

SET TOP DEVICE

TECHNICAL FIELD

5 The present invention relates to a set top device in particular to a set top box/device for providing television services having an integrated video recorder and which provides programme alerts and has auto tune functionality.

BACKGROUND ART

10 Set-top devices are end-user electronic devices used to decode the signal, for example from cable, satellite or terrestrial distribution systems, into a form suitable for display on consumer devices, in particular television sets. When used with subscription television services, the service provider will need protect the television signal by some form of scrambling or encryption technique, so that only subscribers who are willing to pay for the service get to decode (i.e. de-scramble or decrypt) the
15 protected signal. The decoding of such protected signal is a function of the set top device and an essential function when a set top device is used in conjunction with a subscription service.

20 In general, set-top devices consist of at least one video tuner that is able to tune to a selected TV channel. Some set top devices have the additional capability to store short-term and long-term information. In addition, some set top devices have advanced functionality including programme alerts that enables the setting of reminder alerts. Other functionality provided may include a video recorder for the recording of television programmes and to provide playback functions (i.e. playback of recorded content).

25 Currently video recorders both digital and analogue are widely used by consumers to record video and television programmes to a storage medium such as tapes, digital video discs and magnetic hard disks. Some set top devices allow

pausing of live television and provide the capability to instantly replay interesting scenes.

WO04068841 which is incorporated by reference, describes an interactive television system that is connected to a network or personal video recorder with the capability to schedule programme reminders. A set top device is required to carry out these functions. The set top device described may include a hard disk drive for storing digital video recordings for play back on a user's television. Television programmes can be recorded automatically on the network or using the local personal video recorder. Furthermore, users may set a reminder for a programme that is scheduled for transmission later in the day or week. Just before the scheduled transmission time of the programme, the user may be presented with a reminder that alerts the user that the desired programme is about to be aired. Users are allowed to make on-screen selection to choose reminder for the desired programme even if there is no scheduled transmission for the programme at that time.

WO04068841 does not provide an auto-tuning function as envisaged by the present invention.

US20010033343 describes a personal video on-demand system and method which permits users to receive content using at least two tuners and perform more than one identical or different operation such as recording of programmes, playback and view live programmes at the same time. The system described in US20010033343 allows users to record an entire programme even after the programme has commenced. To assist in the selection of the desired television programme, the invention has an electronic programme guide installed. The programming guide receives information on available content which will then be transmitted to the interactive device. The interactive device serves as the user interface for users to select the desired programmes to be recorded on the storage device. The storage device is expandable and/or easily removable as required. Some examples of storage device that the invention may include: magnetic tape, optical disk, CD, DVD, or any portable digital audio/video/data player. Further enhancement includes a method whereby the device

can potentially determine the desired programme which may be of interest to users. This can be determined by tracking previously selected content so that that the device will be able to learn the consumers preferences.

5 US20010033343 does not describe programme alerts nor the auto-tune functionality. The focus is on automatically recording programmes which the system conceives to be of the interest to the users based on tracking of past recorded programmes.

10 US5987213 describes a system for automatically recording of television programmes transmitted on different cable channels. The user enters a string of code into the video recorder which consists of channel, date, time-of-day and length commands ("CDTL"). The codes will then be stored in the video recorder's memory. The purpose of entering a string of codes is to reduce the amount of keystrokes and interaction with the system to set up the timer pre-programming feature on a video recorder. This can be done remotely or locally at the video recorder. By entering the
15 codes, the device will automatically decode and convert the codes into proper CDTL programming information and activate the video recorder to record a given programme with the corresponding channel, date, time and length as instructed by the user. Multiple codes can be entered for multiple selections.

20 The above-mentioned invention describes mainly on automatic recording function provided by the video recorder. Auto-tune and programme alert are not incorporated in the device. This invention is largely similar to invention described in publication US20010033343. The main function is to record television programmes automatically based on what is provided by the user. It is not as interactive as the current invention which provides reminders to users when an upcoming programme is
25 of interest to users nor does it switch the channel automatically when the desired programme is aired.

The invention described in US20060048207 is a television set that is operated by voice commands without the use of remote control or manual tuning. The device is able to combine basic television capabilities, digital video recording (DVR), voice

telephone sending and receiving capabilities and weather alert indications. A voice command is spoken by the user and detected by a microphone in the device which will be processed such that the intended function is carried out. For example, the DVR can be activated if the command is detected by the device. The device will be operated to display television programming, to record and review digitally recorded television programmes. It is able to provide recording and playback function with a built-in DVR.

