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US 20030018969 A1
US 20040172650 A1
US 20030182567 A1
US 20030115596 A1

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(72) Inventor(s):
Alistair Bruce Kelman

(73) Proprietor(s):
Alistair Bruce Kelman
37 Station Road, LONDON, NW4 4NJ, United Kingdom

(74) Agent and/or Address for Service:
Vivien Irish
33 St Saviourgate, YORK, YO1 8NQ, United Kingdom

GB 2490802 B

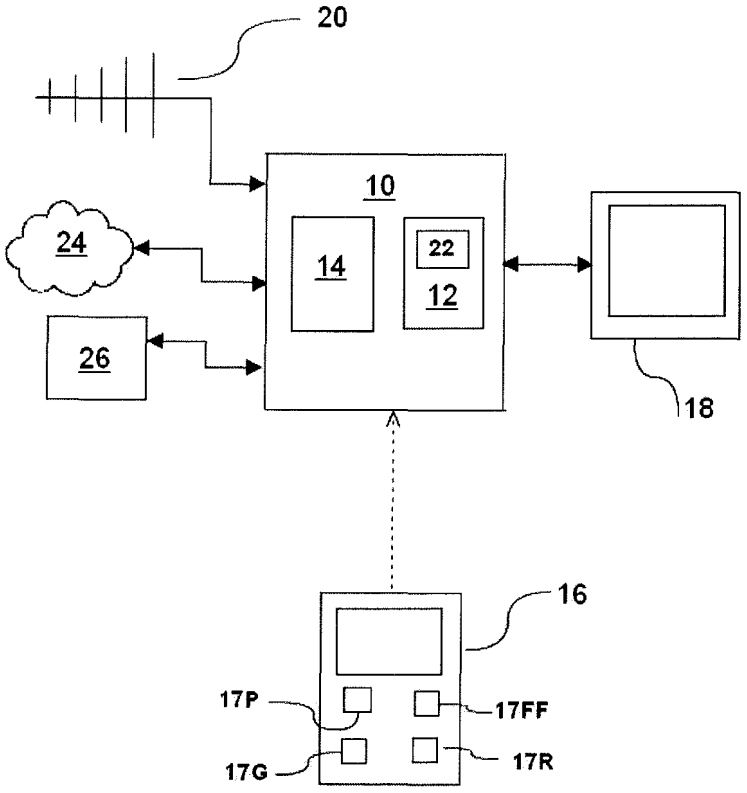

Figure 1

PRIOR ART

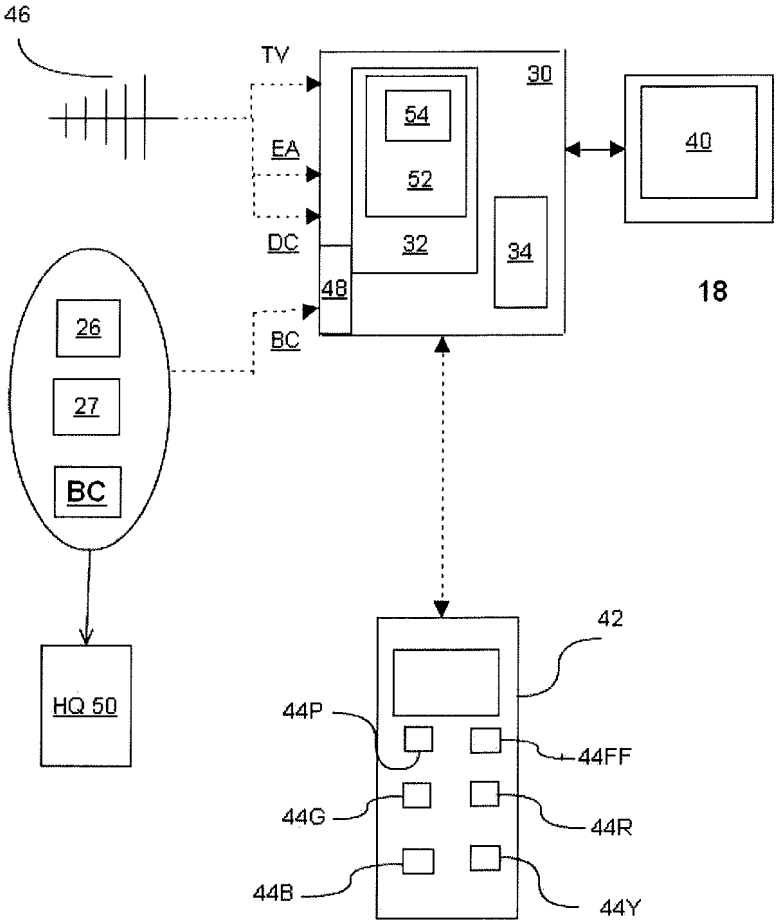
46
TV
EA
DC
BC
30
54
52
32
34
48
40
18
26
27
BC
HQ 50
42
44P
44FF
44G
44R
44B
44Y

