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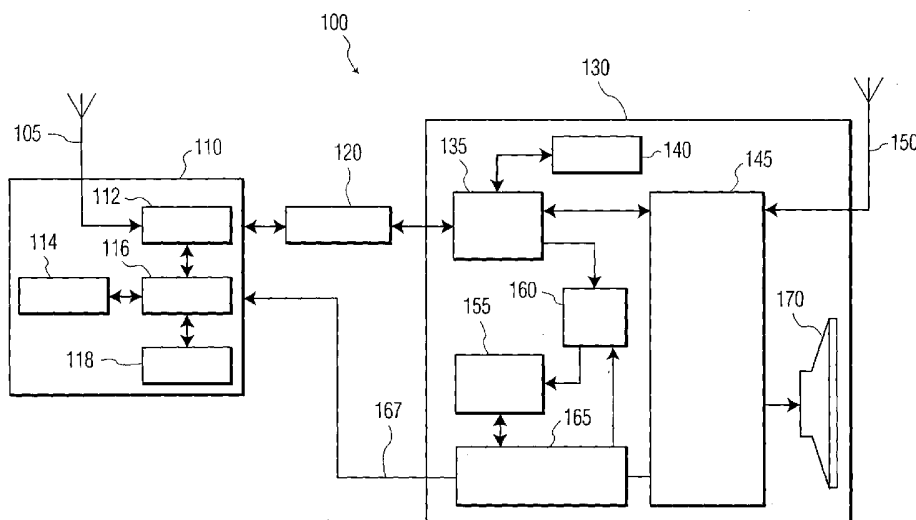
(57) Abstract: Energy consumption is reduced in a hybrid analog-digital television receiver (100) having a digital part (110) and an analog part (130) by searching for software, or information for downloading the software, when transport streams are tuned in response to user commands to view content from the transport streams. The transport streams are searched one at a time as they are tuned one at a time in response to the user commands. If the software itself is present, it can be downloaded immediately when a user command is received to enter the standby mode. If information such as a date and time for downloading the software is present, the information can be stored by the analog part for use in waking up the digital part from the standby mode in time to download the software. An interface (120) enables communication between the digital and analog parts.

DETECTION OF NEW SOFTWARE IMAGE FOR DOWNLOAD FOR DIGITAL/HYBIRD TV DURING PLAY MODE

The invention relates generally to a method and apparatus for downloading

5   software to a hybrid analog-digital television receiver to achieve reduced power consumption.

In the near future, it is expected that all new television sets will be equipped with a digital component that allows the television to receive both digital and analog signals. Such televisions are referred to as hybrid televisions. One example of such as digital

10   component is the Intelligent Bolt On (IBO+) module designed by Philips Semiconductors. Such modules are designed to provide a smooth migration path to fully digital systems. However, the modules contain complex software that is upgraded from time to time. Accordingly, the hybrid television should have the capability to be upgraded by a newer version of software, e.g., a software image, that is broadcast in, and downloaded from, the

15   received digital stream. Commonly, this is achieved by performing a software upgrade during the early morning hours when it is likely that no one is watching the television. In this case, the television set is maintained continuously in a state where the digital and analog parts are fully powered, while the display is depowered.

In particular, the digital module can run a specially designed application known as a

20   signaling application to detect the appearance of the new software version in the digital broadcast signal. To do this, the digital module controls the tuner to scan all installed transport streams to locate a download schedule for a new software image. During this scanning, it is not possible for the viewer to watch any television programs. If the viewer switches the television set on while the scanning is in progress, the scanning is interrupted.

25   However, to run this application, the digital part of television must be fully powered for excessive time periods, resulting in unnecessary power consumption. Additionally, such televisions may not be in compliance with proposed energy consumption standards.

The present invention addresses the above and other issues by providing a method and apparatus for downloading software to a hybrid television receiver to achieve reduced

30   power consumption. In particular, the power consumption of the hybrid television receiver with digital and analog parts can be reduced to essentially that of a conventional analog-only television.

In a particular aspect of the invention, a hybrid television receiver includes an analog part for receiving an analog broadcast signal, and a digital part for receiving a

digital broadcast signal. The digital part tunes different transport streams in the received digital broadcast signal responsive to user commands for viewing content in the different transport streams, and searches the different transport streams when they are tuned, for the purpose of downloading software.

5   In a further aspect of the invention, a method is provided for downloading software at a hybrid television receiver having an analog part for receiving an analog broadcast signal, and a digital part for receiving a digital broadcast signal. The method includes tuning different transport streams in the received digital broadcast signal responsive to user commands for viewing content in the different transport streams, and searching the

10   different transport streams when they are tuned, for the purpose of downloading software.

In another aspect of the invention, a digital part of a television receiver includes means for tuning different transport streams in the received digital broadcast signal responsive to user commands for viewing content in the different transport streams, and means for searching the different transport streams one at a time as they are tuned one at a

15   time in response to the user commands while the digital part is in a play mode.

In the drawings:

Fig. 1 illustrates a block diagram of a hybrid analog-digital television receiver according to the invention;

Fig. 2 illustrates a method for obtaining information for downloading software

20   during a play mode at a hybrid analog-digital television receiver according to the invention;

Fig. 3 illustrates a method for downloading software immediately in an active standby mode at a hybrid analog-digital television receiver according to the invention; and

Fig. 4 illustrates a method for waking up the digital part of a hybrid analog-digital

25   television receiver during a normal standby mode according to the invention.

