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(54) PROMOTION SERVER USING STREAMING MEDIA CHANNEL

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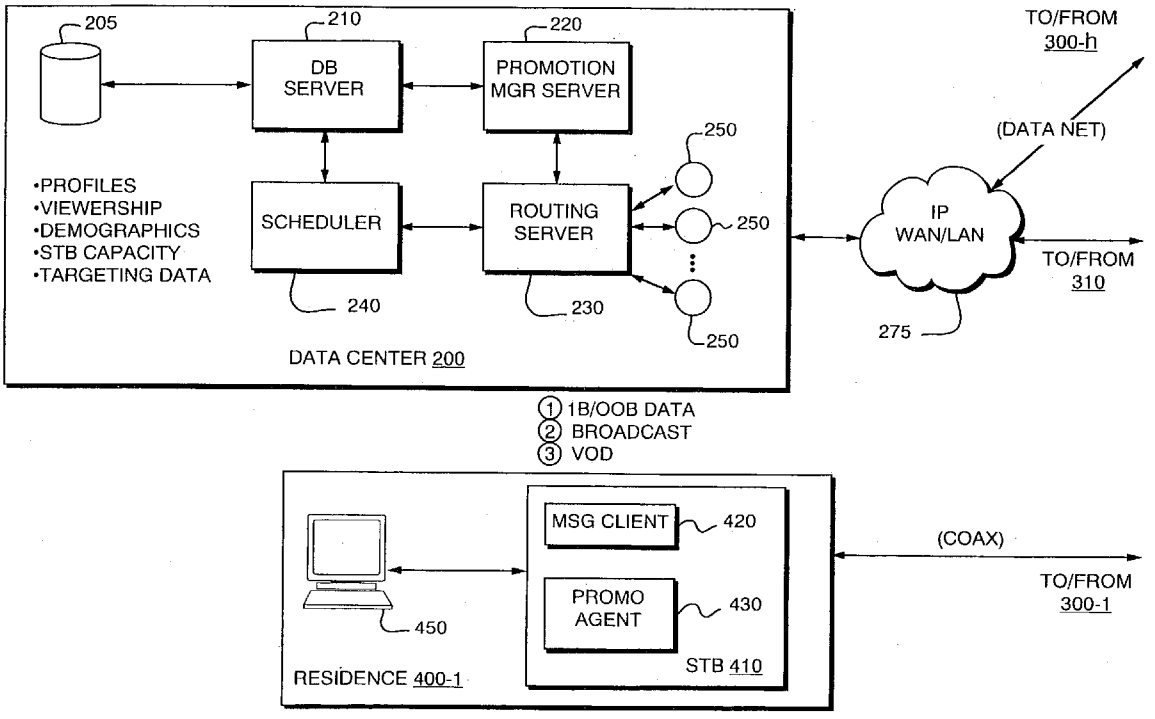
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(57) **ABSTRACT**

Idle video-on-demand (VOD) and/or other streaming media channel capacity is used to deliver promotional content to selected set-top boxes (STBs) in a cable television network. Commercial segment cues are used to instruct a set-top box to switch away from a broadcast program to the streaming media channel during a commercial segment, and then switch back again to the original broadcast program at the end of the segment.

More particularly, a promotion server determines an asset to be distributed such as a targeted promotion item (e.g., a commercial), and a list of STBs that are to receive it. The promotion server causes the video promotion content to be stored in VOD/streaming media servers located at the head ends. A scheduler process then delivers schedule messages to head end message servers which identify each promotion asset, and an STB which is to receive it. The head end message server notifies its associated VOD/streaming media server which then cues the asset by loading the asset, starting the asset, but pausing it. Prior to the occurrence of a commercial slot in a broadcast program, an asset trigger is inserted into the broadcast stream at the head end. This asset trigger contains general information concerning the asset to be sent, and an idle VOD/streaming media channel number. The STB receives the asset trigger and readies itself to tune to the VOD/streaming media channel when cued for at the beginning of a commercial segment, but does not yet tune to the VOD/streaming media channel. Upon detection of a commercial cue tone in the broadcast channel, the head end message server sends a tune away trigger to the STB, and also instructs the VOD/streaming media server to start playing the cued promotion. When the STB receives a tune away trigger, it switches from the broadcast channel being played to the selected idle VOD/streaming media channel, and the promotion is viewed.