Figure 2

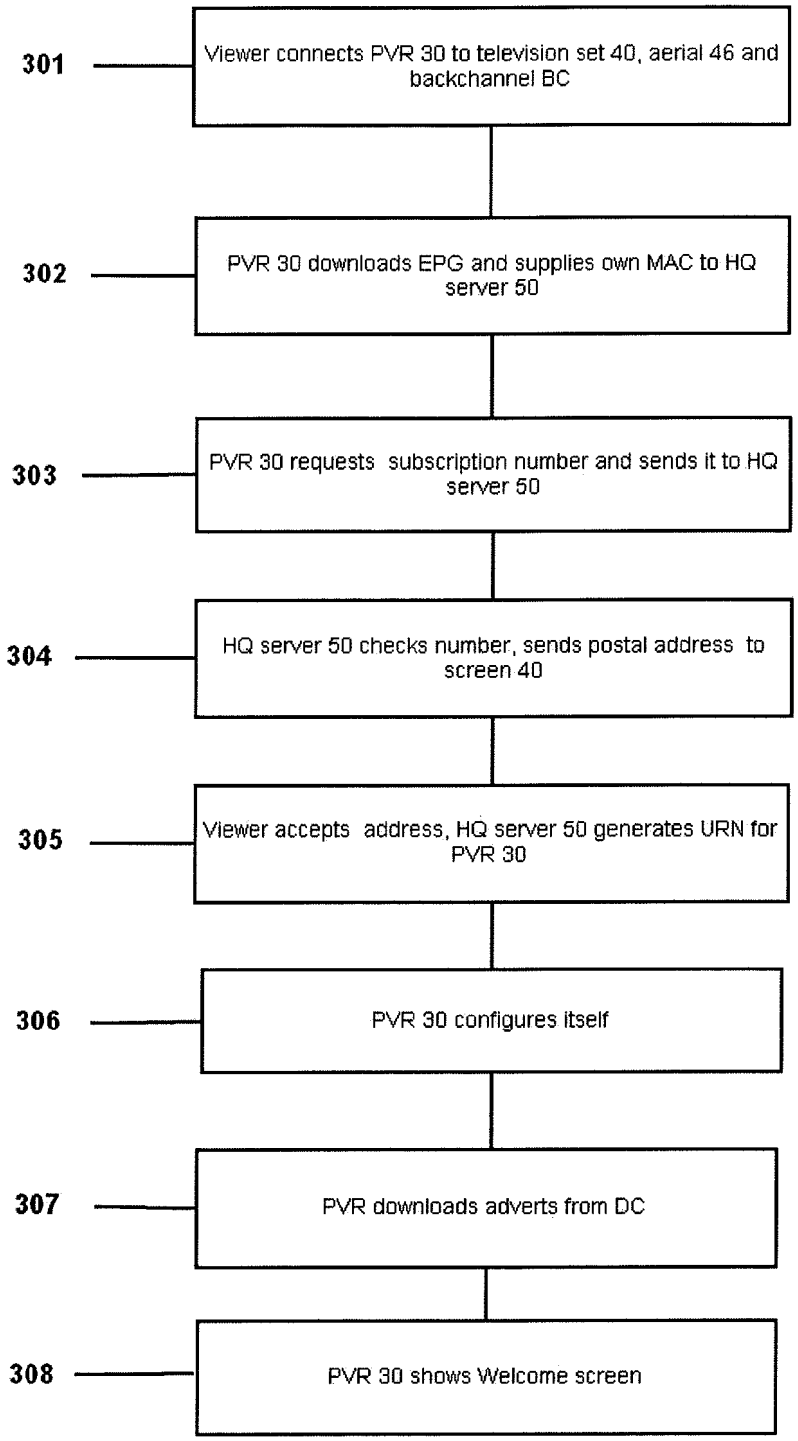
301
Viewer connects PVR 30 to television set 40, aerial 46 and backchannel BC
302
PVR 30 downloads EPG and supplies own MAC to HQ server 50
303
PVR 30 requests subscription number and sends it to HQ server 50
304
HQ server 50 checks number, sends postal address to screen 40
305
Viewer accepts address, HQ server 50 generates URN for PVR 30
306
PVR 30 configures itself
307
PVR downloads adverts from DC
308
PVR 30 shows Welcome screen