The above-mentioned publication does not disclose an auto-tune or programme alert functions specifically for a subscription TV set top, as envisaged by the present invention.

It would be desirable to incorporate in an interactive system the video recording capabilities, programme alert and auto-tune.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an set top device that provides recording means, programme auto tune and programme alert or at least provides the public or industry with a useful choice.

In a first embodiment the present invention consists in a set top device having:

at least one video tuner;

at least one video recorder associated with said tuner;

video output means for connecting a display to said set top device;

network communication means for communicating with a central server;

a processor and associated memory; and

user communication and input means,

wherein said processor is programmed to:

receive information on upcoming programs via said network communication means and display said information on an associated display connected to said video output means, said information being displayed to a user on receipt of a request from a user via user input means;

5 store user requests for at least one of:

video tuner auto tune; and

user programme alert,

auto tune a said video tuner to a programme at the start of said stored program;

and provide an alert about an upcoming programme alert.

10 Preferably said processor has conflict management means to manage conflicts between an auto tune and a programme alert.

Preferably conflict management means includes alerting a user via said associated display to a conflict between a previously set auto tune or programme alert and an auto tune or alert a user via user input is attempting to set and refusing to set an
15 auto tune or programme alert where there is a conflict.

Preferably a conflict exists if the timing of the new programme alert or auto tune is concurrent with the timing of a previously set auto tune.

Preferably said programme alert is provided on said associated display means.

Alternatively said programme alert is provided via email.

20 Alternatively said programme alert is provided via an sms message.

Preferably said central server provides information on upcoming programs.

Preferably said information includes the programme time and duration.

Preferably each said at least one video tuner is a digital tuner.

Alternatively each said at least one video tuner is an analogue tuner.

Preferably said set top device as having two said video tuners, said first and second video tuners, wherein said first video tuner is associated with said video recorder and said second video tuner is associated with said video output means and
5 wherein said auto tune and programme alerts are provided via said second video tuner.

Preferably said processor is programmed to record a programme in response to a user request via said user input.

Preferably said set top device as having only one video tuner, wherein said processor is programmed to record a programme in response to a user request via user
10 input and wherein said conflict management manages possible conflict between a record request, and auto tune request and an alert request.

Preferably said processor is programmed to resolve conflicts and said processor is programmed to give preference to the first stored event.

Preferably said processor is programmed to:

15 store user set programme genre preferences; and

in the event of a conflict arising give preference to a programme with a genre having a higher stored user preference.

Preferably said processor is programmed to give preference to the first stored event, in the event the stored genre preferences are equal.

20 **BRIEF DESCRIPTION OF THE DRAWINGS**

One preferred form of the present invention will now be described with reference to the accompanying drawings in which

Figure 1 is a block diagram of the present invention an associated information server,

Figure 2 is a high level flow diagram of the programme alert and auto tune conflict management capability of the present invention,

Figure 3 is a block diagram of the set top device of the present invention and

Figure 4 is a flow diagram of the conflict management routines of the present invention.

DETAILED DESCRIPTION

Referring to Figures 1 and 3 a device 101 hereinafter referred to as a set top box or set top device interchangeably is integrated with a television transmission system, be it wired or wireless. Data signals 103 are distributed using a transmission network, such as a Hybrid Fiber Coaxial (HFC), Copper, IP, or any form of broadcast or communication network. The data signals include distribute programme guides and television. A server 102 distributes electronic programme guide data (EPG) over the transmission network. While the data 309 is preferably distributed over the same network as the television transmission 304 the data 309 may be distributed separately. The EPG data is constantly updated and broadcast as a result of programme changes.

The set top device 101 of the present invention consist of at least one video tuner 303 that is able to tune to a selected TV channel and a decoder 306 associated with each video tuner for decoding an encoded signal. The provision of a decoder 306 is only necessary for subscription services and therefore is optional. The device 101 also includes a recorder 320 and a controller 308. The controller includes a CPU 310 and associated memory 311. A user interacts with the controller via a control panel (not shown) or remote control 307. The set top device output 305 is feed to a user device such as a computer screen or television set via the set.

In order to provide consumers with more control and greater interactivity of their television viewing experience, the present invention incorporates a digital video recorder (DVR) 320, and programme alert and auto-tune functions are integrated into the set top device 101. The digital video recorder 320 includes a storage device 321 (for example a magnetic high capacity hard disk drive) that is integrated within the set

top device 101 that allows users to record and store their favourite programmes and watch them at a more convenient time.