In all the Figures, corresponding parts are referenced by the same reference numerals.

Fig. 1 illustrates a block diagram of a hybrid analog-digital television receiver according to the invention. The receiver, shown generally at 100, includes a digital part or

30   portion 110, an analog part or portion 130, and an interface 120 between the digital and analog parts. Note that the term "analog part" refers to the type of broadcast signal received by the part, and it should be clear that digital circuitry can be used in the analog part. The digital part 110 receives a digital broadcast signal such as a terrestrial, cable or

satellite signal via an antenna or other input terminal 105, while the analog part 130

receives an analog broadcast signal such as a terrestrial, cable or satellite signal via an

antenna or other input terminal 150. The digital and analog broadcast signals include

content such as television and radio programs and other content that can be displayed on

5   the screen or display 170. The receiver 100 may be provided as a set-top box, television

console, or in another configuration. A set top box typically contains only a digital

receiver and it does not have an analog part, but it has its own standby mode and similar

components as the analog part (such as the control 135, memory 140 and timer unit 160)

should be implemented in the set top box itself.

10   A high level overview of the components of the digital part 110 is provided, as

these components are known per se in the art. Advantageously, the invention can be

implemented with only software changes at the digital part 110, e.g., when the analog part

has a wake-up functionality and the capability to store a schedule into memory. The digital

part 110 includes a tuner 112 that tunes different transport streams that are provided at '

15   different carrier frequencies in the received digital broadcast signal. A decoder 114

decodes the received data, while a control 116 coordinates the activities of the tuner 112,

decoder 114 and other components to provide decoded data to the analog part 130, via the

interface 120, for display on the display 170. A memory 118, such as a flash memory, may

store any type of computer readable instructions, such as software, firmware, micro code or

20   the like, that are executed by the control 116 to achieve the functionality described herein,

including the signaling application described below. The memory 118 may be considered

to be a program storage device that tangibly embodies a program of instructions executable

by a machine such as the control 116 or a computer to perform a method that achieves the

functionality described herein. As mentioned, updated software may be downloaded to the

25   memory 118 from time to time, via the received digital broadcast signal, as it becomes

available, e.g., to provide new features or correct prior software bugs.

               The analog part 130 includes a control 135, which may execute instructions such as

software, firmware, micro-code or the like, to achieve the functionality described herein.

Or, the control 135 may be a dedicated circuit such as an application-specific integrated

30   circuit (ASIC). A memory 140 may store such instructions as well as schedule data that

indicates a time for the digital part 110 to download software from the received digital

broadcast signal, as discussed further below. The memory 140 may be considered to be a

program storage device that tangibly embodies a program of instructions executable by a

machine such as the control 135 or a computer to perform a method that achieves the functionality described herein. A timer unit 160 is responsive to the control 135 for waking up a power supply 165 to the digital part 110 via a wake up switch 155. The timer unit 160 may be a component that is found in many analog televisions that allows the user

5 to set a countdown time for turning off the television, e.g., while the user falls asleep. A digital circuit for providing this function may be provided if needed. The power supply provides power to the digital part 110 via an electrical path 167. The analog part 130 includes other hardware 145, such as a tuner and a display driver for the display 170.

The interface 120 allows the digital part 110 to be added onto an existing analog

10 television receiver in a master-slave relationship where the analog part 130 performs the main control functions, including controlling the power supply to the digital part 110 and controlling the display 170. The analog and digital parts can interact via the common link interface 120. For example, the analog part 130 can send commands to the digital part 110, or request information from the digital part 110, and the digital part 110 can notify the

15 analog part 130 of various events. Examples of commands that may be provided by the analog part 130 include: SetLanguage, ModifyAspectRatio, ClearOSD (on-screen display), GetUTCTime, GetLocalTime, etc. Examples of notifications that may be provided by the digital part 110 include: NewDownloadScheduleFound, ActiveStandby, NormalStandby, etc.

20 In a regular viewing mode of the receiver 100, such as a play mode, the analog part 130, digital part 110, and the display 170 are fully powered. However, note that the digital part 110 can be powered off during viewing of an analog TV program, and vice-versa. That is, some components of the analog part, which are responsible for receiving an analog signal, can be powered off during viewing of any type of digital program. In a normal

25 standby mode of the receiver 100, the digital part 110, analog part 130 and display 170 are depowered, with the exception that the analog part 130 has a capability to wake up, e.g., become fully powered, when the user provides a "power on" command via a remote control, for instance. The analog part 130 has an appropriate receiver such as an infrared receiver for receiving such a command. When the digital part 110 enters the normal

30 standby mode, this indicates that all data has been saved and it is safe to depower the digital part. In an active standby mode of the receiver, the analog part 130 and the digital part 110 are powered, while the display 170 is depowered. Moreover, in the digital part, a

signaling application is implemented to detect and to download software from the received digital broadcast signal as discussed below.

Fig. 2 illustrates a method for obtaining information for downloading software at a hybrid analog-digital television receiver according to the invention. The text in Fig. 2 is as

5   follows: analog part (200), digital part (205), download schedule notification (206), store download schedule (207), new transport stream tuned? (210), search current transport stream for new download schedule or software (215), new matching download schedule or software image for download found? (220), user consents? (225), store reply in flash memory (230), matching schedule found? (235), software present - create download

10   information (240), store download information (245), notify user about the schedule and that download will be done when TV is set to standby mode (250), continue with play mode (255) and end (260).