Figure 3

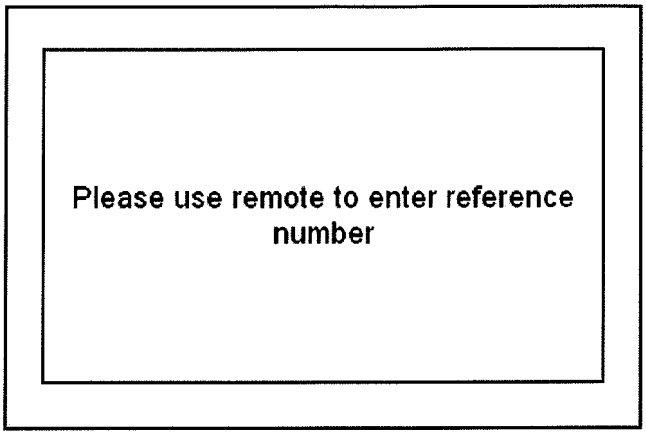

Figure 4A

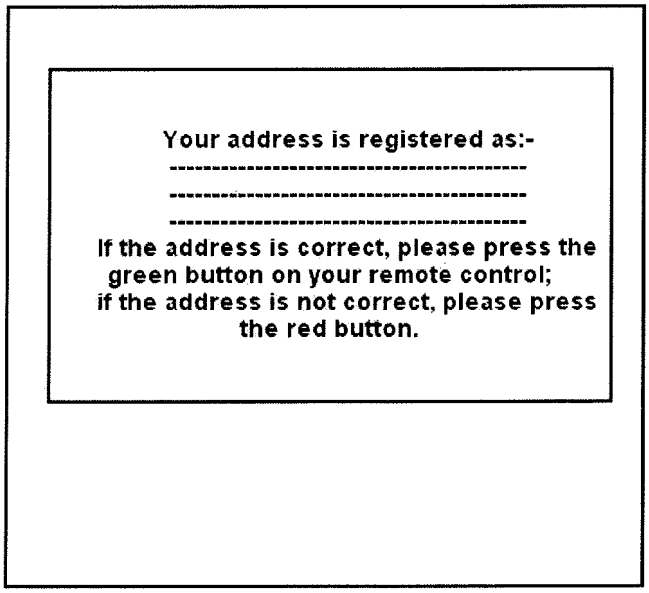

Figure 4B

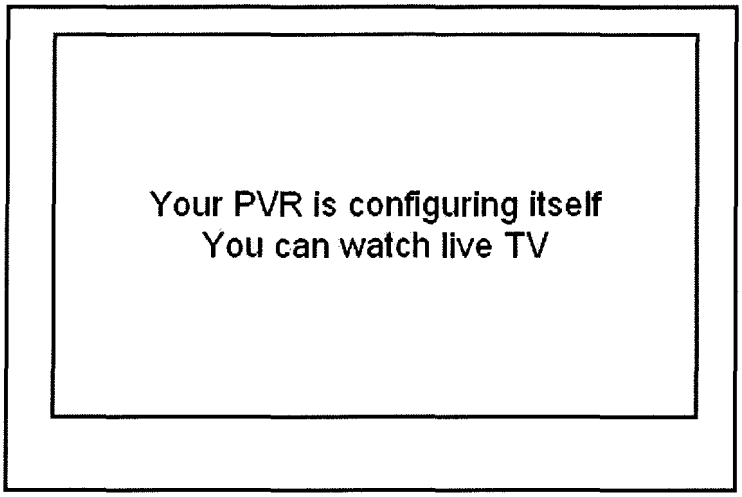

Figure 4C

Figure 5

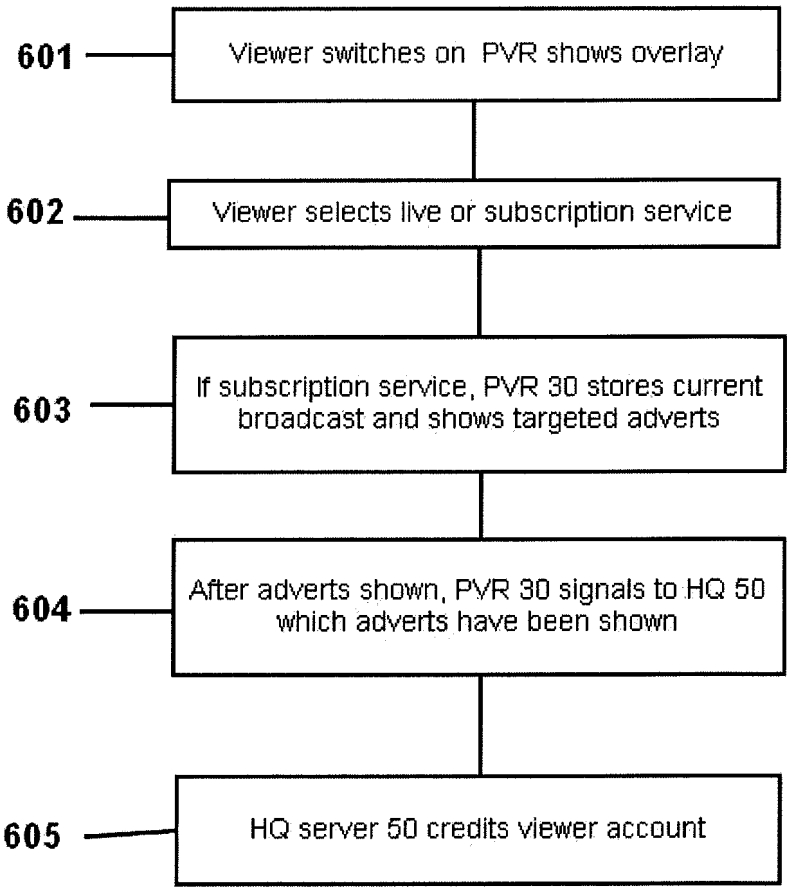
601
Viewer switches on PVR shows overlay
602
Viewer selects live or subscription service
603
If subscription service, PVR 30 stores current broadcast and shows targeted adverts
604
After adverts shown, PVR 30 signals to HQ 50 which adverts have been shown
605
HQ server 50 credits viewer account

Figure 6

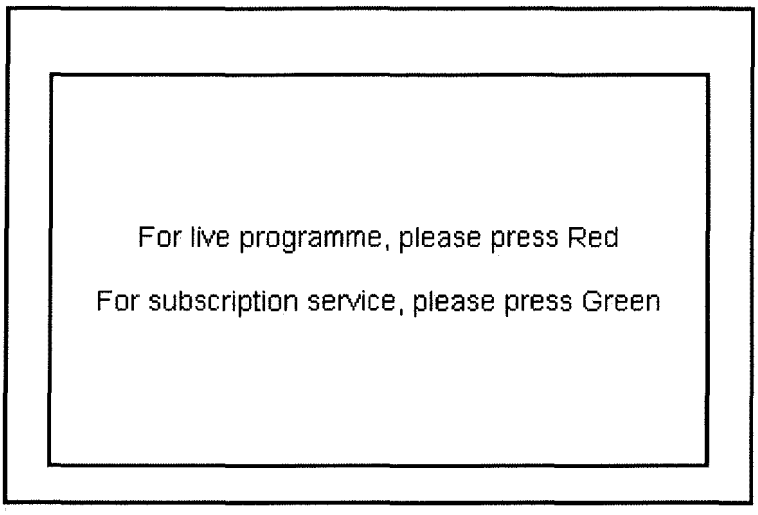

Figure 7

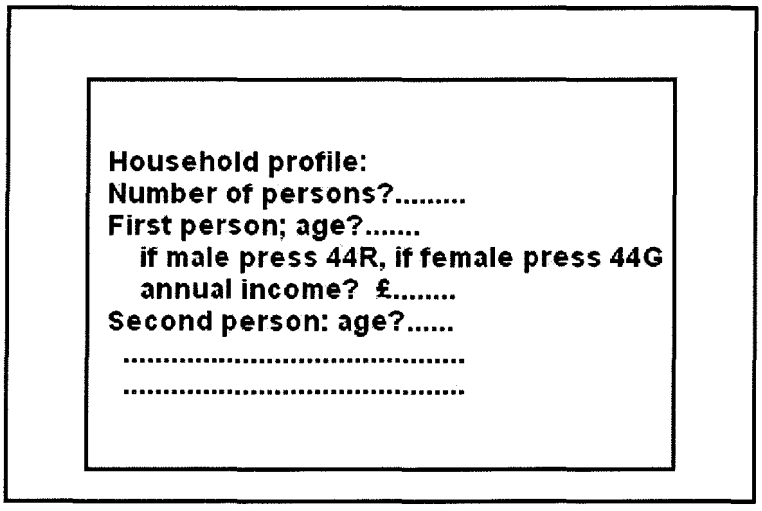

Figure 8

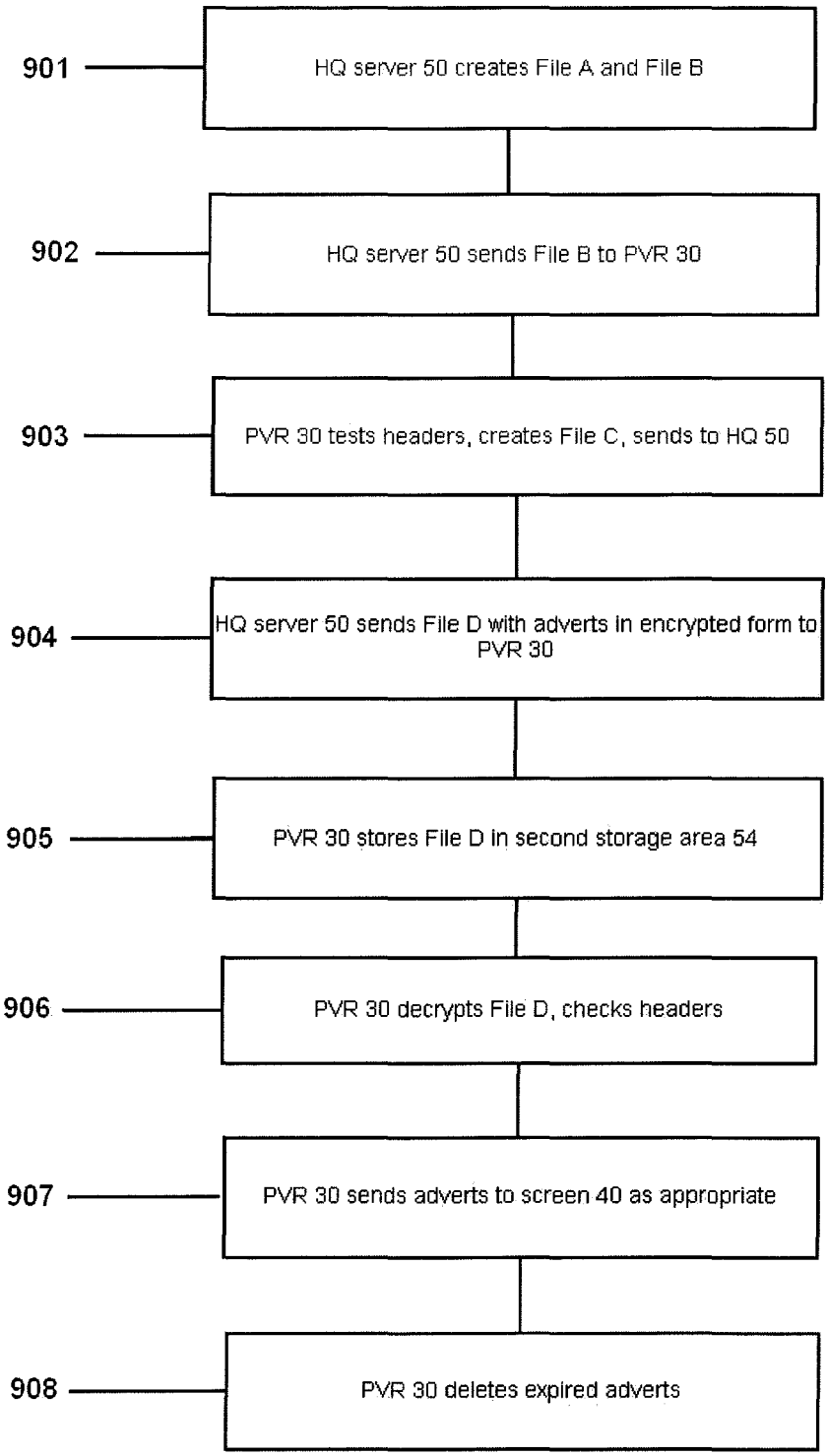
901
HQ server 50 creates File A and File B
902
HQ server 50 sends File B to PVR 30
903
PVR 30 tests headers, creates File C, sends to HQ 50
904
HQ server 50 sends File D with adverts in encrypted form to PVR 30
905
PVR 30 stores File D in second storage area 54
906
PVR 30 decrypts File D, checks headers
907
PVR 30 sends adverts to screen 40 as appropriate
908
PVR 30 deletes expired adverts