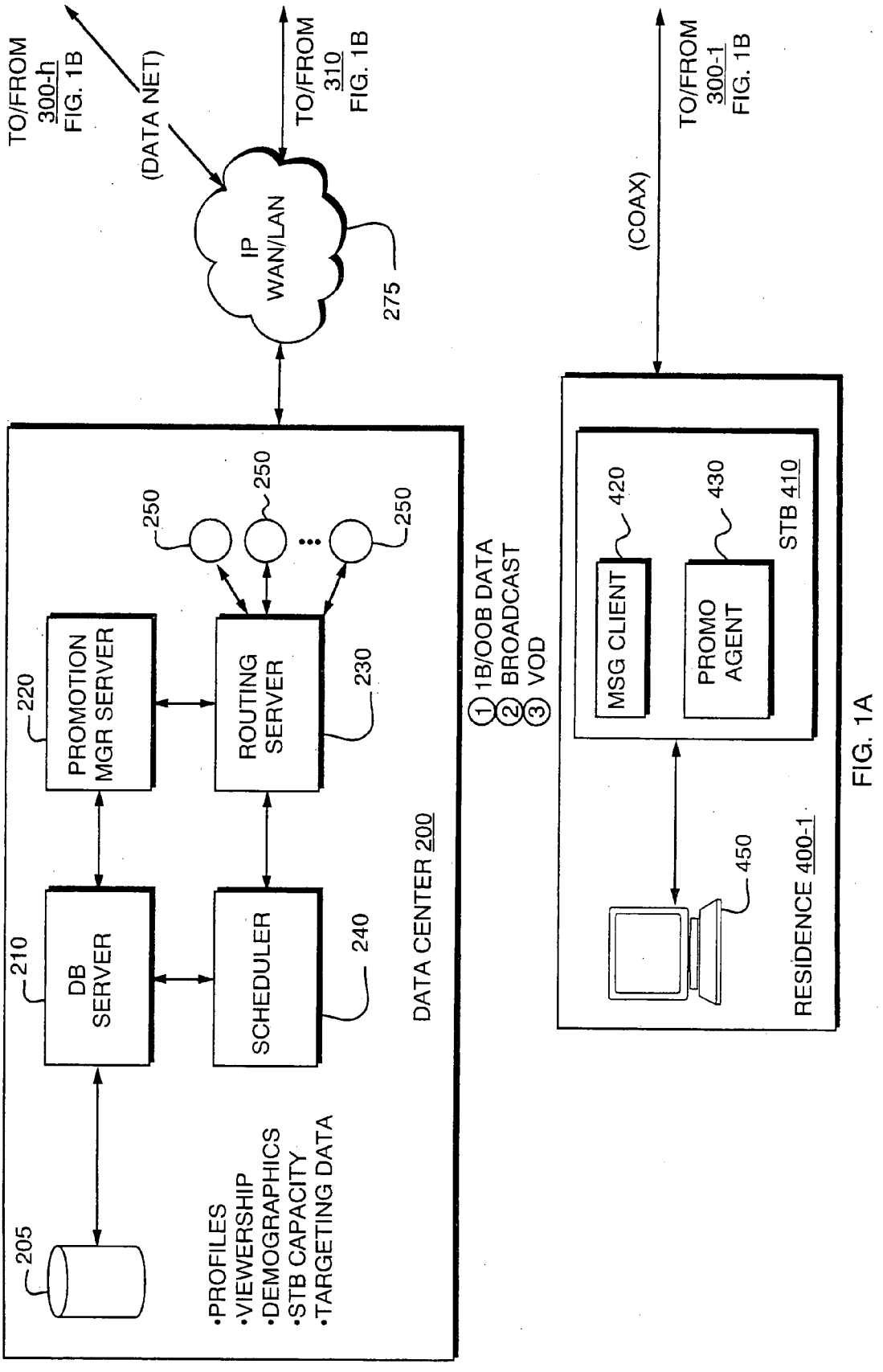

TO/FROM 300-h FIG. 1B
(DATA NET)
TO/FROM 310 FIG. 1B
IP WAN/LAN
275
(COAX)
TO/FROM 300-1 FIG. 1B
250
250
250
PROMOTION MGR SERVER
220
ROUTING SERVER
230
1 1B/OOB DATA
2 BROADCAST
3 VOD
MSG CLIENT
420
PROMO AGENT
430
STB 410
DB SERVER
210
SCHEDULER
240
DATA CENTER 200
205
•PROFILES
•VIEWERSHIP
•DEMOGRAPHICS
•STB CAPACITY
•TARGETING DATA
450
RESIDENCE 400-1

