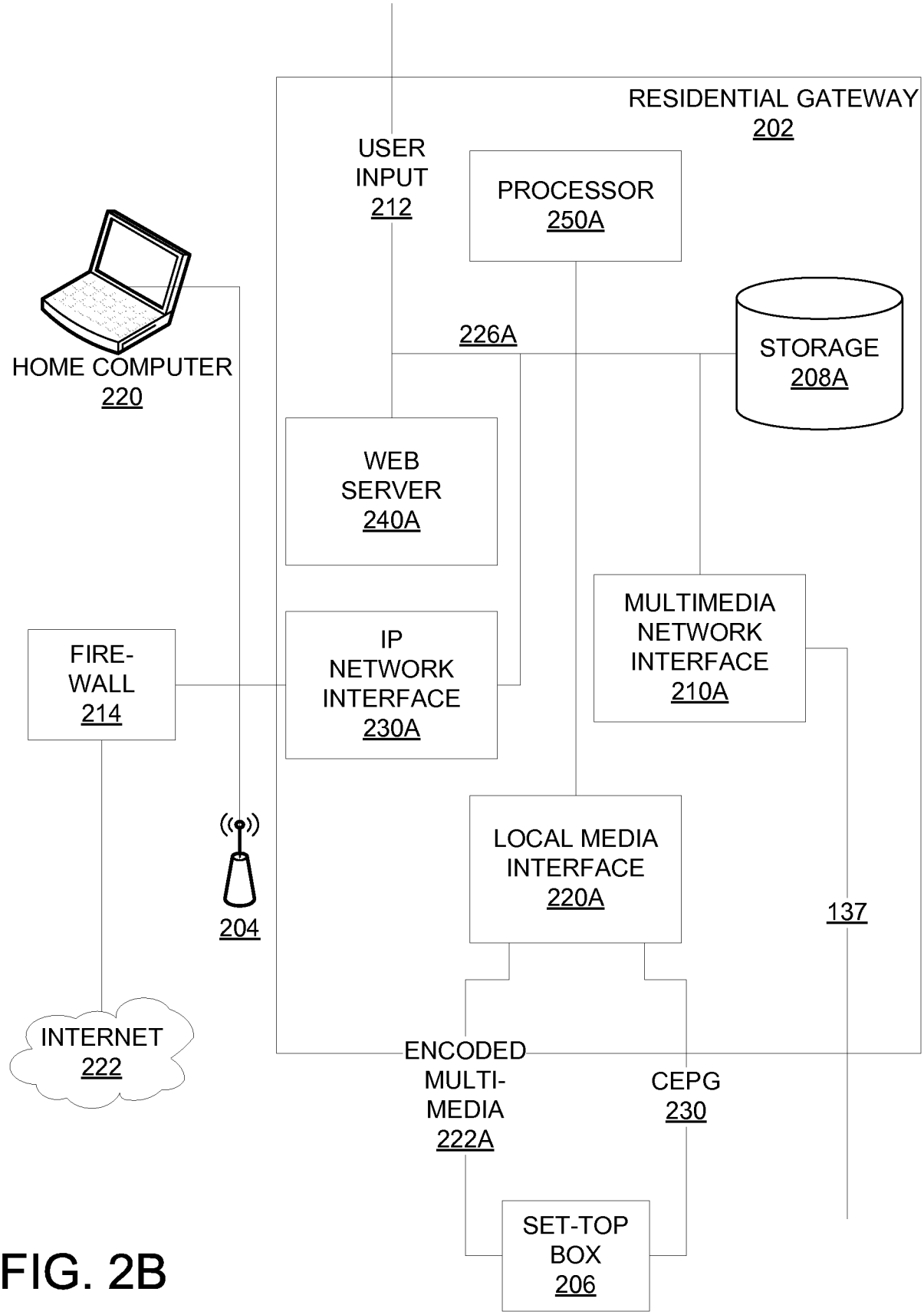
RESIDENTIAL GATEWAY
202
USER
INPUT
212
PROCESSOR
250A
HOME COMPUTER
220
226A
STORAGE
208A
WEB
SERVER
240A
MULTIMEDIA
NETWORK
INTERFACE
210A
FIRE-
WALL
214
IP
NETWORK
INTERFACE
230A
LOCAL MEDIA
INTERFACE
220A
204
137
INTERNET
222
ENCODED
MULTI-
MEDIA
222A
CEPG
230
SET-TOP
BOX
206