Figure 9

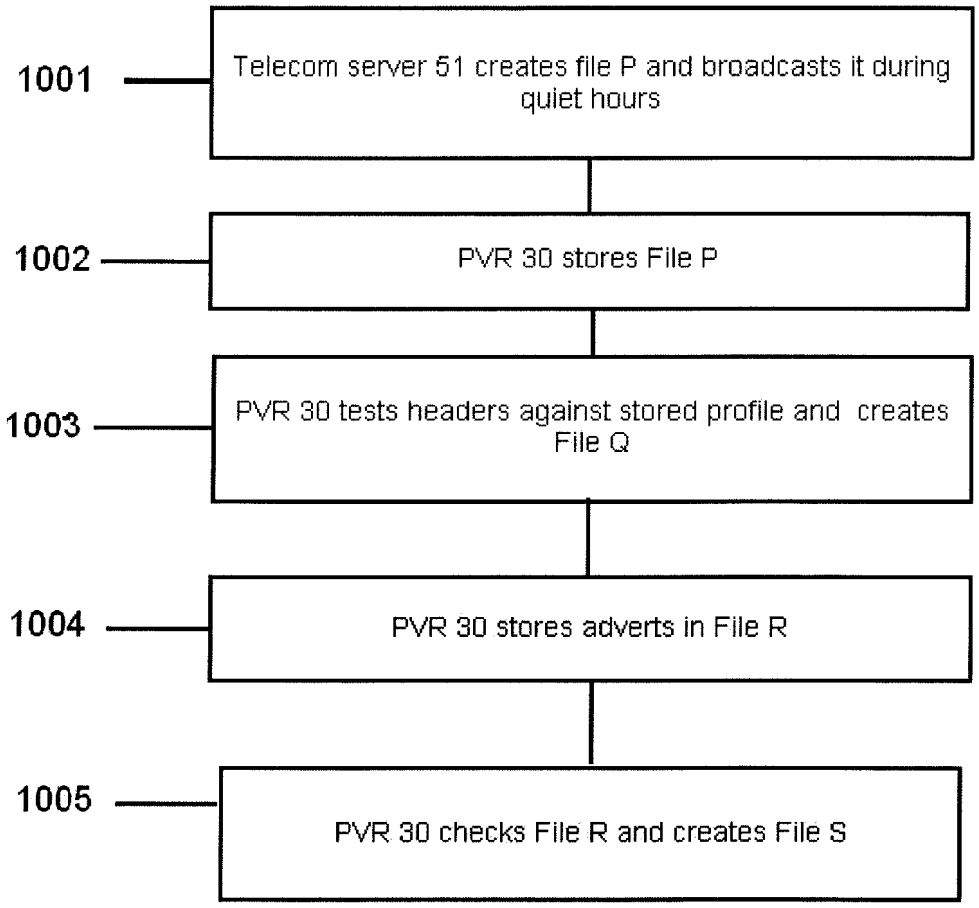
1001
Telecom server 51 creates file P and broadcasts it during quiet hours
1002
PVR 30 stores File P
1003
PVR 30 tests headers against stored profile and creates File Q
1004
PVR 30 stores adverts in File R
1005
PVR 30 checks File R and creates File S

Figure 10

The following terms are registered trademarks and should be read as such wherever they occur in this document:

WiFi
Arqiva

An improved PVR and a system for the provision of enhanced television services

BACKGROUND OF THE INVENTION

1. Technical Field

This invention relates to Personal Video Recorders (PVRs) which are purchased by viewers to convert digital broadcast audio and television signals for supply to the viewer's television set or visual display unit. The invention also relates to enhanced services which can be supplied using a PVR.

In this specification the term "broadcast" includes digital terrestrial television, satellite and one-way cable television services (ie cable which does not have a back-channel), and any other similar system.

2. Description of the Related Art

As shown in Figure 1, a known PVR 10 contains a computer-type hard disc 12 and twin signal decoders/tuners 14. The PVR 10 is controlled by a remote control 16, such as an infra red control, and supplies signals to the viewer's viewing station such as a television set or visual display unit 18. The PVR receives broadcast digital television and audio signals from an aerial 20 which may be a satellite dish

The remote control 16 allows the viewer to navigate through the received digital and audio broadcast channels, to call up an on-screen guide to current and forthcoming programmes, either for live viewing or for recording on the hard disc 12 for later viewing, and to set parental controls. The viewer can pause live television, schedule the recording of programmes into the hard disc 12, and watch one channel while viewing another by use of the twin decoders 14. The PVR may contain facilities to decrypt encrypted broadcasts, sometimes by use of a smart card authorisation device (not shown). The remote control 16 can be used to navigate through a series of menus, sub-menus and sub-sub-menus to

select TV and radio content for downloading for live viewing or for storage on the hard disc 12. The remote control has the conventional red and green buttons 16R, 16G, a pause button 16P and a fast forward button 16 FF.

The PVR incorporates a feature known as "chase play". A viewer can set the PVR to store a broadcast television programme in a buffer 22 in the hard disc 12, and can start to watch the stored programme before the entire programme has been broadcast. The viewer can fast forward through any advertisements included in the broadcast and through any parts of the programme which are not of interest, and can even catch up with the broadcast so as to watch the later parts of it live.