FIG. 1A

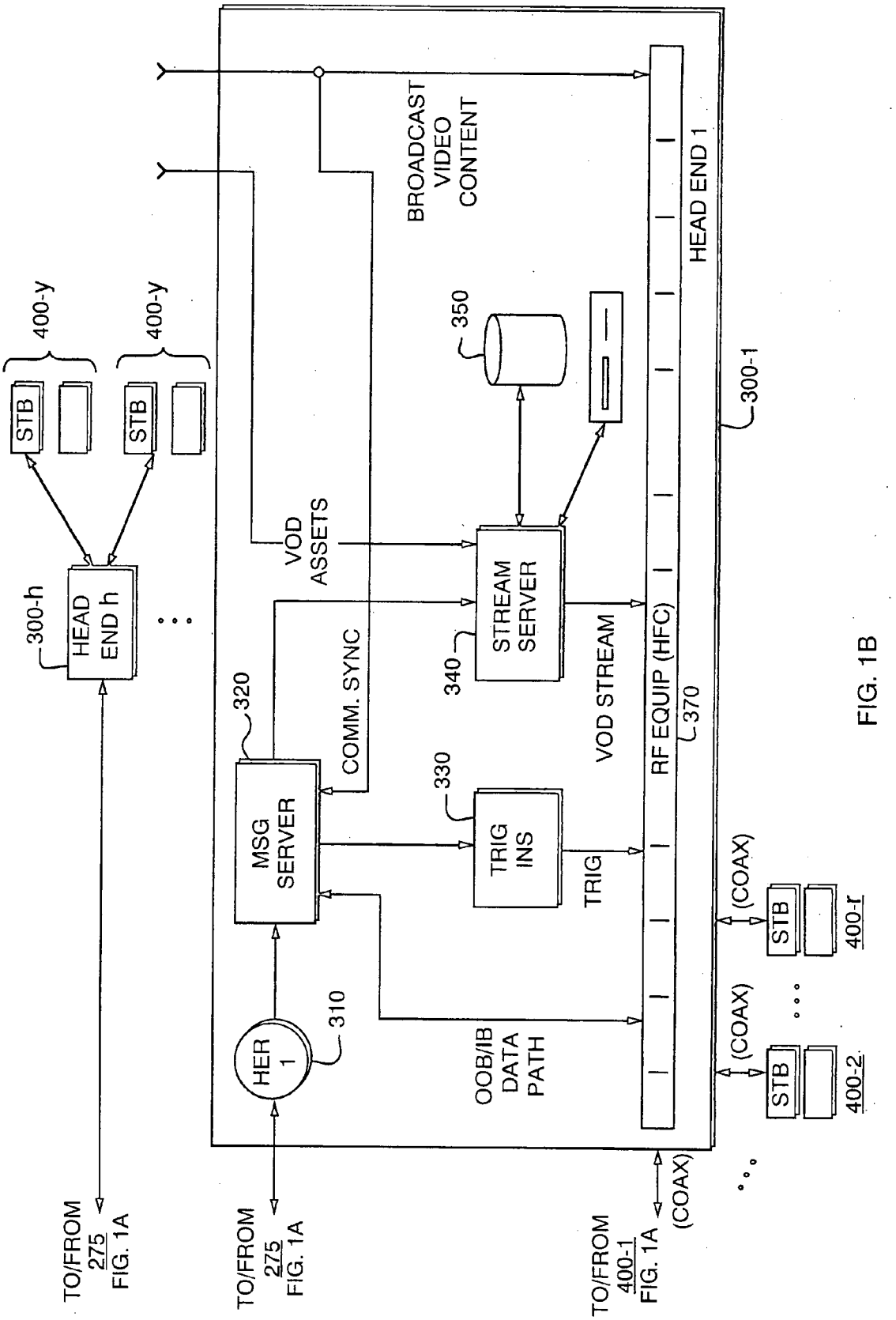

HEAD END 1
300-1
BROADCAST VIDEO CONTENT
350
VOD ASSETS
STREAM SERVER
340
VOD STREAM
RF EQUIP (HFC)
370
COMM. SYNC
MSG SERVER
320
TRIG INS
330
TRIG
HER 1
310
OOB/IB DATA PATH
HEAD END h
300-h
400-y
400-y
STB
STB
(COAX)
(COAX)
(COAX)
STB
STB
400-2
400-r
TO/FROM 275 FIG. 1A
TO/FROM 275 FIG. 1A
TO/FROM 400-1 FIG. 1A