When the digital part 205 is in a play mode, the user has the ability to command the digital part to tune in different transport streams so the user can view different television

15   programs or other audio and/or video content. The user may use an infrared remote control for this purpose, for example. In this case, the digital part is not in a virgin mode, where no transport streams are installed, and is instead in a play or record mode, for instance, so the signaling application can be started. When a new transport stream is tuned (block 210), the digital part (205) searches the current transport stream for a new download schedule or

20   software (block 215). If a new matching download schedule or software image for download is found (block 220), and the user consents to obtaining the software and paying any associated fee (block 225), and if a matching schedule is available (block 235), the analog part 200 is notified (path 206). The necessary download information is stored in memory (block 245), such as in the memory 118 of the digital part (Fig. 1). A download

25   schedule is matching to the receiver if, e.g., the software image is intended for the current television brand, model, and version, and the image's software version is higher than the current software version already present at the digital part. Essentially, there is a match if the software is intended for use with, and not already present at, the receiver. Also "matching" means that user did not reject this version for download previously (see

30   below).

The download information may include a download schedule, including, e.g., the date and time of the download, and an identifier of the transport stream. The download schedule is provided by the digital part to the analog part as a download schedule

notification (path 206) and stored thereat (block 207). The user's reply to the query of whether the user consents can also be stored in flash memory.

In some cases, the software may be present as an unscheduled image broadcast (case "NO", block 235). If such matching software is found, and the user consents to obtaining the software and paying any associated fee (block 225), download information can be created (block 240) and stored by the digital part (block 245). That is, the current date and time can be considered as a download schedule. At block 250, the user is notified about the download schedule (if present) and that the download will occur when the TV is set to a standby mode by the user. This notification can be made later, when the user has finished watching the TV. The user's reply to the query of whether the user consents can also be stored in flash memory. The process ends at block 260, but can be repeated when a new transport stream is tuned and no download schedule or software has been recently stored.

In case the user did not consent (case "NO", block 225), the user reply is stored in flash memory (block 230). The next time the user tunes to the same transport stream and exactly this new download schedule or image for download is still present in a stream, the user will be not asked again about the same version of the once-rejected download.

Note that the software or information for downloading the software can be provided in a transport stream in which popular television programs are also provided to ensure a high likelihood that the user tunes the transport stream.

In a specific example, the download schedule may be expressed as a time of day and a date. If no date is provided directly, this may be interpreted as an indication that the current date applies, or a predetermined date or day of the week can be used. Coordinated Universal Time (UTC) may be used. The download time can be hours, days or even months away. The analog part stores the download schedule (block 207), such as in the memory 140, and the control 135 configures the timer unit 160 according to the download date and time so that it activates the power supply 165 in time to wake up the digital part so that it can download the software at the indicated time. There is no need to wake up a few minutes before the download time since the new software version for download will be broadcasted cyclically many times, starting at the time which is mentioned in the download schedule. Moreover, because of special organization and indexes, the digital part downloads new software block-by-block using a control check sum for each block and for the whole image as well. The digital part does not need to start downloading from the

beginning - it can start downloading from the beginning of any block that is currently broadcasted. Note that the download schedule may indicate multiple possible download dates and times. The timer 160 can then be configured accordingly. If a download is not possible at a given time, e.g., due to the user viewing a television program, a further

5   attempt can be made at the next subsequent time indicated by the schedule. The digital part may also store an identifier, such as a channel number, frequency or other tuner setting, to identify the particular transport stream from which the downloading will take place. A software version number for acceptance and verification parameters is stored as well.

10   Fig. 3 illustrates a method for downloading software immediately in an active standby mode at a hybrid analog-digital television receiver according to the invention. The text in Fig. 3 is as follows: analog part (300), standby request (301), active standby notification (302), normal standby notification (304), digital part (305), power down (306), virgin mode? (307), switch to active standby mode (310), load download information

15   (download time and transport stream ID) from memory (320), tune to designated transport stream at designated time to download software (325), download software (330), flash software (335), switch to normal standby mode (340), and end (345).

When the user presses a "standby" button on a remote control device or issues a similar command, the analog part 300 communicates a signal to the digital part 305, as

20   indicated by path 301, informing the digital part that a standby request has been received. For example, a command such as Notify_Power_Down_in_3_sec may be sent. The analog part also switches off the display/screen. The control 135 of the analog part remains active, or at least the part of the control responsible for saving data received from the digital part and the part which powers off the digital part. In response to signal from the

25   analog part, the control logic of the digital part checks to see if it is in a "virgin" mode wherein there are no services, e.g., transport streams, installed (block 307). The signaling application is not used in the virgin mode. If the digital part is in the virgin mode, the digital part switches to the normal standby mode (block 340), and reports back to the analog part, as indicated by path 304, accordingly. In response, the analog part 300 powers

30   down the digital part 305, as indicated by path 306, and the process ends (block 345).