The known PVR also has a two-way backchannel connection, provided either by the Internet 24 or a modem 26. This permits the viewer to communicate with the broadcaster and others, for example to notify what programme is being or has been viewed, and which programmes are stored in the hard disc 12 for later viewing. Both the digital television signals and the backchannel carry very accurate time signals which can be used to synchronise the start or stop of the recording of programmes.

Additionally the broadcaster can send commands to the PVR 10 so that it records specific programmes and/or adverts using one of the twin decoders 14. Further, the broadcaster can "push" programmes and adverts directly into the PVR from the Internet 24. There is however concern that use of the backchannel allows information on the viewer's television viewing habits to be misused.

The providers of advertisements dislike the current practice of viewers "fast forwarding" through the adverts, and while it is technically possible to disable fast forward controls during advertisements, this is disliked by viewers.

A granted patent, GB 2464630, IncenTV Ltd, relates to use of a Set Top Box, (the precursor of a PVR, without the recording and "chase play" facilities) in a system for supplying targeted advertisements to viewers of video and audio services in which the privacy of personal characteristics provided by each viewer is protected by the use of pseudo identities, and by use of a deliberate mis-match to a controlled extent. The adverts are stored centrally. The programmes and adverts are viewed on a fully time-shifted basis. There is also disclosure of use of a television remote control to respond to advertisements, by pressing the red and green buttons. This indicates that the viewer is actually present and watching the advert.

In another co-pending patent application, WO2012/072999, Mr Alistair Kelman, there is disclosed the use of headers on advertisements which indicate the time of day at which that advert may/may not be shown, in accordance with local broadcast regulations, and of a PVR which checks the header and a real-time clock, and shows to the viewer of a time-shifted programme only advertisements which are permitted at the actual time of viewing.

It is an object of the present invention to provide an improved PVR which protects viewer privacy while permitting the provision of targeted advertising services. It is a further object to provide a PVR in which the viewer can select the option of being rewarded for watching adverts; such reward may be incremental contributions to the cost of a subscription broadcast service; such subscription broadcast service may be a service which does not include advertisements in its broadcast programmes. Alternatively such reward may be cash or cash equivalent payments being made to the viewer.

Brief Summary of the Invention

According to the invention, a Personal Video Recorder (PVR) for decoding digital transmitted signals for supply to a viewer's television set comprising; first

input connection means for connection to broadcast digital video and/or audio signals; output means for connection to a viewer's television set; control means to control operation of the television set; first data storage means for temporary storage of a broadcast programme; second data storage means for storage of targeted advertisements; private data storage means arranged to receive and to store a personal profile of the viewer; and a firewall arranged to prevent external access to data stored in the PVR.

Also according to the invention, in a broadcast television system to which a plurality of PVRs each under the control of an individual viewer are connected, a method of delivering targeted advertisements comprising the steps of:

each viewer storing a personal profile in their PVR behind a firewall which is arranged to prevent external access to data stored in the PVR;

storing, in a central processing means, a multiplicity of advertisements each with a header indicating a target personal profile of a target viewer;

broadcasting, by broadcasting means, the multiplicity of advertisements and headers; and

each PVR storing only the advertisements having headers which match the stored personal profile.

Brief Description of the drawings

The inventions will be described by way of example with reference to the accompanying drawings in which:-

Figure 2 illustrates a PVR according to the invention connected to a system permitting the supply of privacy–enhanced services in association with a chase-play facility;

Figure 3 illustrates the initial set-up of a PVR according to the invention;

Figures 4A, 4B and 4C illustrate screen displays during the set-up;

Figure 5 illustrates a Welcome Screen

Figure 6 is a flow chart illustrating how a viewer selects and uses a subscription service;

Figure 7 illustrates a screen display during such selection;

Figure 8 illustrates the collection of personal information;

Figure 9 is a flow chart illustrating a first method of delivering targeted advertisements to a PVR; and

Figure 10 is a flow chart illustrating a second method of delivering targeted advertisements to a PVR.

Detailed description of the preferred embodiment of a PVR

Figure 2 shows an enhanced PVR 30 containing a computer-style hard disc 32, and twin decoders 34. The PVR 30 supplies television and audio signals to a television set 40 and is controlled by a remote control 42 such as an IR control, which has buttons for the functions pause, 44P and fast forward 44 FF, and the conventional red and green buttons 44R, 44G. In addition there are blue and yellow buttons 44B, 44Y. The PVR is connected to an aerial 46 and to the two-way communication back-channel BC which may be provided by WiFi (RTM) or by a broadband service 26 or by a mobile telephone 27. Whatever the mode of delivery, the back-channel need only be of low capacity, for example around 1 kilobit per second (kbps).

In the enhanced PVR 30 the hard disc 32 is connected to the backchannel BC through a firewall 48, and as shown the backchannel is connected to a server 50 in the headquarters HQ of a subscription service provider.

The aerial 46 can receive three types of signal, which are supplied in a system according to the invention for providing an enhanced television service;

a) broad cast television signals TV, which are arranged to be received in and stored by a first storage area 52 of the PVR 30;

b) encrypted adverts EA, which are arranged to be received in and stored either by the first storage area 52 or by a second storage area 54 of the

PVR;

c) private data channel information DC, which may be stored either in the first storage area 52 or in the second storage area 54.

The encryption can be provided by any suitable technique. The first storage area 52 stores decrypted adverts as will be described below.

Figure 3: Initial set-up of the PVR

The viewer purchases the PVR 30 for use with a subscription service from an authorised supplier, and at step 301 the viewer or an authorised installer connects the PVR to the television set 40, plugs in the aerial 46, and enables the narrow backchannel BC through a WiFi (RTM) or cable broadband connection. In step 302 the PVR 30 downloads, via the aerial 46, an up to date copy of the local Electronic Programme Guide EPG which is broadcast by locally-available broadcasters, and also connects via the backchannel BC to the subscription service provider HQ, supplying its unique reference code or MAC (Media Access Control) which is built into the hardware, and the code is logged in the server HQ 50. Optionally the Internet Protocol address being used at the time of the connection is also provided; this allows control of copyrights in programmes and adverts, which may vary with the country of viewing.

In step 303 the PVR 30 presents on the television screen 40 a request for the viewer's subscription number; the screen is shown in **Figure 4A.** The viewer/installation technician is asked to enter the subscription number via the keypad of the remote control 42; for example, in the UK this may be the ten digit number of the viewer's annual Television Licence; still at step 303, when the number is entered, the PVR 30 sends the number to the HQ server 50. In step 304 the HQ server 50 enters the number into the Annual Television Licence database, which provides the postal address for that Licence. Still at step 304, HQ server 50 sends to the television 40 the registered address, and at step 305 the viewer accepts the address or request a correction. The relevant screen

display is shown in **Figure 4B**. (If the viewer does not have a TV Licence, a request for one may be made at this stage.) Also at step 305 the server 50 at the headquarters HQ generates a Unique Reference Number URN based on the MAC address, and the postcode associated with the Television Licence number. Alternatively the number may be the reference number of a fee-paying television service, or other subscription service reference number. Use of the IP address in the URN is also optional.