FIG. 1B

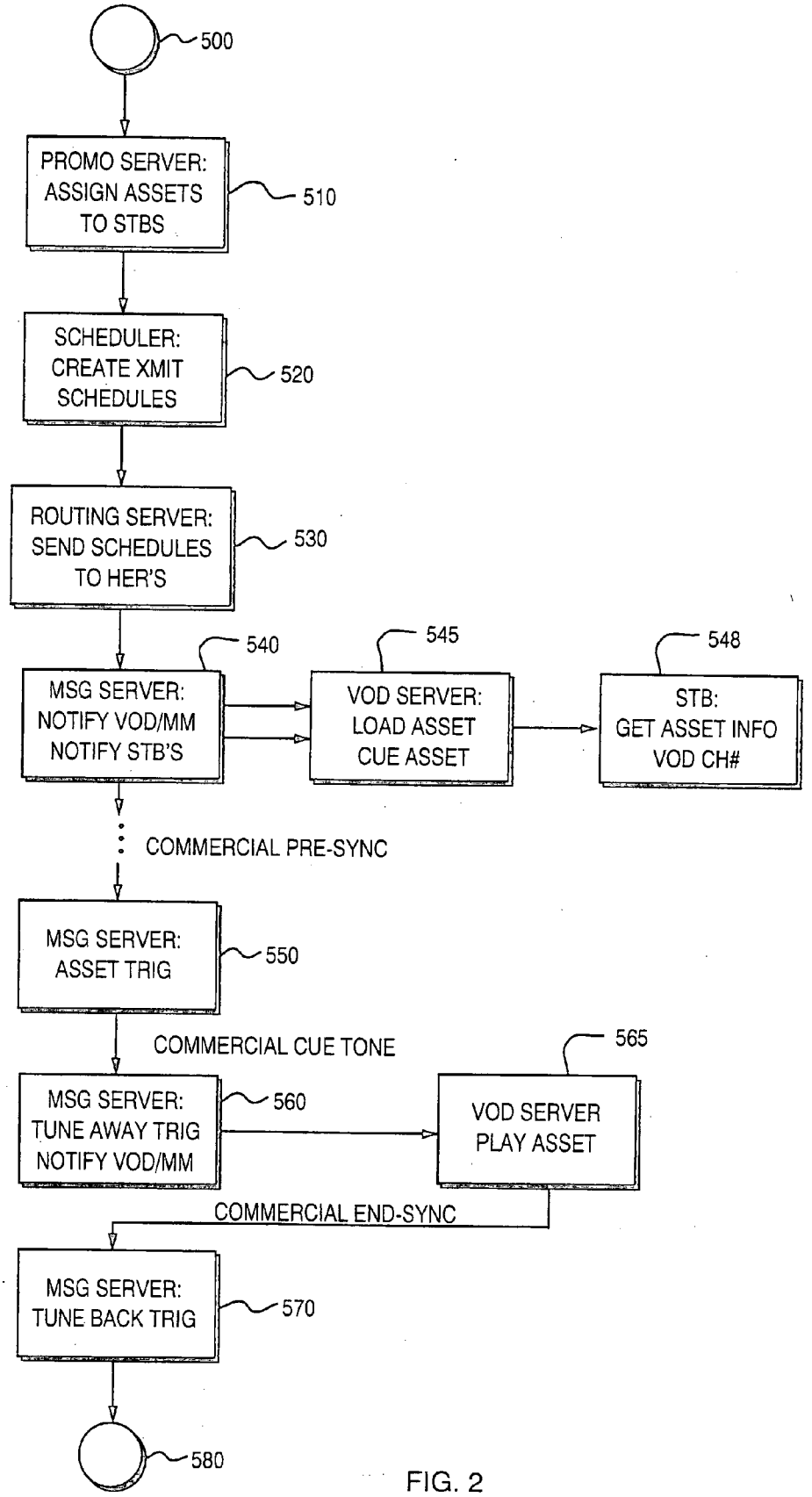

500
PROMO SERVER: ASSIGN ASSETS TO STBS
510
SCHEDULER: CREATE XMIT SCHEDULES
520
ROUTING SERVER: SEND SCHEDULES TO HER'S
530
540
MSG SERVER: NOTIFY VOD/MM NOTIFY STB'S
545
VOD SERVER: LOAD ASSET CUE ASSET
548
STB: GET ASSET INFO VOD CH#
COMMERCIAL PRE-SYNC
MSG SERVER: ASSET TRIG
550
COMMERCIAL CUE TONE
565
MSG SERVER: TUNE AWAY TRIG NOTIFY VOD/MM
560
VOD SERVER PLAY ASSET
COMMERCIAL END-SYNC
MSG SERVER: TUNE BACK TRIG
570
580

FIG. 2

PROMOTION SERVER USING STREAMING MEDIA CHANNEL

RELATED APPLICATION(S)

[0001] This application is a continuation of U.S. application Ser. No. 10/003,079, filed Nov. 2, 2001, which claims the benefit of U.S. Provisional Application No. 60/253,350, filed on Nov. 28, 2000.