FIG. 2B

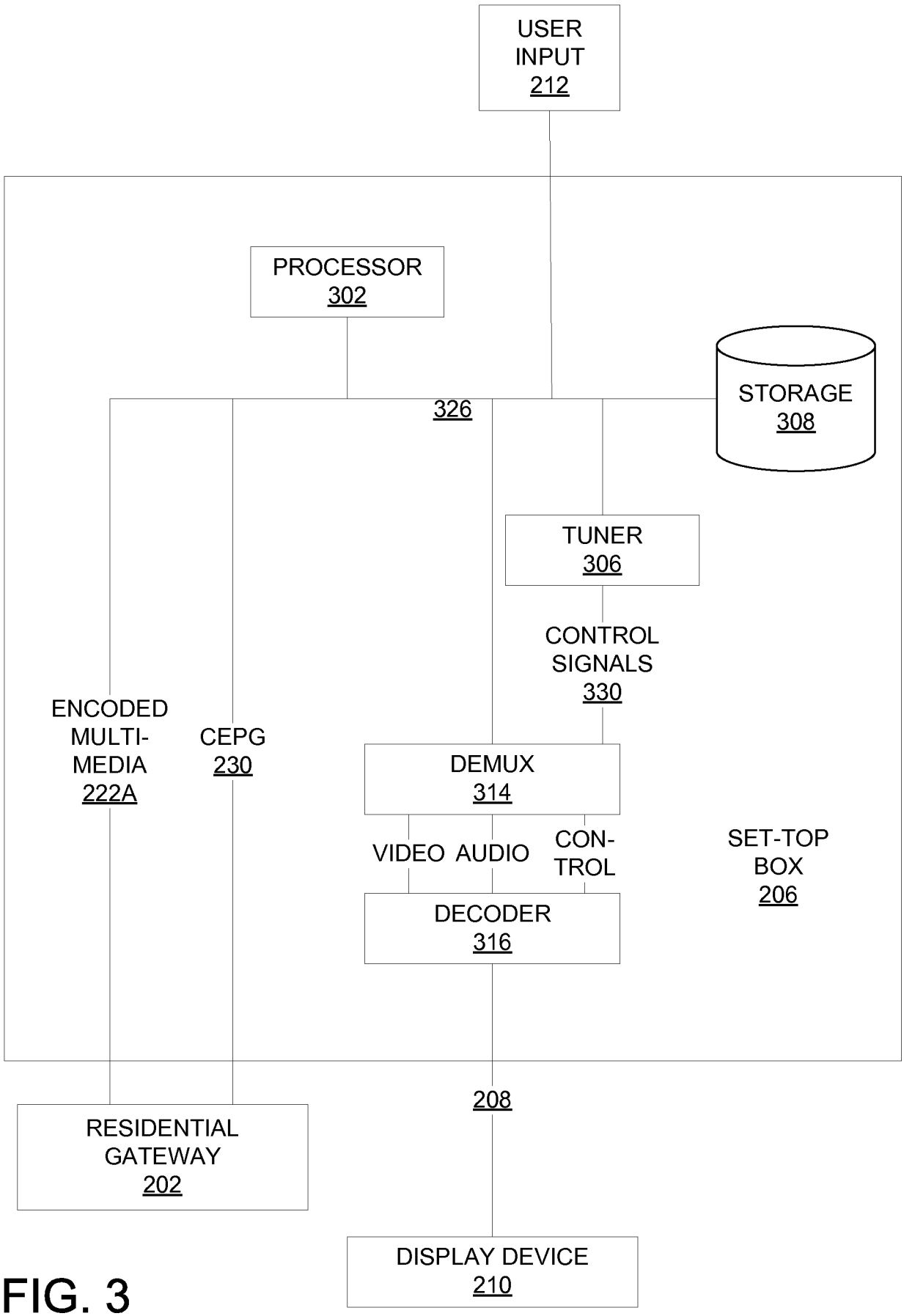
USER INPUT 212
PROCESSOR 302
STORAGE 308
326
TUNER 306
CONTROL SIGNALS 330
ENCODED MULTI-MEDIA 222A
CEPG 230
DEMUX 314
VIDEO
AUDIO
CON-TROL
SET-TOP BOX 206
DECODER 316
208
RESIDENTIAL GATEWAY 202
DISPLAY DEVICE 210