Within the set top device, there is a processing unit 310 and associated memory 311 that stores an entitlement map matrix and the device 101 is programmed to
5 determine the channels subscribed by the users and only decode those channels subscribed to. An entitlement map represents all of the channels that the user is currently subscribed to and entitled to watch. The entitlement map is essentially a matrix that contains data on all the channels being transmitted along with for each channel an indication of whether a user is entitled to view the channel.

10 The entitlement matrix can be updated from time to time and is sent from a separate server, not shown, known as a conditional access server to the set top device 101. Thus providing detailed information on which of the channels are being subscribed to by an end-user.

With the integration of a digital video recorder 320 within the set top device
15 101, two extra value-added features: programme alert and auto-tune functions have been added by the present invention. Programme alert and the auto-tune function along with features commonly provided by existing digital video recorders such as recording of television programmes and providing playback functions will enhance the user's viewing experience.

20 Auto-Tune allows the device 101 to automatically switch to the pre-selected programme when it is transmitted. Programme Alert allows the setting of reminder alerts before or at the start of the selected programme.

Programme Alert provides users with more flexibility and convenience. Existing systems do not provide interactivity or remind users of any upcoming
25 television programmes by following the operator's transmission schedule. The Programme Alert function is a feature that will remind users when the selected programme is about to be aired. It is essentially a time-based function that enables the setting of reminder alerts for selected programmes. The set top system of the

present invention has an internal clock that tracks the current date and time. While the date and time are configured during the initial set-up of the device, the device may include functionality to synchronise the time with a central server.

The internal clock will be compared against the information input by the users when they require the device to remind them of the programme when it is about to be aired. The alert timing can be set according to user preference. Users are given the option to be reminded in different ways, including on-screen pop-up display of the alert message on the television set, through short-text message (sms) on mobile phone, and/or email alert to an associated email account.

To further enhance viewing experience, Auto-Tune function is incorporated into the device. Auto-Tune function allows the digital set-top device to automatically switch to a pre-selected programme when the desired programme is aired. Similar to Programme Alert, it makes use of the internal clock that will be configured during the initial set-up of the digital set-top device. The internal clock will be compared against the information input by users and the Programme Alert will be activated by switching to the pre-determined channel automatically when the programme is aired. The Auto-Tune function can be implemented by directly applying the channel setting commands to the device or through operator's transmission media. The number of tuners available to each user is dependent on the user's subscription plan and preference and is limited by the number of physical tuners in the device 101.

Auto-Tune and Programme Alert functions are mutually exclusive. They do not depend on each other to carry out their functions. Even though Auto-Tune and Programme Alert system can reside in the EPG server, they currently are stored in the Set-Top Device owned or rented by consumers. In the present invention, there is no limit to the number or type of programmes that can be stored or tuned.

Users no longer need to abide by the television programme schedules that may be inconvenient for some users. With the introduction of DVR, recording of cable programmes can be scheduled in advance. Telecast schedule changes can also be detected by the system 101 as a result of EPG data being transmitted and the recording

function will be modified accordingly to record the programme automatically at the updated timing. Checks will also be performed automatically for space availability on the storage device 321 and any recording conflicts of scheduled recordings. The device 101 will also give users more control of their television programme viewing as they are allowed to pause or instantly replay any scene even while watching 'live' television programme. This is known as Time Shift viewing in the broadcasting or info-communication industry.

With the integration of Auto-Tune and Programme Alert functions in the set-top device 101, it is vital to monitor possible recording conflict that may arise. Conflict Management is implemented to overcome any potential conflict. Referring to Figures 2 and 4 if the user wishes to preset a channel using the Auto-Tune function 203, the system first scans 401 the memory 204 stored in set top box/device to ensure that the available tuners for recording (instant/scheduled) are not fully utilized to prevent Auto-Tune function from operating. There must be at least one tuner available before the user is allowed to activate the Auto-Tune or Programme Alert function.

If there is an available tuner the system allocates 402 a tuner for the user request. If the user request is to record a programme the system checks 405 if a recorder is available. If a recorder is available the system allocates 406 a recorder, the request is completed 407 and the user is notified 404. In the event that no tuner or no recorder is available then a conflict 403 exists and the user is notified 404 and asked to make a selection. As the scheduled programmes may change from time to time, conflicts may sometime occur only after the user has preset certain functions before the change of programme schedule. To address this issue, the system checks the point of setting every few minutes (example in the order of every five minutes) for a conflict. Users will be prompted to choose between the programmes that were found to have conflict. Notice of conflicts may be notified via email, sms and/or television pop-up window depending on user preference.