[0002] The entire teachings of the above application(s) are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0003] This invention relates generally to broadcast systems such as cable television networks and more particularly to a technique for coordinating the insertion of specific video content, including targeted commercial or other promotional video content, over idle video-on-demand channels.

[0004] For many years it has been realized that cable television (CATV) systems provide numerous advantages as compared to over-the-air broadcast systems. First, these cable systems were valued for their ability to provide for reception of signals in remote rural locations, or where radio signals may be blocked, such as in dense high rise apartment buildings. Later, it was realized that by incorporating long distance communications equipment, such as orbital satellite transponder equipment, centralized distribution networks could be built that not only could route local channels more reliably, but also distribute program content on a nation-wide basis. This gave rise to broadcast program content which is available strictly for the cable television subscriber, and the now widely familiar movie, news, weather, music, childrens, sports, family and other program-gendre-specific cable channels.

[0005] The present trend is towards a model where the reception devices in the home will include embedded computer systems designed for a particular function or purpose. Today, for example, set-top boxes typically have limited data communication capabilities. The main function of these devices is to handle channel access between residential users and a head end or server on the cable TV network. For example, these systems are typically deployed to offer certain types of premium services, such as video-on-demand. This service allows a viewer to use a menu system to select from a variety of typically pre-recorded premium programs that may be available, such as movies or sporting events. The selected program content is then immediately delivered to the viewer over channels dedicated to delivery of the video-on-demand content.

[0006] In the future, the functionality offered by these set-top boxes or other embedded platforms will be expanded even further. For example, they may offer Internet browsing capabilities and e-commerce serving capabilities. Moreover, it is anticipated that common-household appliances will also have computer network functionality, in which case the set-top boxes may be used to remotely control and automate various tasks in the home.

[0007] Indeed, millions of digital set-top boxes have already been deployed in the United States. It is estimated that the worldwide market for Internet appliances such as digital set-top boxes and other Internet-connected terminals will reach $17.8 billion in 2004. Increasingly, advertisers and content providers therefore view the cable set-top as the first platform of choice for widespread delivery of a suite of intelligent content management and distribution services.

SUMMARY OF THE INVENTION

[0008] The present invention is a system for delivery of targeted content such as promotional video content to a cable television viewer, where the specific content is under control of the a central operator and the viewer is not necessarily aware of the targeted nature of the content.

[0009] Consider that the digital set-top box provides interesting functionalities, including the ability to collect data such as a log of the channels watched over time. The set top box can thus be designed to report this information to a central location. At the central location, this data can be aggregated for many hundreds of thousands of users. This information, when coupled with other information, such as viewer demographics, can then be used by advertisers to blanket defined market segments with promotional content. The delivery of promotions to specific target segments can thus allow for impulse responses yielding immediate increases in product revenues.

[0010] However, a nationwide cable television network may have hundreds of thousands, if not millions of set-top boxes, each tuned to a different channel. An efficient scheme for routing the targeted content to specific set-top boxes is therefore not as straightforward as it might appear at first glance.

[0011] Some have proposed systems in which the targeted content is digitized and sent to the set-top boxes in compressed form, well prior to its display. However, even a single promotion may require several hundred megabytes of storage. These techniques therefore require each set-top box to have a fairly large storage capacity, the cost of which might be prohibitive. And if such a distribution network were built using strictly standard data network protocols such as TCP/IP, the sheer number of require connections could overload a central data servers and routers.

[0012] The present invention seeks to overcome these limitations by making use of idle video-on-demand channel capacity to deliver promotional content to selected set-top boxes in the network. The set-top boxes are then enabled to switch away during a commercial segment from the broadcast program to the available video-on-demand channel. The set-top boxes then switch back to the previously selected broadcast program at the end of the segment.

