- Latest Releases: This view shows, for example, the 50 Latest films ordered by Latest (i.e. most recently created) by default. The user can toggle to show the content viewed by A to Z or by Popularity. This list carousels.
- Most Popular (landing point): This view shows, for example, the 50 Most Popular films ordered by Popularity by default and on hover the user sees a selection of the most popular content. The user can toggle to show the content viewed by A to Z or by Latest. This list carousels.

Genres

Beyond these views of content, in one example, there is also Film OD Genre Categories. All genre categories order content by Popularity by default, and the user can toggle the view to A to Z or Latest. All lists of content carousel, and because of the large volume of content in each category the double carousel shall be used. The Audio Description area is only visible if this is requested in Settings or if the user presses the "AD" or "ST" RCU button (NB: it makes the sections visible, but cannot then be "toggled off" with another button press – the user may have to go to Settings to hide these sections again).

Players (i.e. portals)

This area displays Players (i.e. portals) in the order described in the UI schedule for EPG Business Rules of the Shareholders' Agreement.

The number of portals that one CP can have and the ordering of these portals are also outlined in the Shareholder Agreement documentation.

An indicative representation of Players is shown in Figure 30. Note that the current content that is being viewed is in a small box 324 in the corner.

In one example, when the user presses the RCU "Arrow Up" button from being on the Players item, the cursor moves to the first Portal in the list. The cursor also moves to the first Portal in the list when the user presses the RCU "OK" button when on the Players item,

TV

Hovering on this item displays to the user a number of highlighted TV OD content selected from all of the TV OD content across the platform. This is a view of the most important content that CPs want to promote to users. Business rules do not mandate that this content has to be different from Most Popular – this remains the editorial choice of the content provider.

Highlights are listed in a randomised order, to ensure that this area abides by FRND guidelines.

An indicative representation of Highlights is shown in Figure 31.

In one example, when the user clicks on "TV" the order of items in the TV OD menu is as shown in Figure 32, with "Most Popular" 340 as the landing point:

The views and genres are described in detail below.

- Most Popular (landing point): This view shows, for example, the 50 Most Popular programmes ordered by Popularity by default and on hover the user sees a selection of the most popular content. The user can toggle to show the content viewed by A to Z or by Latest. This list carousels. Most popular may just be an ordering reference rather than a menu item in itself.

Genres

Beyond these views of content, there is also TV OD Genre Categories as described below. In one example, all genre categories order content by Popularity by default (except the "All" category e.g. "All Comedy", which is A to Z by default). The user can toggle to show the content in sub-categories by A to Z or by Latest. All lists of content carousel, and because of the large volume of content in each category the double carousel may be used. The ordering of sub-categories is largely alphabetical, but varies by exception to give sub-categories that are likely to be most popular with the entire audience more prominence.

The Audio Description and Sign Language areas are only visible if this is requested in Settings as indicated by the dotted lines.

Examples of the breakdowns of the categories shown in Figure 32 are shown in Figures 33-42 as described below.

- Children's: This category breaks down into the categories shown in Figure 33.
- Comedy: This category breaks down into the categories shown in Figure 34.
- Drama & Soaps: This category breaks down into the categories shown in Figure 35.
- Entertainment: This category breaks down into the categories shown in Figure 36.
- Factual: This category breaks down into the categories shown in Figure 37.
- Lifestyle: This category breaks down into the categories as shown in Figure 38.
- Music: This category does not break down further currently – NB: these are TV programmes concerning music, not music videos.
- News & Weather: This category breaks down into time-based sub-categories as shown in Figure 39, and is listed in reverse chronological order.
- Regional: This category does not break down further NB: radio does break down into Northern Ireland, Scotland and Wales, but there is not sufficient OD TV content to justify doing this.
- Sport: This category breaks down into the categories shown in Figure 40, but may well require changing categories (e.g. different seasons have different sports, and the categories accommodate this).
- Audio Description: This category breaks down into the categories shown in Figure 41, which essentially replicate the categories as sub-categories here (there is no need to have another level of categorisation here, as the relevant volume of AD content does not warrant this).
- Signed: This category breaks down into the categories shown in Figure 42, which essentially replicate the categories as sub-categories here (there is no need to have another level of categorisation here, as the relevant volume of BSL content does not warrant this).