At block 307, if the digital part is not in the virgin mode, and is instead in a play mode, for instance, the signaling application is started, and the digital part 305 immediately switches to the active standby mode (block 310). In the case where matching software is

present in one of the transport streams that is being viewed by the user in a play mode, e.g., the answer to block 235 in Fig. 2 is "NO", and the user consents to downloading the software, the digital part can create and store download information with the current date and time. This indicates to the digital part that it should download the software essentially

5   immediately after the user provides a command to enter the standby mode. Upon receiving such a command, the digital part (305) switches to the active standby mode, where the digital part is active but the screen is depowered, and provides a corresponding notification to the analog part (300) via path 302. The digital part loads from memory 118, into its control 116, the download information, including the download time, which is essentially

10   the current time, and the transport stream ID in which the software is carried (block 320). The digital part tunes to the designated transport steam at the designated time to download the software (block 325). The software is downloaded (block 330) and immediately "flashed" or stored into memory (block 335). Generally, downloading software includes two steps: downloading the software into memory, and if the download is successful, the

15   downloaded software is flashed or burned into flash memory. Subsequently, the digital part switches from the active standby mode to a normal standby mode (block 340) in which it and the screen are depowered, resulting in minimal energy consumption, and provides a corresponding notification to the analog part via path 304. In response to receiving this notification, the analog part 300 powers down the digital part (path 306), and the signaling

20   application ends at block 345. The switching to the normal standby mode can be done only after completing both steps 330 and 335. Moreover, to obtain a fully functional scheduled download, the analog part should not remove power from the digital part while the searching or downloading is in progress. Instead, the analog part should wait until the digital part informs the analog part that the digital part has gone into the normal standby

25   mode, at which time it is safe to depower the digital part.

Fig. 4 illustrates a method for waking up the digital part of a hybrid analog-digital television receiver during a normal standby mode according to the invention. The text in Fig. 4 is as follows: analog part (400), time reaches indicated download time (402), wake up power supply to digital part (404), digital part (405), power on (406), active standby

30   notification (408), switch to active standby mode (410), normal standby notification (412), power down (414), load download information (download time and transport stream ID) from memory (415), tune to designated transport stream at designated time to download

software (420), download software (425), flash software (430), switch to normal standby mode (435), and end (440).

In the analog part (400), when the timer reaches the indicated download time (block 402), the power supply to the digital part is woken up (404), as indicated by path 406, to
5   power on the digital part (405). In response, the signaling application begins again, and the digital part (405) switches to the active standby mode (410), providing a notification of its status to the analog part, as indicated by path 408. The digital part then loads the download information from memory (block 415), and tunes to the designated transport stream at the designated time to download the software (block 420). The software is downloaded (block
10   425) and flashed (block 430). When the download and flashing of the new software is finished, the digital part switches to the normal standby mode (block 435), and notifies the analog part accordingly, as indicated by path 412. In response, the analog part depowers the digital part, as indicated by path 414, and the signaling application ends (block 440).

Note also that, during each initialization (initial transition from "no power" to
15   "power present"), which may occur after a power outage, for example, the analog part checks to determine if some download schedule is written into memory 140, and the control 135 configures the timer unit 160 according to the downloaded date and time so that it activates the power supply 165 in time to wake up the digital part so that it can download the software at the indicated date and time. After the timer unit 160
20   configuration is done, the analog part enters a standby mode. The digital part is not powered on during this step. In practice, other checks and operations can be performed as well by the signaling application. For example, if, during a previous search for a download schedule, a schedule was found and stored in flash memory, then the stored schedule context information may be used to quickly check to determine if the schedule is still being
25   broadcast in the specified stream. If it is not still being broadcast in the specified stream, this may mean the software is no longer available. The digital part can also check the validity of the schedule, e.g., by confirming that the schedule's end time or expiration date is not due within a certain period of time. If the download schedule has not been found or is not valid anymore, the schedule information in flash memory is cleared, and searching of
30   the digital broadcast signal can be restarted (block 215, Fig. 2). A download schedule in the digital broadcast signal may be considered to be invalid or redundant, e.g., if a transport stream is tuned a second time after the download schedule was previously found in the transport stream and stored in flash memory.

As mentioned, a dialogue may be initiated with the user after the digital part has detected a new software download schedule or software itself to obtain the user's consent for the download, e.g., via an interactive menu on the display 170. The user may be informed by the dialogue of any fee for downloading the new software. The download

5   schedule is then sent to the analog part to configure the power on timer 160 only after the user has given consent.

Accordingly, it can be seen that the present invention provides a hybrid television with reduced power consumption. Advantageously, no changes are needed on the broadcaster side since broadcasting of a new software upgrade or download schedule can

10   continue according to existing standards. Moreover, the invention can be implemented with existing receivers by providing changes in software only, e.g., regarding the signaling application, analog television software and the analog-digital communication interface. By searching for software or information for downloading the software when a transport stream is tuned by the user to view its content, e.g., in a play mode, there is no need to

15   perform a separate search when the receiver is in a standby mode, when viewing of television programs is not possible. In one approach, the software is downloaded immediately after the user initiates a standby mode, which becomes an active standby mode specially designed for this purpose. In another approach, when the user initiates a standby mode, a normal standby mode is entered until the time for downloading is reached,

20   at which time the analog part acts as a power control for the digital part, waking it up in time to download the software. The digital part of the hybrid receiver does not need a low power mode – in fact, it needs only a few minutes of full power in active standby mode to download software, and then it can just be powered off completely by the analog part, in a normal standby mode. In comparison, a conventional download can take about 25 minutes.

25   While there has been shown and described what are considered to be preferred embodiments of the invention, it will, of course, be understood that various modifications and changes in form or detail could readily be made without departing from the spirit of the invention. It is therefore intended that the invention not be limited to the exact forms described and illustrated, but should be construed to cover all modifications that may fall

30   within the scope of the appended claims.

CLAIMS:

1.   A hybrid television receiver, comprising:

an analog part (130) for receiving an analog broadcast signal; and

a digital part (110) for receiving a digital broadcast signal;

wherein the digital part tunes different transport streams in the received digital broadcast signal responsive to user commands for viewing content in the different transport streams, and searches the different transport streams when they are tuned, for the purpose of downloading software.