In a variation, the HQ server 50 requests the input of a mobile telephone number which it logs, and then sends to that mobile phone (not illustrated) a validation number which the viewer enters into the PVR 30 using the remote control 42.

In step 306 the PVR 30 puts on the television screen 40 information indicating that the PVR is configuring itself, as shown in **Figure 4C**. During the configuration process, the viewer can watch live broadcast television programmes, listed in the Electronic Programme Guide which was previously provided.

In step 307 the PVR makes a connection to the private data channel DC and downloads a small number of adverts suitable for display to any type of viewer.

In step 308 the PVR 40 displays on television 40 a message indicating that the subscription service is now available as shown in **Figure 5**.

Provision of Subscription Service with Lightly Targeted Advertisements

Once the subscription service is available, for the first time after the initial configuration of the PVR 30, and in future whenever the viewer switches on the television 40, the procedure shown in **Figure 6** is followed. In step 601 an overlay appears on the screen of television 40. Preferably the overlay is shown after a short delay, eg 15 seconds, to permit channel selection. The overlay

shows a message such as "If you wish to watch this programme live, press red button 44R; if you wish to watch via the subscription service with targeted advertisements, please press green button 44G"; a typical screen is shown in **Figure 7.** In step 602, if the viewer wishes to use the subscription service and see the lightly targeted adverts and so presses the green button, then at step 603 the PVR 30 begins to store the currently selected broadcast programme in the first storage area 52, (ie the broadcast is paused and the chase-play facility is initiated), and shows one or more adverts stored in storage area 52 on the television screen 40.

Since the postcode of the viewer has been stored in the HQ server 50 of the subscription service provider, some initial approximate targeting of advertisements is possible, using public database information. For example, in the UK a database known as ACORN (A Classification Of Residential Neighbourhoods) divides viewer households into five categories, 17 groups and 56 types, depending on post code. For example, the likely income of the viewer can be inferred and adverts targeted on that income selected for supply to the television 40. Thus some targeting of adverts is possible with minimal/no loss of privacy.

If a viewer has chosen to watch lightly targeted advertisements then in step 604 at the end of the advertising break the PVR 30 sends a signal over the back channel BC to the subscription service HQ server 50, indicating which adverts have been displayed, by use of the Unique Reference Code (see Table 1 below) of each advert. In step 605 the viewer's account is credited with an increment. The use of this credit will be described later. The PVR now provides to the television 40 the stored broadcast programme from the point at which it was paused

The stored adverts in the first storage area 52 may be displayed immediately the viewer indicates that subscription service viewing, with adverts, is selected,

and/or at selected intervals during a programme, for example every 15 minutes for a 2 minute duration; this is the conventional timing in commercial television programmes. The choice may be programmed into the PVR 40 by the viewer. The targeted adverts may be programmed to coincide with the advertisement breaks in the broadcast programme, or with the showing of a trailer in a broadcast programme which does not carry adverts.

When the subscription service television programme itself includes general advertisements, the targeted adverts can be arranged to replace the general advertisements, and to be shown at the same frequency and for the same duration. The viewer would have the option of fast-forwarding through the general advertisements, because the chase-play facility is in operation.

As an alternative, the viewer may choose to watch more adverts than are conventionally inserted into a programme, and thus gain more credits. In one arrangement, a predetermined period after an advertising break has ended, eg eight minutes, an indicator on the screen such as a blue dot at a top corner shows that further adverts are available for viewing; the viewer indicates a wish to see them by pressing blue button 44B on the remote 42, and the PVR 30 connects the adverts, If the viewer does not want to watch additional adverts, the dot is ignored.

After the initial set up of the PVR 30 after purchase, an upgraded service may be made available to the viewer. The PVR 30 may also be provided with high definition adverts.

As set out above, the minimum of information about the viewer who purchases and connects a PVR 30 includes the viewer's postcode and subscription service number/annual TV Licence number. Viewer privacy is thus preserved. However, the viewer will then probably be shown a number of adverts during subscription service viewing which are a poor match to viewer interests.

Highly targeted adverts

An optional but important feature of a PVR 30 according to the invention is that the viewer can store in the PVR additional personal information which will permit highly targeted adverts while preserving privacy completely. The viewer may store information such as the number of adults and of children in the household and their ages, their interests, their ethnicity, the language they normally speak, and other sensitive details, together constituting personal profiles of members in the household.

This information is input to the PVR 30 using the remote 42, so the questions are formulated so that they can be answered by use solely of buttons on the remote; a keyboard is not required. A typical screen is shown in **Figure 8**. For example, the sex of each person in the household can be entered by pressing red button 44R for a male occupant and green button 44G for a female occupant. Income per year or per month can be entered, using the buttons numbered 0 to 9. To enter the interests of the household and the language they speak, the screen is arranged to display a list of interests or a list of languages, and the viewer can be asked to use the conventional Programme Scan up and down buttons to navigate through it, and a button such as yellow button 44Y to select and record in the PVR 30 an interest or language.

Since the two-way communication with the service headquarters HQ via the back channel BC is protected by the firewall 48, such information cannot be accessed by the subscription service supplier or any other external contact. However, headers associated with each advert stored in the first storage area 52 allow adverts to be selected by the PVR 30 for supply to the television 40 which are targeted on personal profiles which match at least one profile stored in the PVR.

Such headers are well known in the art. Each header specifies the properties of the advert and its target audience. The Field Names in each header are listed

in Table 1 below.

Table 1

Field Name	Comments
Unique Advert Identifier	Unique number universally used to identify this particular advertisement
Length	Length of advert in milliseconds
Audience Classifier	ACORN code from 1 to 56 which identifies the demographic to which the advert is addressed. This field lists all Household Classifier codes acceptable to the advertiser
Household Classifier	Code identifying the number of adults and children and their ages and sexes in the household. This field lists all Household Classifier codes acceptable to the advertiser
Language	Code to identify the language of the advert
Advert type	Code to identify the type of advert, eg financial services. food, clothing etc
Start Date	Earliest date the advert can be shown to a viewer
End Date	Date on which advert should be retired
Number of Showings	Number of times the advert is to be shown to a viewer before being retired

Channels Identifier	Code to identify the channels on which the advert can be shown

The associated comments are mainly self-explanatory. Advert Type is included because some adverts, eg those for alcohol, are legally not permitted to be shown before certain times of day; this time restriction is applied by the PVR 30 which reads the actual time of day from the real-time clock signal conventionally provided on the backchannel BC, and does not show the advertisement to the viewer if viewing of it is not permitted at the actual time of day. The Channels Identifier is required for geographical locations having multi-channel services.