Radio

Hovering on this item displays to the user a number of highlighted Radio OD content selected from all of the Radio OD content across the platform. This section could also include Digital Audio Broadcasting (DAB) services. This is a valuable view of the most important content that CPs want to promote to their customers – beyond being "Most Popular", it is ideally content that has not yet gained popularity / warrants promotion.

Highlights are listed in a randomised order, to ensure that this area abides by FRND guidelines.

In one example, when the user clicks on "Radio" 318 (Figure 27) the order of items in the Radio OD menu is as shown in Figure 43, with "Most Popular" 360 as the landing point.

The views and genres are described in detail below:

- Most Popular 360 (landing point): This view shows, for example, the 50 Most Popular Shows ordered by Popularity by default and on hover the user sees a selection of the most popular content. The user can toggle to show the content viewed by A to Z or by Latest. This list carousels.

Beyond these views of content, there is also Radio OD Genre Categories under Music / Talk Radio / Sport as shown in Figures 44-46 and described below.

In one example, all genre categories order content by Popularity by default (except the "All" category). The user can toggle to show the content in sub-categories by A to Z or by Latest. All lists of content carousel, and because of the large volume of content in each category the double carousel may be used.

- Music: This category breaks down into the categories shown in Figure 44 with 'Most Popular 368 being the landing point.
- Talk Radio: This category breaks down into the sub-categories shown in Figure 45.
- Sport: This category breaks down into the sub-categories shown in Figure 46.

Description of Different Types of Ordering

For flexibility, users are able to reorder content by different sort orders as they see fit using a toggle mechanism.

Examples of possible orderings are described below:

Popularity

Popularity is based on the number of On Demand "play events" (e.g. watching or listening to an asset for more than 30 seconds) of that asset from only the platform and 3rd party VOD portals on the platform. In one example, linear views do not count towards this metric of popularity. IP channel views do not count towards usage data for popularity, as they are linear viewing. Views initiated from the OD placeholder channels will count, as they are OD viewing.

For all OD content (including films, TV, radio on demand, catch-up TV etc.) popularity is based on the number of "play events" for that asset over the past day or any other time period. This approach enables recent content to surface rapidly, and then its ranking in popularity lists to degrade fairly swiftly once its popularity has declined. One option for this is that initially there is a very simple decay function that decays the total popularity score nightly by a fixed factor. This gives a quick drop-off in popularity in the first few days and then a slower and slower decay as the number drops. This means that particularly popular programs will decay rapidly at first and not overwhelm all other content; and "slower burning" items like old films or archive episodes will retain some amount of popularity without going to zero in a few days. The platform ensures that it is possible to adjust the decay factor as needed to either speed it up or slow it down and deliver an enhanced user experience of search.

A to Z

Alphabetical ordering starts with A, through to Z, with numbers listed at the beginning of the list.

Content Provider Guidelines for Submission of Alphabetised Metadata

The system has provided a metadata field to specify sort order by title alphabetically. Preferably, where the programme or web app begins with 'The' or 'A', the content supplier provides the Sort Title with a following comma and the word appended to the end e.g. 'The One Show' should be supplied as 'One Show, The' in the Sort Title field. This process is not done by the platform, as the CP has full editorial control to decide if the programme is listed under "T" or "O". The programme cannot be listed under both in the alphabetical list.

Latest

This ordering lists content by the time stamp of the item's Production Date:

- For TV OD, this production date is equivalent to the first broadcast date.
- For Film OD (including films that have been broadcast at some point), this production date is equivalent to the UK release date where available. If there is no UK release date, then the date is the release date in the country in which it was produced. If there is no specific date or time available (only a release year), then the date is 00.00am on the 1st of January of that year. Where no date is available, content is then ordered by popularity.

If two assets have the exact same time stamp (to the millisecond), then their ordering may be assigned on a randomised basis.

Soon to Expire

This ordering lists content by the time stamp of the end of the content's availability window in chronological order (against each separate channel i.e. not one combined list showing content from all channels). The user will therefore be able to navigate a list of content that will not be available to them for very much longer i.e. for <48 hours. Also, any content that is going to expire in <4 hours is not included in this list so that users generally do not find that their content expires part-way through playback. If the user pauses the content, and this goes beyond the end of the 4 hour window before expiry then this asset will not be available to complete viewing.