When a conflict is detected AFTER the tuner and/or recorder resources are allocated as a result of programme changes, the order of subsequent resource

allocation will be based on the "First In First Out (FIFO)" logic. As an example if the user schedules a programme alert (event-A) at 8am and an auto-tune (event-B) at 9am. The system resources will be allocated at the point of user input. If due to broadcast schedule changes, event-A is moved to 9am, i.e. event-A becomes event-A' a conflict with event-B results. The system will notify the user of the conflict but if the user does not resolve the conflict the FIFO design will cause event-A' to be executed and event-B will not occur.

In a further enhancement the system can assign a priority to an event based on a previously set user preference. For example the user preference could be based on genres (eg news, drama, sports). The EPG data would include information on which category a programme was in. The user can set their preferred order. So a business person might set news as 1, sport as 2, drama as 3. If a conflict occurs the system first checks to see if there is a priority between conflicting events. If multiple events are of different priority then the higher priority event occurs and the lower priority even does not occur. If both events are of the same priority then the FIFO logic would apply.

In yet a further enhancement user would be able to categorise programs irrespective of their category, so that favourite programs would be 1, and less favoured programs 2 etc.

A user can be notified of the conflict by means other than the television screen, for example SMS or email and the user can cause changes to occur via mobile phone, email or a web interface.

The foregoing description of the preferred embodiment of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed, since many modifications or variations thereof are possible in the light of the above teaching. All such modifications and variations are within the scope of the invention. The embodiments described herein were chosen and described in order best to explain the principles of the invention and its practical application, thereby to enable others skilled in the art to utilise the invention in various embodiments and with various

modifications as are suited to the particular use contemplated thereof. It is intended that the scope of the invention be defined by the claims appended hereto, when interpreted in accordance with the full breadth to which they are legally and equitably suited.

CLAIMS

1. A set top device having:

at least one video tuner;

at least one video recorder associated with said tuner;

5 video output means for connecting a display to said set top device;

network communication means for communicating with a central server;

a processor and associated memory; and

user communication and input means,

wherein said processor is programmed to:

10 receive information on upcoming programs via said network communication means and display said information on an associated display connected to said video output means, said information being displayed to a user on receipt of a request from a user via user input means;

store user requests for at least one of:

15 video tuner auto tune; and

user programme alert,

auto tune a said video tuner to a at the start of said stored program;

and provide an alert about an upcoming programme alert.

2. A set top device as claimed in claim 1 wherein said processor has conflict
20 management means to manage conflicts between an auto tune and a programme alert.

3. A set top device as claimed in claim 2 wherein conflict management means includes alerting a user via said associated display to a conflict between a previously

set auto tune or programme alert and an auto tune or alert a user via user input is attempting to set and refusing to set an auto tune or programme alert where there is a conflict.

4. A set top device as claimed in claim 2 or claim 3 wherein a conflict exists if the timing of the new programme alert or auto tune is concurrent with the timing of a previously set auto tune.

5. A set top device as claimed in any one of claims 1 to 4 wherein said programme alert is provided on said associated display means.

6. A set top device as claimed in any one of claims 1 to 4 wherein said programme alert is provided via email.

7. A set top device as claimed in any one of claims 1 to 4 wherein said programme alert is provided via an sms message.

8. A set top device as claimed in any one of claims 1 to 7 wherein said central server provides information on upcoming programs.

9. A set top device as claimed in claim 8 wherein said information includes the programme time and duration.

10. A set top device as claimed in any one of claims 1 to 9 wherein each said at least one video tuner is a digital tuner.

11. A set top device as claimed in any one of claims 1 to 9 wherein each said at least one video tuner is an analogue tuner.

12. A set top device as claimed in any one of claims 1 to 11 having two said video tuners, said first and second video tuners, wherein said first video tuner is associated with said video recorder and said second video tuner is associated with said video output means and wherein said auto tune and programme alerts are provided via said second video tuner.

13. A set top device as claimed in claim 12 wherein said processor is programmed to record a programme in response to a user request via said user input.

14. A set top device as claimed in any one of claims 1 to 11 having only one video tuner, wherein said processor is programmed to record a programme in response to a user request via user input and wherein said conflict management manages possible conflict between a record request, and auto tune request and an alert request.

15. A set top device as claimed in claim 14 wherein said processor is programmed to resolve conflicts and said processor is programmed to give preference to the first stored event.

16. A set top device as claimed in claim 14 wherein said processor is programmed to:

store user set programme genre preferences; and

in the event of a conflict arising give preference to a programme with a genre having a higher stored user preference.

17. A set top device as claimed in claim 16 wherein said processor is programmed to give preference to the first stored event, in the event the stored genre preferences are equal.