[0013] More specifically, a network configured in accordance with the invention includes a promotion server, a scheduler process, and a message router located and/or controlled at a central location, head end locations that include message servers, VOD servers, and trigger insertion equipment, and set-top boxes (STBs) located at subscriber premises that include at least a message client process and a promotion agent process.

[0014] The promotion server determines an asset to be distributed such as a targeted promotion item (e.g., a commercial), and a list of STBs that are to receive it. The promotion server causes the video promotion to be sent to a VOD service so that it is available at the VOD servers at the head ends.

[0015] The scheduler process then delivers schedule messages to the head end message servers which identify the promotion and an STB which is to receive it. Receipt of a schedule message by the head end message server causes its

associated VOD server to cue the asset by loading the asset, and starting the asset, but pausing it so that the asset does not yet play.

[0016] Prior to the occurrence of a commercial slot in a broadcast program, an asset trigger is inserted into the broadcast stream at the head end. This asset trigger contains general information concerning the asset to be sent, and a VOD channel number. The STB receives the asset trigger and readies itself to tune to the VOD channel when it detects a commercial begin cue tone.

[0017] Upon detection of a commercial begin cue tone in the broadcast channel, the head end message server sends a tune away trigger to the STB, and also instructs the VOD server to start playing the cued promotion. When the STB receives the tune away trigger, it switches from the broadcast channel being played to the selected VOD channel, and the promotion is viewed.

[0018] When a commercial end cue is detected in the broadcast channel, the head end message server instructs the STB to tune back be sending a tune back trigger. The tune back trigger causes the STB to return to the broadcast channel that was being watched prior to delivery of the promotion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings in which like reference characters refer to the same parts throughout the different views. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

[0020] FIGS. **1**A and **1**B are a block diagram of a network in which promotion is delivered using a video-on-demand channel according to the invention.

[0021] FIG. **2** is a process flow diagram illustrating how the various elements and processes in the system deliver the promotion.

DETAILED DESCRIPTION OF THE INVENTION

[0022] A description of example embodiments of the invention follows.

[0023] 1. The Promotion Delivery System Generally

[0024] Turning attention now to the drawings, FIGS. **1**A and **1**B illustrate a multimedia content delivery system which delivers promotions using a video-on-demand channel according to one embodiment of the present invention. The content delivery system may be any type of Cable Television (CATV) network system which may include any type of Hybrid Fiber Coax (HFC) physical cabling, or satellite equipment, or even digital video content distribution systems based on Digital Subscriber Line (DSL) or broadband wireless technologies such as Microwave Distribution Services (MMDS).

[0025] The system includes a data center having a promotion server subsystem **200** at which the promotion delivery process originates, and a cable signal distribution network, including head end locations **300-1**, . . . , **300-*h*** for routing the promotions to a large number of network devices or set top boxes (STBs) **410** located at individual residences and other cable system subscriber locations **400-1**, **400-2**, . . . , **400-*r***, . . . , **200-*x***, **400-*y***, where respective video displays **450** are located. The promotions include promotional content that may be presented in various multimedia formats including compressed digital formats (MPEG 2 and 4), or praghical images compressed and uncompressed using standard formats such as JPEG, GIF or BMP. Promotions are used to advertise goods and services, promote events, or present other commercial or non-commercial information.

[0026] The promotion server subsystem **200** located at the data center communicates with a promotion agent subsystem **430** embedded within each of the STBs **410**. The promotion server subsystem **200** and the promotion agent subsystems **430** may communicate with each other through the routing server **230**, data network **275**, head end router **310**, head end message server **320**, and message clients **420** by using a combination of application-level messaging and serialized bulk data transmissions.

[0027] In more detail, the promotion server subsystem **200** includes a database server **210**, a promotion manager server **220**, a message routing server **230**, a promotion scheduler **240**, and a bank of message routers **250**. These components are typically located at a central location in the multimedia network such as at a data center or head end, or divided between the two depending on the density and population of STB devices **410**.

[0028] The routers **250** communicate with the hea ends **300** through a data network **275**. The data network **275** may be a local area network, but depending upon the geographic dispersion of the head ends **300**, may itself include a wide area network having a further hierarchy of routers and bulk servers (not shown in FIGS. **1**A and **1**B). Ultimately, each of the STB devices **410** is reachable through the data network **275** via an associated head end **300**. In a typical cable television network, there may be many thousands of network devices **410** connected to a particular head end **300**, and there may be many thousands of head ends **300**.

[0029] Each head end **300** includes a number of devices and processes including a head end message server **320**, a trigger inserter **330**, a Video-on-Demand/Multimedia (VOD/streaming media) streaming server **340** and associated storage device **350**, and RF distribution equipment **370**, which distributes broadcast video channels from a video distribution network (not shown).