Time of EPG Listing

This ordering lists content by the time that the asset was broadcast, delivered by IP, or the time that the OD asset was listed in the EPG (for OD placeholder channels). This ordering is used in the Channels area.

Time of Last Playback of that Asset

This ordering lists content by the time that the asset was last played in either the plaform player or in any 3rd party player i.e. the timestamp of when playback was initiated. If the 3rd party player cannot capture and communicate this time of playback, then their assets cannot be listed in the Recently Played area. This ordering is used in the Recently Played area.

Further Possible UI Features

Examples of further possible Main Menu Items are as follows.

- Oringinal Equipment Manufacture (OEM): This area provides information on the customer's device and / or accessories that may complement that device. After some interstitial pages (incurring the same number of clicks as to other OD content) there can be content behind that item.
- Web Apps: This area contains lists of applications that the user can access. In general the apps are not stored locally, however some OEMs may have certain 'Favourite' applications pre-loaded onto their devices. These web apps are not subject to the system's TV Quality Requirements, but are subject to Web App Governance Rules and limited Web App Style Reference Guides. There is a security model to determine the level of privileged APIs that web apps can access e.g. have the ability to change the channel.

Description of the User's Search Journey

In one example, the search function is available:

- Behind a top level menu item labelled as "Search"
- By the user pressing the blue button on the RCU

Due to the large amount of content on the platform a feature called "search from here" is provided. This feature provides a contextual search from the position that search was called from e.g. if a user navigates through browsing down to Categories>Drama and then selects "Search from here" they are redirected to the main search screen where it indicates that the user is searching within a specific category for search results.

In one example, the user goes through the main steps shown in Figure 47 as they perform a search – a detailed description of these steps is given below. The steps are split into three categories, Optional 380 – the user may or may not perform them; Either / Or 382 – the user has a choice to make and Necessary 384 – the user has to follow this step. The numbers on each step correspond to the order in which they are performed in.

Amend Search Filters

Users are not required to filter their search results – the user may always search all content if they require. However, the user may opt to filter their potential search results

upfront through pre-filters, or cut-down the number of search results they have through post-filters.

The user is able to select one or more filters which will be used in conjunction to return the search results.

Accessibility pre-filters persist from the last search as this enables users to only deal with filters on an exceptional basis, when they want to deviate from their existing search filtering choices. Locating pre-filters in the search area, rather than solely burying them in Settings, make it easier for users to switch between the different filtering needs and preferences of the entire household.

Users can also search for <filtered> content by entering the filter in the search term text itself. For example entering "Life HD" would return all programmes that matched "Life" in high definition in addition to programmes that had both Life and HD in the metadata.

#	Filter Name	Filter Type	Rationale
1	AD Only	Audio Description - Pre and Post Filter	To enable the user to find content that has accessibility versions quickly. These filters are only visible if indicated within the Settings Area (not shown as the factory default setting).
2	SL Only	Sign-Language - Pre and Post Filter	
3	ST Only	Subtitles - Pre and Post Filter	
4	HD Only	Post Filter	To enable the user to find quickly High Definition content – to promote this service as a key selling point for the platform.
5	Free to Me Only	Post Filter	To enable the user to hide all content that is not Free to Air or part of the user's existing subscriptions NB: Dependent on the delivery of CREDS.

NB: Beyond the filters above, Adult content is excluded from search results – this is a hidden filter.

Enter Text in the Search Field

There are a number of potential methods for a user to enter the search term:

- The core method for text entry is multi tap on the remote
- The use of an onscreen keyboard.
- The use of a standard keyboard as an accessory.

Previously entered search terms are 'saved', so when a user goes back to the search function their previously searched items are shown and can be selected. The saved searches only show successful searches. This list is clearable so that previous search terms can be deleted.

Choose a Free Text Search or Search by an Auto-Suggestion

The user can enter word(s) to be searched, and as the letters are entered, auto-suggestions are surfaced to the user. The user can either select an auto-suggestion (which will narrow the search to a single brand or even asset if there is no associated brand) or conduct a free text search (which is likely to include multiple brands).

Auto-Suggestion Search

In one example, to make it easier and quicker for users to enter a line of text, they are provided with a list of 'auto-suggestions' from which they can make their choice of search term, after an appropriate number of letters has been typed. This number is 1 as a

minimum and 3 as a maximum. The user is only given 7 suggestions i.e. this list of suggestions does not carousel.