The Household Classifier is a code (which may be left blank if the advert is aimed at all ages and sexes) that enables the advertiser to specify the make-up in ages and sexes of the households to match a defined profile. For example a Household Classifier code may mean that the household consists of two adults, one male between 22 and 30 and the other female between 18 and 21, and no children. Another Household Classifier code may mean that the household consists of one female adult aged between 50 and 60 years. Advertisers put a series of Household Classifiers in this field to cover the types of households at which the advert is targeted.

Preferably the adverts supplied via the aerial 46 to the second storage area 54 of the hard disc in the PVR 40 are in encrypted form so that adverts are not publicly disclosed before a date predetermined by an advertiser. Each advert header will contain a date after which an encrypted advert may be decrypted by the PVR 40 and then stored in the second storage area 52.

Loading a PVR with highly targeted adverts - overview

For efficient use of broadcast channel capacity, the system according to the invention may utilise three types of signals received via aerial 46, at different times of day, depending on bandwidth requirements.

The broadcast television services, from one or more channels, which may be fee-paying or public broadcast services or a one-way cable service, are indicated as reference TV in Fig 2, and these service are received by the aerial 46 at the normal times of such broadcasts.

The encrypted high definition adverts EA received by the aerial 46 are high volume and require high bandwidth; they are conveniently broadcast during the night time quiet hours, eg 4am to 6am.

The private data channel DC broadcasts three different types of signal and all three are received by the aerial 46;

a) a carousel of low definition adverts is broadcast repeatedly so that newly purchased PVRs according to the invention can be configured at any time of day or night; the low volume, low bandwidth signal does not need special treatment; the duration of each carousel may for example be 30 minutes;

b) at a regular time of night, which is programmed into the PVR 30, there is a broadcast of an encrypted list of adverts which are to be broadcast in full (EA) the following night;

c) during the quiet hours, there is a broadcast of an encrypted "playlist" of adverts to be played the following day; this list need not be regional but can be country-wide; since an early position in the list will be desirable to advertisers, they may be willing to pay a premium for such a position.

The format of the headers for broadcast b) above is similar to that in Table 1 except that there is an additional Field Name of "Position in Broadcast", which indicates the time in milliseconds from the start of the broadcast of HD adverts.

The Advert Footprint identifies geographical locations which may, for example, match the postcodes codes of regional television channels.

The format of the headers in broadcast c) above is as shown in Table 1, , with the addition of a Field having a Code to indicate a time of day when the advert may/may not be shown.

Detailed loading of a PVR, first option – Figure 9

Since the payload of adverts is high, one way to reduce the call on bandwidth while loading the PVR 30 with adverts highly targeted to the viewer is shown in figure 9.

In step 901, the HQ server 50 creates File A of all adverts which are available for current showing, and then creates a subfile, File B, which includes only the headers of those adverts and not the adverts themselves.

In step 902 the server 50 broadcasts File B to the PVR 30 over the data channel DC.

In step 903 the PVR 30 tests the headers in File B against the personal profile(s) entered by the viewer, and creates File C which includes only the headers which match the profile(s). File C is sent to the HQ server 50 via the data channel DC.

In step 904, the server 50 creates File D, which includes the adverts, in encrypted form, whose headers are in File C, and sends it to PVR 30 via the data channel DC. The PVR stores the encrypted adverts and their headers in the second storage area 54 in Step 905.

In step 906, the PVR 30 decrypts File D, and checks the headers for showing instructions, such as whether the advert can be shown before certain times of day; some adverts can be shown after 6pm and others only after 9pm, eg adverts relating to alcoholic drinks. The decrypted adverts are stored in the hard

disc 32.

In step 907, the PVR sends adverts to the television screen 40 at appropriate actual times of day, while the viewer is watching subscription service television with chase-play in operation. The date and time the programme was originally broadcast is not relevant.

In step 908 the PVR deletes adverts which have reached their expiry date.

Detailed loading of a PVR, second option – Figure 10

In this alternative arrangement, the adverts are delivered by a general telecommunications network and service provider such as Arqiva (RTM).

In step 1001, the telecommunications provider server 51 (not shown) creates File P which includes all adverts in encrypted form which are current for showing to viewers. This file is broadcast over the channel TV during the quiet hours, eg between 4am and 6am.

In step 1002 the PVR stores File P on its hard disc in the first storage area 52.

In step 1003, the PVR tests the header of each advert in File P against the viewer's stored profile, and when there is a match, the header is put into File Q. All other headers and adverts are deleted.

In step 1004, the PVR 30 stores the encrypted adverts with headers in File Q in the second storage area 54 as File R.

In step 1005, the PVR checks the headers of each advert in File R for showing instructions. If the advert is not yet available for showing, it is passed over; if it is available, it is stored in File S in decrypted form for showing to the viewer as the subscription service during chase-play operation.

The personal data stored in the PVR 30 by the viewer is used by the PVR to generate its "personal" play list; adverts are selected and shown to the viewer which are appropriate to the viewer, so that the irritation caused by inappropriate adverts is minimised; that is, the adverts are highly targeted. The personal data is protected by the firewall 48 and is inaccessible to any outside contact.

The advantage for advertisers is that, after a given period to allow accumulation of data, they can then be informed by the HQ server that a particular advert has been shown a defined number of times to viewers who say they match the profile set in the advert header. Such information allows advertisers to judge the effectiveness of that advert.

Since the HQ server 50 knows which adverts have been shown to viewers, feedback to individual advertisers can be given for them to monitor the effectiveness of each advert, for example on a regional basis, or over a television broadcasting area, but without the need to identify any individual viewer. Indeed such identification is impossible. Viewer privacy is thus maintained.

A further advantage to advertisers is that a randomised trial is possible in which different version of an advert can be sent to a number of households in the same socio-economic group. The advertiser selects the target Audience Classifier and Household Classifier Field Names from Table 1, and determines how large a sample is needed, for example 500 households for each of two different adverts. The adverts are supplied, and from the responses from viewers, the effectiveness of each advert can be evaluated. Privacy of each viewer is preserved as before.

To retain the randomness, the different versions can be allocated to viewer on a truly random factor, such as whether the MAC code (which is sent to the service

provider HQ when a new PVR is being registered) is an odd or even number. Two different adverts can be allocated on that basis, by use of an additional header in Table 1. The additional header is arrange to block showing of the broadcast advert on odd-numbered PVRs, but is inactive on even numbered PVRs. If three or more adverts are to be included in a randomised trial, then the final digits 0 to 9 of the MAC code can be used to block or permit showing of the different adverts.

The credits generated by watching the adverts can be used in many ways. In one example, the credit can be used towards payment of the annual fee of the subscription service. In a variation, instead of increments towards a subscription service, the system may be arranged to make additional offers, such as contributions towards a mobile telephone bill, or loyalty vouchers. The viewer will make the appropriate choice in setting up the PVR and may alter the choice at any time. This choice will be confirmed in a message from the server 50 via the back channel BC.