2.   The hybrid television receiver of claim 1, further comprising:

an interface (120) between the analog part and the digital part.

3.   The hybrid television receiver of claim 1, wherein:

the digital part (110) searches the different transport streams one at a time as they are tuned one at a time in response to the user commands while the digital part is in a play mode.

4.   The hybrid television receiver of claim 1, wherein:

the digital part searches the different transport streams when they are tuned, to obtain information for downloading the software.

5.   The hybrid television receiver of claim 4, wherein:

the information comprises a matching download schedule that indicates a date and time at which the software can be downloaded from a particular one of the different transport streams.

6.   The hybrid television receiver of claim 4, wherein:

when the digital part (110) determines that the information is present in a particular one of the different transport steams, the digital part initiates a dialogue with the user via a user interface to obtain the user's permission to download the software.

7.   The hybrid television receiver of claim 4, wherein:

the information indicates a date and time at which the software can be downloaded from a particular one of the different transport streams;

the digital part communicates the date and time to the analog part;

the analog part includes a memory (140) for storing the date and time communicated thereto; and

the analog part includes a timer (160), responsive to the memory, for waking up a power supply (165) to the digital part to cause the digital part to switch from a normal, depowered standby mode to an active, powered standby mode, in time to allow the digital part to download the software from the particular one of the different transport steams at the indicated date and time.

8.   The hybrid television receiver of claim 7, wherein:

a screen (170) for displaying content from the received analog and digital broadcast signals is also depowered when the digital part (110) is in the normal, depowered standby mode.

9.   The hybrid television receiver of claim 4, wherein:

the digital part (110) comprises a memory (118) for storing the information when it is present in a particular one of the different transport streams, and for storing an identifier of the particular one of the different transport streams.

10.   The hybrid television receiver of claim 9, wherein:

after the information is stored in the memory, the digital part determines, when the particular one of the different transport streams is subsequently tuned by the digital part responsive to a subsequent user command to view content thereof, whether the information is still present therein; and

if the digital part determines that the information is not still present in the particular one of the different transport streams, the digital part deletes the information stored in the memory.

11.   The hybrid television receiver of claim 9, wherein

the memory (118) stores an expiration date associated with the information when storing the information;

the digital part determines, after the information is stored in the memory, whether the information has expired based on the stored expiration date; and

if the digital part determines that the information stored in the memory has expired, the digital part deletes the information stored in the memory.

12.   The hybrid television receiver of claim 9, wherein:

after the information is stored in the memory (118), the digital part determines, when the particular one of the different transport streams is subsequently tuned by the digital part responsive to a subsequent user command to view content thereof, whether new information that supercedes the information that was previously stored is present therein; and

if the digital part determines that the new information is present in the particular transport stream, the digital part instructs the memory to store the new information and delete the information that was previously stored.

13.   The hybrid television receiver of claim 1, wherein:

the digital part searches the different transport streams when they are tuned, to determine whether the software is present in a particular one of the different transport streams.

14.   The hybrid television receiver of claim 13, wherein:

when the digital part determines that the software is present in the particular one of the different transport streams, the digital part enters an active standby mode, responsive to a subsequent user command, for downloading the software from the particular one of the different transport streams; and

the digital part switches from the active, powered standby mode to a normal, depowered standby mode after downloading the software from the particular one of the different transport streams.

15.   The hybrid television receiver of claim 14, wherein:

the digital part creates a download schedule for downloading the software based on the date and time at which the digital part determines that the software is present in the particular one of the different transport streams.

16.   A method for downloading software at a hybrid television receiver having an analog part for receiving an analog broadcast signal, and a digital part for receiving a digital broadcast signal, the method comprising:

tuning different transport streams in the received digital broadcast signal responsive to user commands for viewing content in the different transport streams; and

searching the different transport streams when they are tuned, for the purpose of downloading software.

17.   The method of claim 16, wherein:

the searching the different transport streams comprises searching the different transport streams to obtain information for downloading the software that indicates a date and time at which the software can be downloaded from a particular one of the different transport streams;

the method further comprising:

communicating the date and time from the digital part to the analog part; and

at the analog part, storing the date and time communicated thereto, and implementing a timer (160), responsive to the storing, for waking up a power supply (165) to the digital part to cause the digital part to switch from a normal, depowered standby mode to an active, powered standby mode, in time to allow the digital part to download the software from the particular one of the different transport steams at the indicated date and time.

18.   The method of claim 16, wherein:

the searching the different transport streams comprises searching the different transport streams to determine whether the software is present in a particular one of the different transport streams;

the method further comprising:

downloading the software from the particular one of the different transport streams, when the digital part determines that the software is present in the particular one of the different transport streams, by causing the digital part to enter an active, powered standby mode, responsive to a subsequent user command; and

switching the digital part from the active, powered standby mode to a normal, depowered standby mode after downloading the software from the particular one of the different transport streams.

19.   The method of claim 16, wherein:

the searching the different transport streams comprises searching the different transport streams one at a time as they are tuned one at a time in response to the user commands while the digital part is in a play mode.