This suggestion list shows matches from the highest-level title (most importantly), keywords and 'cast and crew' metadata fields.

If the user types in an OD genre category as the searched item (e.g. comedy), then the user is offered to be directed to that OD browse, as well as being shown titles that include Comedy.

Auto-suggestions are listed by relevance (a significant part of which being popularity of this as a search term across all users), rather than just in alphabetical order. For example, if a user typed in "COR", they would be presented with "Coronation Street" as the top auto-suggestion, rather than "Coral Reef Adventures" (or other less popular assets), even though coral is alphabetically first. The search term, in this case "COR", may be the first 3 letters of any word in a title e.g. "The Wonders of the ***Cor***nish Coastline".

Device Returns Structured and Ordered Search Results

Structuring "Rolled Up" Content

Especially within the OD area, it is likely that the volume of content returned in search results will necessitate that the platform presents content from the same CP rolled up by brand or series. For example, roll ups may be "Top Gear from BBC", "Top Gear from Dave", "Top Gear from Seesaw".

These roll-ups would need to extract all relevant results from that brand or series, not just include entire brands or series e.g. searching for "Top Gear" and "Ferraris" will have roll ups of a subset of Top Gear episodes that include Ferraris in their metadata.

To reduce needless clicking, content is not rolled up if there is only a single entity underneath the roll-up. This means that:

- If there is only one series, then there is no need for the series to roll up underneath the brand, and users would go straight from clicking the brand thumbnail to being presented with the list of episodes
- If there is only one episode / asset available, then it is presented on the top level.

Ordering Content

Results are ordered by a calculation of their "Relevance" according to an algorithm that takes into account:

- Word match (by titles, keywords and synopses in that order)
- Age (by production date i.e. when it was created for OD search results, or by recent broadcast date for linear search results)
- Popularity (i.e. VOD views on the platform).

In the case of roll-ups, the ordering is based on the SINGLE most relevant asset within that roll-up. The following weightings are used for search relevancy, but these are flexible to alter over time:

Metadata Field (weightings in decreasing order)
brandTitle (or highest available title if brand title not available)
seriesTitle
programmeTitle
programmeSynopsisLong
category
keywords
brandSynopsis
seriesSynopsis
popularity

Date (either 'broadcast date' for linear content, or 'UK release date' / 'original broadcast date' for OD content)

Definition of Popularity

Popularity of an asset (generally a VOD asset) relates to how many times that asset has been viewed as a VOD asset on this platform alone (i.e. this does not include how many times it has been viewed as a linear programme, nor how many times it has been viewed on other platforms). The system does not distinguish between Catch-Up and OD content to determine the popularity rating, as this will distort search results and browse list ordering which is contrary to user expectation.

For all OD content (including films, TV, radio on demand, catch-up TV etc.) popularity is based on the number of "play events" (e.g. watching or listening to an asset for more than 15 seconds) for that asset over the past day on a rolling basis.

User Browses Search Results

Search results are presented to the user by separate content type, with a count of the number of relevant individual assets / episodes in each area e.g.

- TV (3) *[i.e. current& future linear]*
- Available Now (99) *[i.e. episodes On Demand or later phase Recordings]*
- Apps (2)

A general principle is that if there is not relevant content in a particular Content Type, then that section is not shown and more content from a different section is shown. Search results could also be returned up to a maximum number of pages – having a limit may make browsing more manageable, as the list of results could carousel allowing the user to easily return back to the beginning of their list from near the bottom of the list.

If results are returned that relate to keywords / synopsis in particular, the extract that the search algorithm has referenced is displayed and the word is highlighted, for example in bold.

Action a Search Item

The table below outlines examples of the search results that are returned and the functionality that is possible from each of these items.