FIG. 3

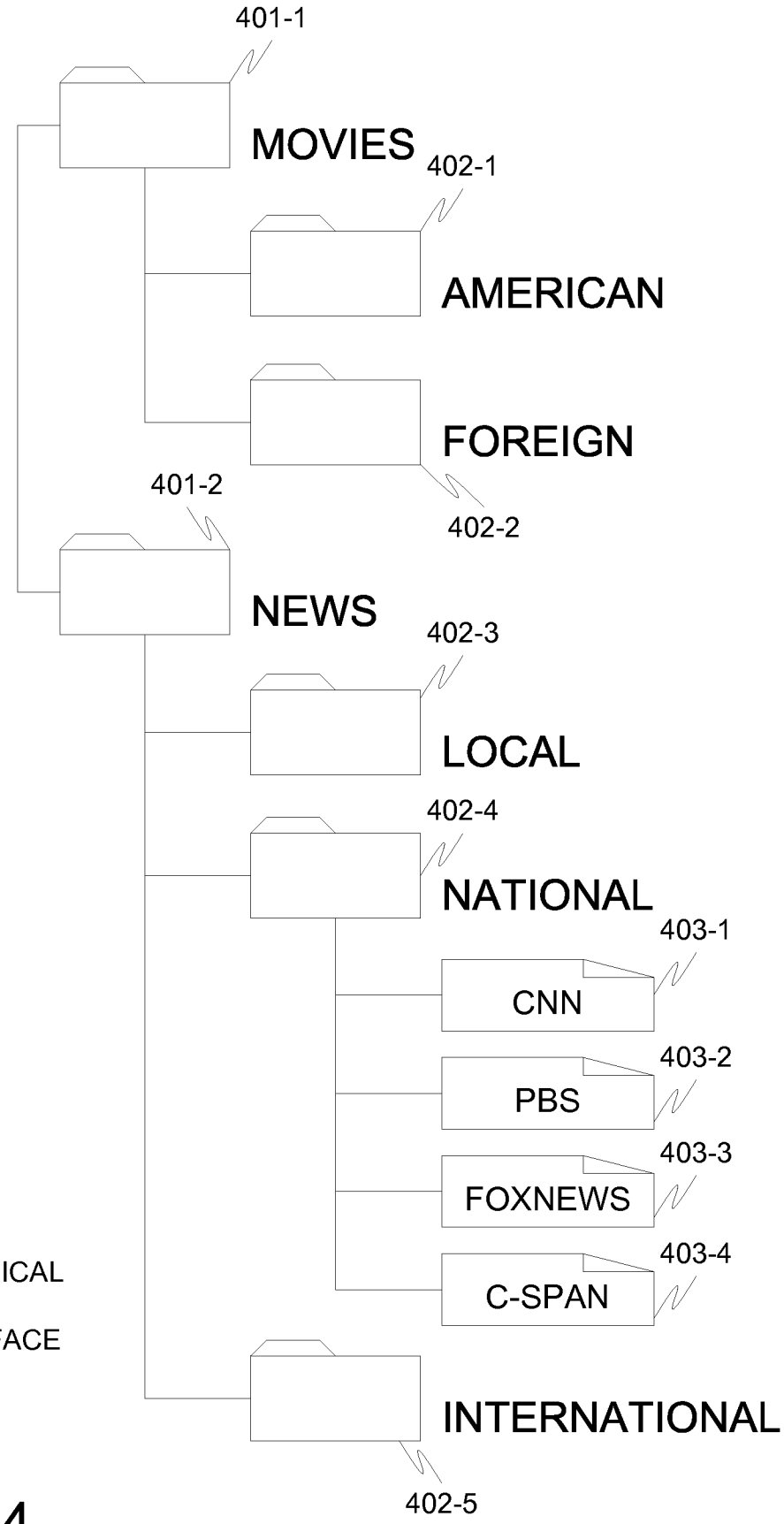
401-1
MOVIES
402-1
AMERICAN
FOREIGN
402-2
401-2
NEWS
402-3
LOCAL
402-4
NATIONAL
403-1
CNN
403-2
PBS
403-3
FOXNEWS
403-4
C-SPAN
INTERNATIONAL
402-5
GRAPHICAL USER INTERFACE 400