The adverts can be interactive, requiring the viewer to press a button such as blue button 44B on the remote 42; this permits the viewer to indicate interest in a product, such as a "Money Off " offer for a local shop or café, when a voucher can be delivered to a mobile telephone registered in the subscription service HQ 50 by that viewer by entering its number via the PVR. From the point of view of the advertiser, it shows that the viewer has actually watched the advert, as disclosed in GB 2464630.

The PVRs are arranged so that the viewer can update the stored personal data at any time. HQ server 50 has no access to the stored profile of any viewer. The viewer selects the personal information stored in the PVR, but it is to the viewer's advantage to ensure that this information is accurate so that adverts can be correctly targeted. Of course, if a viewer chooses to store incorrect information about the household, the PVR will

match the incorrect profile.

Viewing without adverts

If at step 602 the viewer does not select the subscription service, then just before the conventional advertising break 13 minutes into a broadcast programme, the viewer will be given a reminder of the availability of the service, eg by showing a blue dot at a corner of the television screen. This indicates to the viewer that in two minutes an opportunity to watch targeted adverts will again be available. If the viewer presses a key on the remote control 42, such a blue key 44B, the broadcast programme is paused and stored as described above. The viewer can now watch targeted adverts. Alternatively the viewer can fast forward through the programme stored in the buffer, and can fast forward through any adverts embedded in the programme – and can even reach the end of the broadcast programme at no later a time than the actual broadcast. The viewer is always in control of what is shown on television 40.

General

While the invention has been described with respect to replacing broadcast adverts with targeted adverts, targeted adverts can also be viewed during a broadcast without adverts such as a BBC broadcast, by use of the conventional Chase Play facility.

While the invention has been described with reference to a viewer having a broadband connection, in an alternative, the authorized supplier of the PVR 30 also supplies a USB data-only mobile dongle which, when plugged into a USB port on the PVR 30 will link to a service plan provided by a mobile telephone supplier. The viewer can configure the PVR 30 as before. A similar process can make use of a mobile WiFi (RTM) hotspot in the home.

CLAIMS

1. A Personal Video Recorder (PVR) for decoding digital transmitted signals for supply to a viewer's television set comprising; first input connection means for connection to broadcast digital video and/or audio signals; output means for connection to a viewer's television set; control means to control operation of the television set; first data storage means for temporary storage of a broadcast programme; second data storage means for storage of targeted advertisements; private data storage means arranged to receive from the viewer and to store a personal profile of the viewer; and a firewall arranged to prevent external access to stored personal data.

2. A PVR according to claim 1 further comprising processing means to compare headers in broadcast targeted advertisements with the stored personal profile and to store in the second data storage means only advertisements for which a match is found.

3. A system for supplying targeted advertisements to a plurality of viewers each having a PVR according to claim 1 or claim 2 comprising:

central storage means to store a multiplicity of advertisements each having a header indicating a target personal profile of a target viewer; and

broadcast means to broadcast advertisements to the PVRs .

4. A system according to claim 3 in which the broadcast means comprises:

first central processing means to prepare for broadcast a first header file containing only the headers of the multiplicity of advertisements;

each PVR comprising processing means arranged:

a) to select from the headers those which match the personal profile stored in that PVR;

b) to prepare a second header file containing the selected headers; and

c) to transmit the second file to the central processing means;

central receiving means to receive from each PVR a second header file; and

second central processing means to prepare and transmit to individual PVRs third targeted advertisement files each containing the advertisements associated with the selected headers in the second header files from that PVR.

5. A system according to claim 3 in which the broadcast means comprises:

central broadcast means to broadcast said multiplicity advertisements with their respective headers;

each PVR comprising processing means arranged:

a) to receive said broadcast and to store the advertisements and headers in temporary storage;

b) to check the headers against the stored personal profile and to select those headers which provide a match;

c) to store selected headers and their associated advertisements in second data storage means and

d) to delete all other headers and advertisements.

6. In a broadcast television system to which a plurality of PVRs each under the control of an individual viewer are connected, a method of delivering targeted advertisements comprising the steps of:

each viewer storing a personal profile in their PVR behind a firewall which is arranged to prevent external access to data stored in the PVR;

storing, in a central processing means, a multiplicity of advertisements each with a header indicating a target personal profile of a target viewer;

broadcasting, by broadcasting means, the multiplicity of advertisements and headers; and

each PVR storing only the advertisements having headers which match the stored personal profile.

7. A method according to claim 6 comprising the steps of:

the broadcasting means broadcasting a first file containing only the

headers of the stored advertisements;

each PVR selecting from the first file the headers which match the personal profile stored behind its firewall, preparing a second file of selected headers, and sending the second file to the central processing means;

the central processing means preparing a third file of selected headers and their associated advertisements for every PVR second file and sending each said third file to the relevant PVR; and

each PVR receiving a third file and storing the advertisements and headers.

8. A method according to claim 6 comprising the steps of:

a) the broadcasting means broadcasting a file of all stored advertisements and their headers;

b) each PVR receiving the broadcast file and storing it in first, temporary storage means;

c) each PVR comparing the header of each advertisement with the personal details stored behind its firewall;

d) each PVR storing in second data storage means only advertisements having headers which match the stored personal details; and

e) each PVR deleting all other advertisements and headers from the temporary storage means.

9. A method according to claim 8 in which the file of advertisements and headers is broadcast during quiet night-time hours.

10. A method according to any one of claims 6 to 9 further comprising a method of generating credits comprising the steps of:

a viewer indicating to his PVR that he is willing to watch targeted adverts in association with a live broadcast television programme;

the PVR pausing the television broadcast, recording it temporarily in first data storage means, and showing targeted adverts stored within the PVR to said viewer for a preselected period;

the PVR showing said viewer the television broadcast from the time it was paused, and sending a signal to a central credit recording means to indicate that said viewer has been shown the targeted adverts; and

the central credit recording means recording an incremental credit for said viewer.

11. A method according to claim 10 in which the television broadcast does not include adverts, and the PVR is arranged to show the targeted adverts to the viewer for a preselected period.

12. A method according to claim 11 in which the PVR is arranged to show the targeted adverts at the beginning of a broadcast and at intervals during a broadcast.

13. A method according to claim 10 in which the television broadcast includes adverts and said viewer's PVR is configured so that the targeted adverts are shown to the viewer during the period corresponding to the broadcast adverts.

14. A method according to any one of claims 10 to 13 comprising the further step of said viewer providing an indication to the PVR that he is present when the selected adverts are being shown.

15. A method according to any one of claims 6 to 14 in which the targeted adverts are encrypted by the central processing means before sending to the PVRs, and are decrypted by each PVR before showing to the viewer.

16. A PVR substantially as described with reference to Figure 2 of the accompanying drawings.

17. A method of delivering targeted advertisements substantially as described with reference to Figures 3 to 10 of the accompanying drawings.