Search Result Type (item)	**Ok Action**	**Other Button Presses**	**Action Menu Item (AMI) display**
Recordings. NB: recordings are more likely to be filtered by first letter than actually searched.	Treat as user trying to play content.	From search results, users are able to protect their content (to save it from auto-deletion) – the iconography to display this may have to be on a lower level, so as not to crowd the visual design of the UI.	Enhanced metadata for recordings are held on the device, so More Information is always be available to the User. For other action menu items, the device shall access MAS or linear metadata to see if there is still metadata available for: - More Episodes (only displayed if there are assets still available to watch – NB: does not display expired OD content) - More Like This (if these assets are still available to watch – NB: does not display expired OD

			content) - Related content / apps (max 3) - Make Favourite
Linear, current programme	Switch to channel and watch	Record Remote control button initiates a recording – then user asked if this is an individual recording, or whether they would like to set a series recording (if metadata available).	As expected by the user, enhanced metadata is available for each search result: - More Info - More Episodes - More Like This - Related content / apps (max 3) - Make Favourite
Linear, future programme	Set reminder for future linear content	Record Remote control button initiates a recording – then user asked if this is an individual recording, or whether they would like to set a series recording (if metadata available).	As expected by the user, enhanced metadata is available for each search result: - More Info - More Episodes - More Like This - Related content / apps (max 3) - Make Favourite
On demand programme	Treat as user trying to play or select content. The user is able to select the particular version type that they want to playback only if they access the More Info page – by default the version played back would be in line with the following: 1) the user filtering e.g. the accessible version if they had filtered by AD / ST / SL, or the HD version if they had filtered by HD. 2) settings the user had previously selected, e.g. AD or Subtitles on as default.	No record functionality available. There is an option to download the OD asset.	Against individual OD assets, there are the following action menu items (NB: users are not able to access these at a series or brand level) - More Info - More Episodes - More Like This - Related content / apps (max 3) - Make Favourite

Web App	Take user into web app.	No record functionality available.	Against web apps, there are the following Action Menu Items, if available: - More Info - More Like This - Related content / apps (max 3) - Later Phase: Make Favourite

Regarding formatting and presentation, Figure 48 shows the basic design frame. Elements are sized for 720 pixel screen resolution (1280x720 pixels). Only the 16:9 TV safe area is included.

Figure 49 shows the design grid system. The grid is a quick, simple way to create consistency. Using the grid in designs creates screens that have a sense of order and encourage intuitive behaviour from users. The design grid consists of 15 columns, each 66 pixels in width with a 10 pixel gutter spacing between them. This gives a total content area of 1130 pixels. There are also sub columns of 28 pixels for greater flexibility. The grid is an aid to designing the UI, but the UI should not be constrained by the grid. The grid sets the bounds for content only.

Further Software Stack Aspects

The architecture of the software stack affords at least the following advantages:

- It enables broadcast and Internet protocol (IP) delivery technologies to be brought together so as to ensure effective coexistence.
- It supports multiple application frameworks and presentation technologies.
- It supports multiple concurrent applications.
- It integrates components from third party suppliers.
- It enables hardware graphics acceleration, and making it easily accessible so as to ensure the best possible viewer experience.
- It surfaces the configuration for key elements of the software stack to allow for performance tuning.
- It reduces fragmentation of technology in the connected television ecosystem, to improve availability of content, and reduce content distribution costs.
- It improves device compliance so as to reduce authoring costs for content providers.

Traditional monolithic middleware solutions do not provide a suitable foundation on which to build a solution with these requirements in mind. Software designs with a single main executable and tight coupling between functional areas often exhibit problems in areas such as memory management, security, resource management, and make it difficult to integrate newer technologies, so a more modular approach is needed. However, the extent of the investment made by device manufacturers and middleware vendors in existing technology is acknowledged and the principle of re-using existing software is central to this architecture.

The proposed architecture defines key technology foundations, a set of interfaces and a component framework that reduces the risk of developing and deploying compliant devices. By adopting a solution that includes the Linux operating system, a multi-process model, a message bus for interprocess communication and a set of common open source libraries, this framework allows device manufacturers and software vendors to integrate and test components easily.

Architecture Overview

Logical architecture

Figure 50 outlines the Consumer Device Software Architecture, showing an example of the levels of software.

Notes:

- The Linux kernel and drivers 390 are typically provided by the silicon vendor.
- The System Services 392 are implemented by manufacturers or middleware vendors.
- The MHEG engine 394 is often closely integrated with the other software components, and the architecture supports implementations that provide the MHEG engine 394 as an integral part of the device middleware or as a separate component.
- Application Player 396 executables and libraries are provided by 3rd party software vendors.
- Platform Configuration 398 and Platform Applications 400 including the Top-Level User Interface (UI)) are managed as part of the Platform Software, and independently from the Core Device Software.
- Content Applications 402 can be delivered over IP and broadcast networks.