[0030] The head end router **310** sends and receives data messages to and from the promotion server subsystem **200**, routing them to and from the head end message server **320**.

[0031] The head end message server **320** receives schedule messages indicating the schedule of promotions for particular STBs **410** connected to its respective head end **300-1**. The hea end message server also transmits and receives messages to the STBs **410** using an Out-of-Band (OOB), In-Band (IB), or broadcast trigger path over the cable network. The signaling used for data communication may be narrowband Quadrature Phase Shift Keying (QPSK), or if high bandwidths are needs, may be Quadrature Amplitude Modulation (QAM).

[0032] Upon the occurrence of certain events, the head end message server **320** also uses the trigger inserter **330** to insert trigger signals into the RF cable channel signals generated by the RF equipment **370**. The use of trigger signals is an additional expedient communication path for critical cueing events.

[0033] The VOD/media server **340** is connected to receive and store VOD/streaming media content from a VOD distribution network (not shown) provide VOD/streaming media channels to the RF equipment. It should be understood that the VOD/streaming media content, which typically includes premium programs such as movies or sporting events, in this

instance also include promotions. The VOD/streaming media content can be stored in recorded form. If it originates in analog form, it is typically stored in a compressed digital format.

[0034] At least three signal paths are there present between the head end **300** and the STBs **410**, including a bi-directional data path for data messages, a broadcast video stream including data in the VBI spectrum or "stuffed" into the private data segments of an MPEG stream, an analog video-on-demand channel or other available channel that provides streaming media such as digital content channel.

[0035] To determine how to deliver targeted promotions to the network devices, the promotion server subsystem **200** generates viewership profiles for each of the STBs **410** from data collected using a variety of statistical models. The viewership profiles are then used to associate groups of STBs **410** with a particular given target promotion.

[0036] More particularly, the promotion server subsystem **200** periodically collects viewer usage data from the promotion agent subsystem **430** located in each of the STBs **410** to generate viewership profiles. In television networks, the data collected by the promotion server subsystem **200** may include tuner data (i.e., a history of channels watched) and responses to past promotions. This history is kept on a relatively fine time scale, such as five seconds. In this way, it can be determined how long a particular promotion was deployed, or even which portions of a promotion or video program were viewed.

[0037] The so-called promotion groups are thus collections of STB devices **410** whose individual viewership profiles match membership criterion describing a particular demographic or viewership history. For example, a promotion group may be demographically based, i.e., "married women in their 30's with more than one school age child and a household income of at least $100,0000," or based on viewership history, i.e., "tends to watch the Golf Channel on Sunday afternoon." Therefore, the promotion delivery system **200** is adaptable to changes in viewer usage or viewership patterns by making adjustments to promotion groups. The process for creation and selection of promotion groups is described in more detail in the U.S. Provisional Patent Application Ser. No. 60/253,488 filed Nov. 28, 2000, entitled "Using Viewership Profiles for Targeted Promotion Deployment" which is hereby incorporated by reference in its entirety.

[0038] Promotions are then scheduled for delivery to promotion groups of specific STBs **410** which may not all be connected to the same head end **300**. A promotion is scheduled for delivery to a promotion group by an advertiser or service provider entering a scheduling request for a promotion such as via the promotion manager **220**. The promotion manager server **220** packages the promotion for delivery and by storing a record of it in the database server **210**, and notifying a video-on-demand service (not shown) that the promotion content will be needed at the VOD/streaming media server **340** locations at the head ends **300**. Typically, broadcast VOD content, such as movies, is more likely distributed using Digital Audio Tape (DAT) which is sent by courier to the various head end locations.

[0039] However, if a wide area data network is in place between the head end locations and the central location, the promotion assets can be distributed to the VOD/streaming media servers **340** using such a network. In such a case, the promotion information is read from the database **210** by the scheduler **240** which then creates customized transmission schedules that specify when each of the STBs **410** is to receive it. Upon receipt of the transmission schedule messages, the promotion agent **430** in each of the STBs **410** processes each schedule entry and waits for the delivery of each promotion identified in the transmission schedule. For further information concerning the use of a wide area network for the distribution of promotions, and a specific protocol and format for such promotion data, reference should be made to U.S. Provisional Patent Application Ser. No. 60/253,369 filed Nov. 28, 2000, entitled "Synchronization of Bulk Data Transfers To End Node Devices In A Multimedia Network" which is hereby incorporated by reference in its entirety.