20.   A digital part of a television receiver, comprising:

means (105, 110) for tuning different transport streams in the received digital broadcast signal responsive to user commands for viewing content in the different transport streams; and

means (110) for searching the different transport streams one at a time as they are tuned one at a time in response to the user commands while the digital part is in a play mode, for the purpose of downloading software.
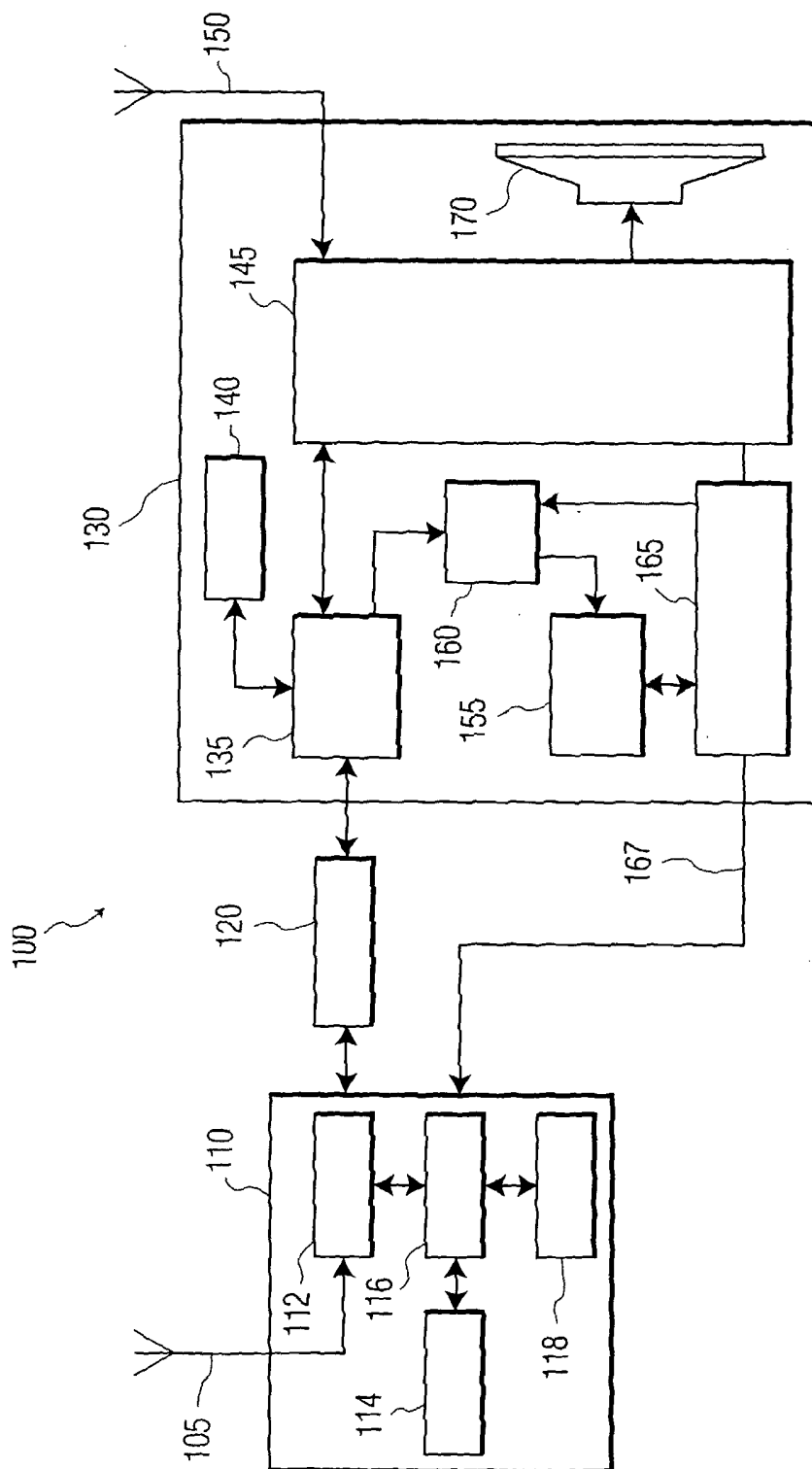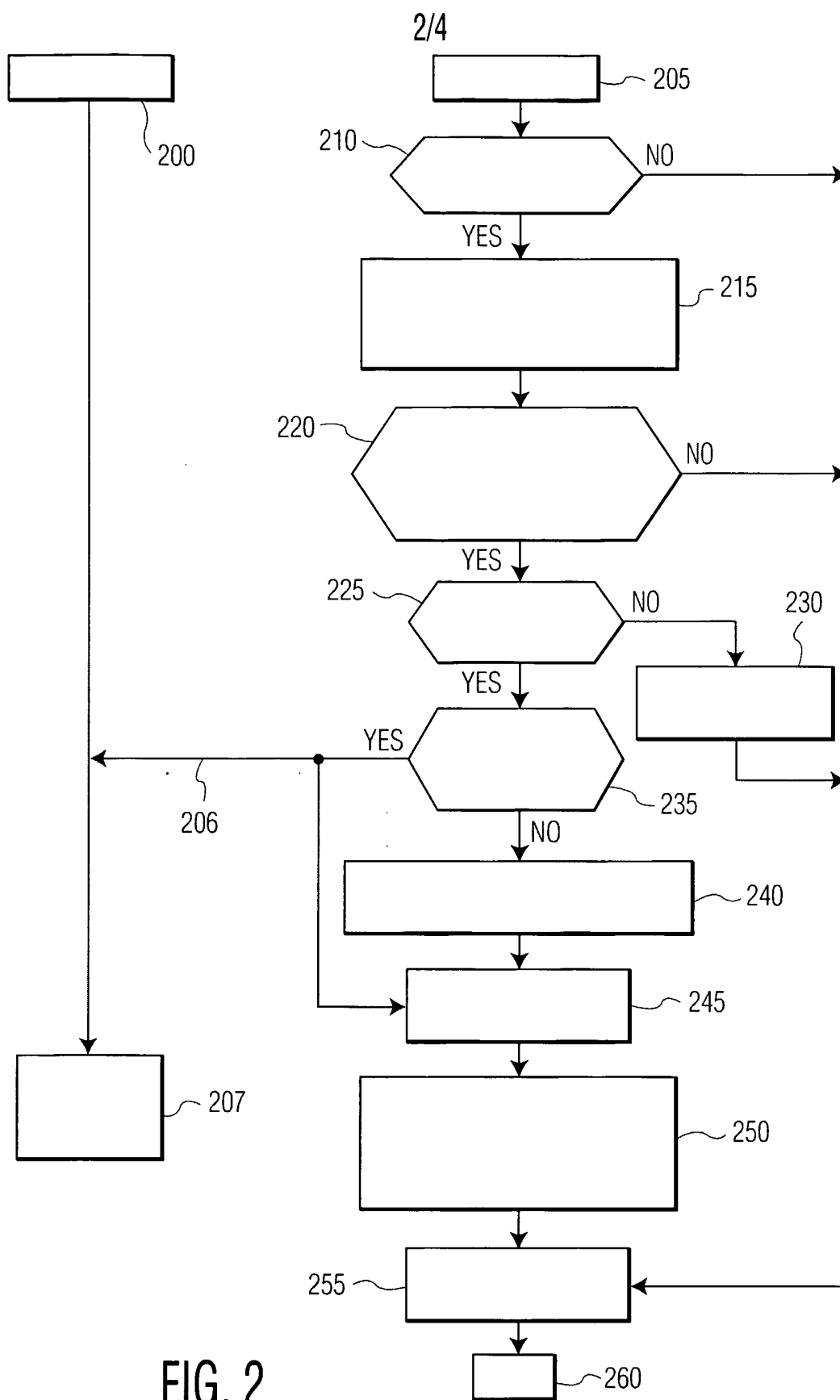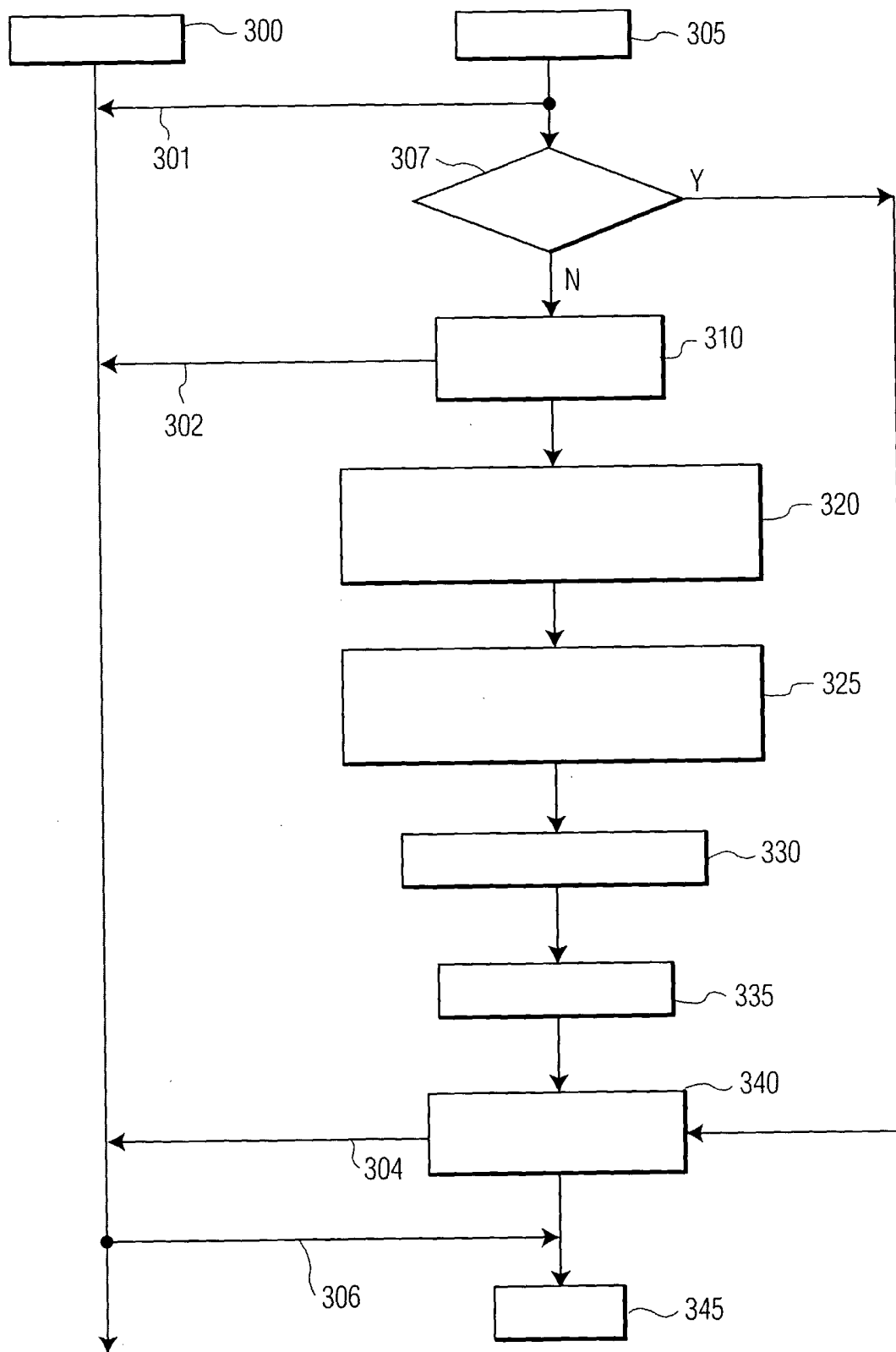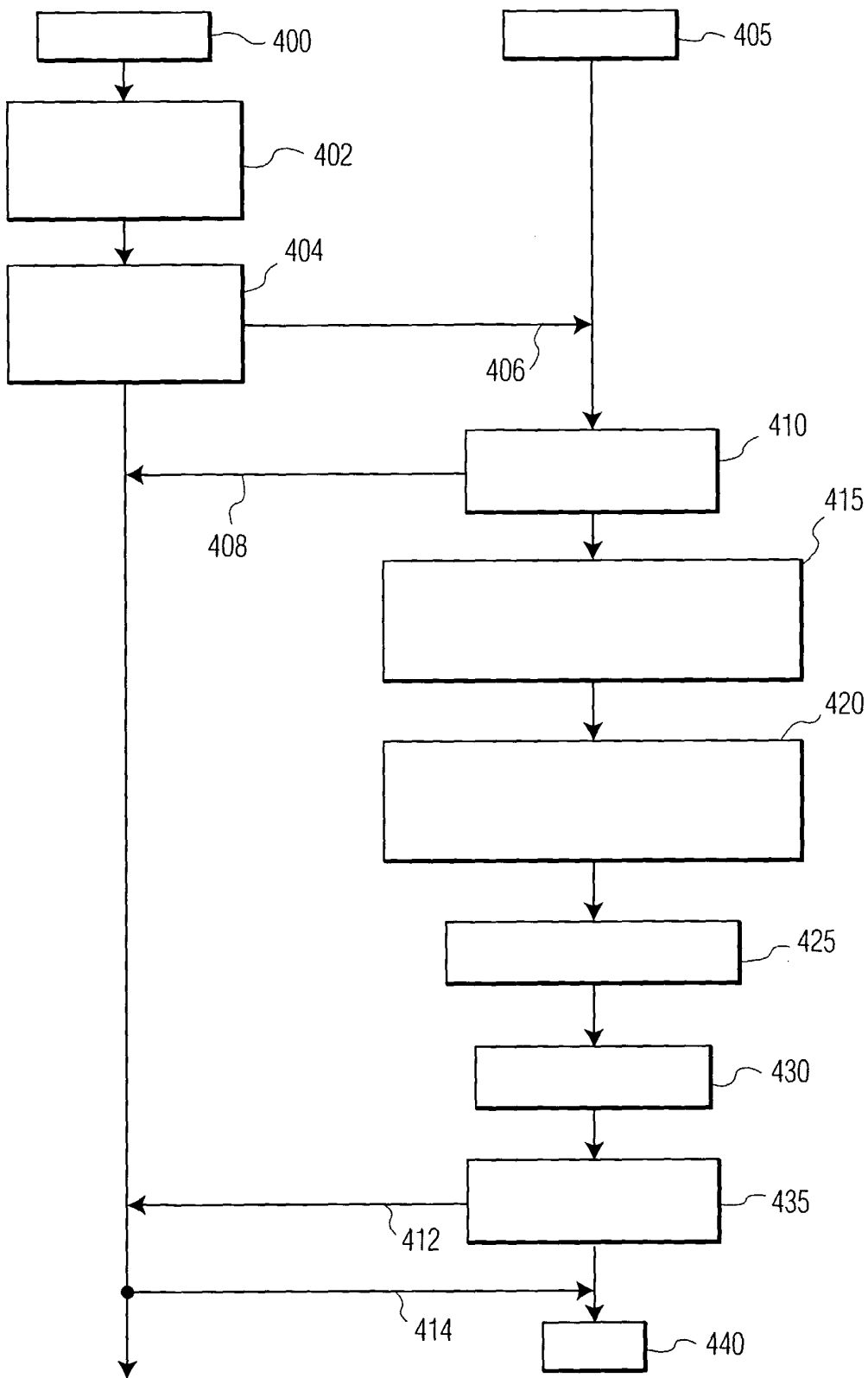
1/4

FIG. 1

2/4

FIG. 2

3/4

FIG. 3

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FIG. 4

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
H04N5/00   H04N7/24

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/159150 A1 (CHERNOCK RICHARD STEVEN ET AL) 21 August 2003 (2003-08-21)	1-6,9, 13,16, 19,20
Y	abstract	7,8, 10-12, 14,15, 17,18
	paragraphs '0012! - '0020! paragraphs '0027! - '0059! figures 1,2	
Y	EP 1 341 380 A (KONINKLIJKE PHILIPS ELECTRONICS N.V) 3 September 2003 (2003-09-03) paragraphs '0041! - '0053! abstract figures 1-4	7,8,14, 15,17,18

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☒ Further documents are listed in the continuation of box C.   ☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
21 November 2005	29/11/2005

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, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Marzal-Abarca, X

INTERNATIONAL SEARCH REPORT

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