Design functionality

The architecture has been designed to achieve the following functionality:

- Align with industry trends.
- Run on silicon products that are available in the market now.
- Use open source software where appropriate.
- Provide suitable Application Program Interfaces (APIs) to abstract from underlying software implementation.
- Allow manufacturers to differentiate their products.

The architecture has the following benefits over a monolithic approach:

- It allows components and Applications to be developed in isolation and tested before final integration.
- It allows for the re-use of existing software components and simplifies the integration of third party software.
- It provides clearly defined responsibilities and interfaces for all components.
- It supports models where Platform Operators wish to manage and upgrade Platform Applications and Platform Configurations independently.

Device Operating System

In one example, Linux is used as the Operating System for the Device. Linux has been ported to run on a large number of silicon products, and is currently supported by the vast majority of hardware and software vendors in the connected television ecosystem. Porting to new hardware is relatively simple due to the architecture of the kernel and the features that it supports. The Linux environment provides the following functionality as a basis for the development and operation of the Device software:

- Multi-processing.
- Real-time constraints and priority-based scheduling.
- Dynamic memory management.
- A robust security model.
- A mature and full-featured IP stack.

Linux is deployed on millions of PCs and consumer electronics devices, and the skills to develop and optimise for it are common in the industry. In addition, a wide range of open source products have been developed for, or ported to Linux.

Multi process overview

The Device is required to support multiple application frameworks and presentation technologies, and content from multiple sources.

The architecture enables Applications and System Services to run in separate operating system processes with appropriate permissions to control access to APIs and system resources. This is essential for enabling a wide range of content from trusted and un-trusted sources. It also allows Applications that provide the Device user interface to be developed and maintained independently without requiring an upgrade to manufacturer software.

Managed components

To support in-field evolution of Device functionality, and in particular to the tuning of system performance, components that provide System Services can exploit the presence of an embedded scripting engine by implementing some of their functionality as a script. These scripts can be upgraded as part of an update to the Platform Software.

Examples of components that use this approach are the User Interface and Management Engine, the Metadata Broker and the Content Acquisition Manager.

Open source components

A number of software components provided by open source projects have been chosen to support the architecture.

A full list of required open source libraries and versions can be found in the Consumer Device Platform Specification for Connected Television.	
D-Bus – message bus	http://dbus.freedesktop.org/
DirectFB – 2D graphics	http://www.directfb.org/
SaWMan – window management	http://www.directfb.org/
Boost – C++ libraries for thread and memory management	http://www.boost.org/
Curl – HTTP networking	http://curl.haxx.se/
OpenSSL – HTTPS and PKI	http://www.openssl.org/
SQLite – persistent storage of structured data	http://www.sqlite.org/

Device Application Programming Interfaces (APIs)

The architecture has been designed with two API tiers:

- System APIs 404 (Figure 50) – A set of interfaces that allow components within the Device to provide services via the message bus.
- Developer APIs 406 (Figure 50) – A set of interfaces that are made available by Application Players 396 (Figure 50) and used by application developers and content authors.

The relationship between these tiers and the implementation in-between is shown in Figure 51.

Message bus for inter-process communication

The Device inter-process communication (IPC) system is based on D-Bus, an open source project from freedesktop.org that provides transport for synchronous and asynchronous method calls, asynchronous events, and error messages.

D-Bus has gained widespread support in Linux based systems, and is used in the majority of desktop and embedded Linux distributions. It was chosen as the IPC mechanism as it supports a suitable range of data types and usage models, and offers low latency data transfers without the unnecessary complexity and overhead of other messaging technologies such as CORBA.

Supported Message Buses

Devices are configured with the following message buses:

- System Bus – the default bus for Linux D-Bus enabled processes.
- Session Bus – used for all Platform-specific messages, and configured with specific access controls for applications.

Devices may be configured with alternative buses to support Service Provider or Manufacturer specific features.

Bus names

All components that are required for the correct operation of the Device must register System Services with Bus names within a namespace specified by the Platform Operator. Manufacturers may provide other System Services using Bus names within a private namespace.

Introspection

System Services on the Bus support an Introspection API that provides metadata about the APIs they provide. This information is useful during the development, integration, testing phases of the Device software, and is available to diagnostics systems running on the Device.