FIG. 4

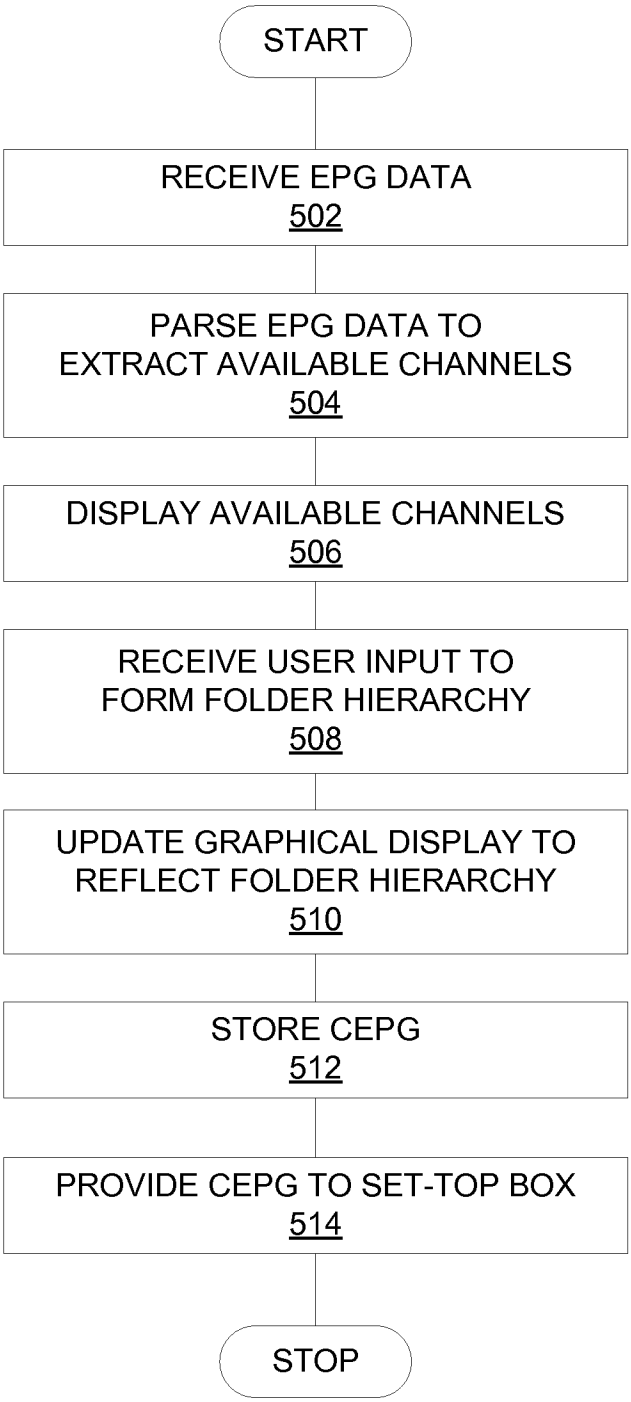
START
RECEIVE EPG DATA
502
PARSE EPG DATA TO
EXTRACT AVAILABLE CHANNELS
504
DISPLAY AVAILABLE CHANNELS
506
RECEIVE USER INPUT TO
FORM FOLDER HIERARCHY
508
UPDATE GRAPHICAL DISPLAY TO
REFLECT FOLDER HIERARCHY
510
STORE CEPG
512
PROVIDE CEPG TO SET-TOP BOX
514
STOP

FIG. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/030766

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04N7/16 H04N5/445

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04N

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 273 167 B (UNITED VIDEO PROPERTIES INC [US]) 7 December 2005 (2005-12-07) the whole document	1-25
Y	US 2004/049787 A1 (MAISSEL JONATHAN [IL] ET AL) 11 March 2004 (2004-03-11)	1,12,17, 21
A	abstract paragraph [0023] - paragraph [0038] paragraph [0067] - paragraph [0072] paragraph [0083] - paragraph [0086]	2-11, 13-16, 18-20, 22-25

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search	Date of mailing of the international search report
13 March 2009	23/03/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Greve, Mario

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/030766

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Y A	WO 00/30350 A (KONINKL PHILIPS ELECTRONICS NV [NL]) 25 May 2000 (2000-05-25) the whole document	1,12,17, 21 2-11, 13-16, 18-20, 22-25
A	US 2004/034867 A1 (RASHKOVSKIY OLEG B [US] ET AL) 19 February 2004 (2004-02-19) abstract	1-25
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Information on patent family members

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