[0040] 2. Process for Delivery of Promotion Content Using Video-on-Demand Channel

[0041] Turning attention now to FIG. **2**, a preferred embodiment of the process for delivery of targeted promotion content will be described. Initially the system is in a idle state **500**.

[0042] Moving to step **510**, the promotion server **220** assigns promotion assets to specific STBs **410**, storing this information in the data base server **210**.

[0043] Next, in step **520**, the scheduler **240** determines that promotions are in need of distribution, and reads the information in the database **210** to create individual transmission schedules. From the schedules are built a list of promotion schedule messages. A promotion schedule message is typically created for each instantiation of an expected playback of a promotion at a particular STB **410**. The schedule message contains payload fields identifying a promotion, the network address or other identifier of the individual STB which is to receive the promotion, and an expected time by which the promotion is to be delivered.

[0044] In step **530** the routing server **230** routes the schedule messages out over the data network **275** to the intended head end **300** via the routers **250** and **310**.

[0045] Following that, in step **540** a particular schedule message arrives at the message server **320**. The message server in turn sends a message to its associated local VOD/media server **340** that a promotion is to be sent.

[0046] In step **545**, this causes the VOD/streaming media server **340** to load the identified asset, and cue the asset for playback, but without actually starting the playback at this time. The VOD/streaming media takes other steps at this time, such as to identify a VOD/streaming media channel number on which the asset will be played, back to the message server **320**.

[0047] At this point, in step **548**, the message server **320** also communicates with the specific STB **410** indicated in the schedule message. This message may include information about the asset such as an identifier which the promotion agent **430** in the STB may use to record the fact that it was played. This message is sent over the OOB/IB data path to the STB **410** as previously described.

[0048] After some period of time, a state **550** is entered which occurs a short time before a commercial break. In this state the message server causes an asset trigger to be inserted in the broadcast stream. This trigger, which may typically be sent in the Vertical Blanking Interval (VBI) as defined in the ATVEF specification, or in other ways. For example, the trigger may be placed in the private data segments of an MPEG stream, if the VOD/streaming media content is so formatted. In any event, the asset trigger contains text character, or other data indicating general information identifying

the upcoming promotion, and a VOD/streaming media channel number on which it will be played.

[0049] Next, a commercial cue is detected in the broadcast signal at the head end **300** as output by a digital ad insertion system typically located at the insertion location in the broadcast network. Since only a few VOD/streaming media channels will be used for the purpose of distributing promotions, the handful of such channels used for this purpose can be monitored at the head end for such tones. Detection of commercial cue causes a tune away trigger to be sent, in step **560**, from the head end **300** to the STB **410**.

[0050] In turn, receipt of the tune away trigger causes the promotion agent **430** in the STB **410** to switch to the indicated VOD/streaming media channel. At the same time, the message server **320** at the head end signals the VOD/media server **340** to begin playback of the promotion.

[0051] The STB may include circuits that blank an undesirable "pixelation" effect that may occur during channel switchover to the VOD/streaming media channel. Alternatively, other information such as channel information is displayed during switchover to the VOD/streaming media channel.

[0052] The promotion is then viewed at the STB **410** in state **565**, until a commercial end tone is detected. At this point, in state **570**, the message server **320** instructs the promotion agent **430** in the STB **410** to return to the original broadcast channel, such as by sending another tune back trigger.

What is claimed is:

1. In a cable television network system that connects set-top boxes (STBs) to receive broadcast program content from cable network head end distribution points, a method for delivery of a promotional content stream comprising the steps of:

cueing a promotional content stream at a streaming media server to be played on a streaming media channel for a particular STB, the streaming media server located at a cable network head end;

sending a first trigger to the particular STB indicating the streaming media channel number, but which does not cause the STB to yet switch to the streaming media channel;

sensing a commercial cue tone signal in a broadcast channel being watched at the STB, the commercial cue tone indicating an upcoming start of commercial segment; sending a second trigger to cause the STB to switch to the streaming media channel indicated by the first trigger; and

beginning playback of the promotional content stream.

2. A method as in claim **1** wherein the STB stores a channel number being watched prior to playback of the promotional content stream, and returns to the stored channel number once the promotional content stream ends.

3. A method as in claim **1** wherein pixelation that may occur during channel switchover to the streaming media channel is blanked at the STB.

4. A method as in claim **1** wherein channel information is displayed during switchover to the streaming media channel.

* * * * *