Message types

The following message types are supported by the message bus and associated libraries.

- Method calls on interfaces provided by an object on the Bus
- Return values from method calls.
  - Behaviour can be blocking or asynchronous via call-backs.
- Error codes and structures.

Error handing

Errors generated by System Services are reported using a specific error message type and are propagated to clients as exceptions or error codes.

D-Bus security

The D-Bus libraries provide security features including policies and access control lists that are applied to objects, interfaces and methods on the Bus and are used to allow or deny messages, and access to System Services. This is managed by assigning permissions to each Application Player instance. For 3rd party applications, the assigned permissions depend on the origin of the application, and are configured using information from the Domain Name System (DNS) domain and/or signing certificate.

Message bus implementation

The API for each System Service is defined in the Extensible Markup Language (XML) format described in the D-Bus specification, and used by code generation tools to create bindings to the Message Bus runtime support libraries. Defining each interface in this manner allows for the implementation to be changed without affecting applications or other dependant services.

The Message Bus is used to access System Services and for low bandwidth data transfers but is not used for the transfer of audio and video streams or other high bandwidth data such as broadcast carousel data. A separate mechanism is required for high bandwidth transfers – this is outside the scope of this description.

System Services

A/V Media

Audio & Video Media processing is provided by a unified component that supports multiple source and sink types. Sources include DVB, local and remote IP unicast, IP

multicast, and local storage. Multiple sources can be active at once. The component is responsible for de-multiplexing, routing, decoding, controlling and rendering A/V streams.

Broadcast and platform metadata

Metadata from broadcast networks is processed and cached by DVB software components, according to the requirements specified in [DTG DBook]. The System API interfaces for broadcast linear metadata present *Event Information, Service Information,* and *Related Content* from broadcast data.

Enhanced platform metadata is delivered via IP networks and the Metadata Broker component is responsible for requesting, parsing, and caching this data.

Content acquisition – DVR and IP download

This group of components is responsible for the two content acquisition mechanisms available to the Device; these are recording from a linear channel (DVR) and downloading over the IP network. In addition to this, the Content Acquisition Manager ensures that the acquisition mechanisms available are utilised in the most efficient manner to deliver any content that the user requests. The Content Acquisition Manager also contains the logic required to process record lists that are used as part of the mitigation strategy for IP bandwidth usage.

User Interface Management Engine

The User Interface Management Engine is a configurable software component which manages the graphics display systems, user interaction, and the lifecycle of Applications. It also provides control APIs for launching and terminating Applications, to System Services and other Applications.

Applications

Applications can potentially be authored in any language supported by Application Players e.g. MHEG, HTML/JavaScript, ActionScript. They are distributed in a processor independent form (e.g. script or byte code). Once downloaded or installed onto the Device, Applications are executed by the appropriate Application Player and their graphical output is rendered into a window to enable composition by the Window Manager. Device-specific services are made available to Applications using extension mechanisms, but Applications can be built without using these additional services; many Applications do not require APIs beyond those documented in existing specifications, and run on the Device with no changes.

Core UI Applications

The Core UI Applications provide display logic and rendering of information to the viewer.

Functionality such as handling metadata from multiple sources is provided by System Services, in order to reduce the complexity and responsibilities of Applications and improve reliability of the Device.

Application Players

Each supported application framework and presentation language has an Application Player associated with it. Multiple Application Player instances can – within the capabilities of the underlying hardware – execute simultaneously, allowing multiple Applications to run. For example, the Top-Level UI Application may be running while an MHEG 'red button' Application is active. These instances are managed independently, and execute in a separate Linux process, with their own security sandbox and privileges.

In one example, application Players must use standard libraries to provide functionality such as networking, and graphics operations. This is to ensure consistent behaviour and to reduce some of the complexity and overhead of managing Device

compliance.

Data caching

Application Players use a common data cache to reduce bandwidth usage and latency for frequently accessed documents and images delivered via the IP network. Pre-fetching of data and images is also used to reduce rendering delays in the user interface.

Application management

The lifecycle of the Application Player instances is controlled by the Application Manager with configuration and policies supplied as part of the Platform Configuration. Each Application Player process is configured with resource limits and priorities, and instances can be started in advance of applications, to reduce delays when applications are launched.

The Application Manager is responsible for stopping processes when there is insufficient available memory to start new applications, and prioritises Applications that it launches to ensure that Application Players or Applications that attempt to allocate large amounts of memory or use more memory than is currently available do not affect the stability of the Device.

The Application Manager terminates Applications and Application Players instances if they exceed configured limits. Instances are also terminated after ach Application has exited, to release allocated memory and reduce memory fragmentation associated with long running processes.

Input event handling

In one example, all user input to the Device is processed by Direct Frame Buffer (DirectFB) and raw input events are converted to window events by the Window Manager and then filtered and routed to the correct component to ensure that the associated function is handled with minimum latency. This also simplifies the creation of content applications by removing the requirement to handle input events associated with power management and volume. The focused Application receives a subset of available keys.

IP Network Manager

The IP Network Manager provides information about the IP network, and events relating to network interfaces and connections.

Data and Configuration Repository

The Data and Configuration Repository provides persistent storage of keys and values that are used by the Platform Configuration components, and for setting and retrieving user preferences and Application data. Clients can be notified of changes for a set of keys. Storage limits prevent Applications from using large amounts of disk space, and an access control mechanism ensures that data can only be accessed by authorised System Services and Applications.

Developer APIs

The Developer APIs exist to allow Applications to access System Services from languages that are supported by Application Players. Ideally a single set of Developer APIs related to connected television functionality would be common to all Application Players – albeit cast into a language specific form – as this would make the task of developing for multiple application environments easier. However, the Device supports environments, such as MHEG, where APIs for developers are already defined, requiring adaptation of the System APIs to these. In addition, for environments such as W3C there may be benefit from the re-use that would be possible by aligning the Developer APIs for this particular Application Player with other emerging connected television solutions, such as being developed by the OIPF.

The implementation of the Developer APIs includes:

- Providing features that are needed by existing or new applications.
- API adaptation to the System APIs where functionality maps directly to System Services.
- Aggregating functionality provided by multiple System Services.

Language bindings

In order to expose functionality to each Application Player, bindings for appropriate language (e.g. for ActionScript or JavaScript) must be made to the Developer APIs via an extension (or plug-in) mechanism provided by the Application Player.

Common support libraries are used by all Application Players for data serialising, data type conversion, event queuing and dispatch, and garbage collection.

Object memory management

The features for dealing with dynamic memory management and object garbage collection vary with each Application Player but implementations typically expose references to objects used within an application via an extension mechanism, and notify the extension bindings when objects provided by System Services are no longer required. This functionality is essential for managing memory usage and enabling garbage collection across the API tiers.

Device Operation

Software updates

The Device software is packaged and distributed in the following upgradable software images:

- Core Device Software Image, including: Operating system, shared libraries, & executables, including System Services and Application Players.
- Platform Software Image, including: Platform Applications, Platform Configuration, scripts, images and resource bundles.

Where software images are delivered over IP, a Downloader service provides APIs to initiate and monitor the progress of data transfers.

The device is also required to support software images that are delivered over broadcast networks.

Software images must be secured in delivery, and on the Device.

Further information is given below.

System start-up

In one example, devices must use a secure boot process to ensure that only authorised system software runs on the device.

Start-up operation is as follows:

- Bootloaders are executed.
- The integrity and signatures of the kernel and root file system are verified.
- Linux kernel is uncompressed and executed.
- Kernel drivers are loaded.
- Init process is started.
- System Service processes are started.
- Application Manager starts instances of required Application Players.
- Platform Applications (including the Top-Level UI) are started.

Process and System memory management

Most System Services are started from Linux start-up scripts, but some can be started on demand when first needed. System Services that are required for correct operation of the Device are not stopped under normal circumstances.

Application Player processes that are started for running Applications are managed by the Application Manager, and are terminated when no longer needed. Core UI Applications are only terminated when inactive, if memory is required by System Services.

Devices must use a memory allocation policy that ensures predictable behaviour in low memory situations.

Scheduling and performance

The Linux kernel's process scheduler must be configured to ensure that System Services execute with higher priority than Applications.

Introduction

The connected television device (Set Top Box) is made up of two software components and some corresponding configuration:

- The Core Device Software is the software image that is installed and managed by the manufacturer.
- The Platform Software is a software image that contains the top level UI application and can be updated by the platform operator independently of manufacturers and without upgrading the Core Device Software.
- The device configuration contains specific configuration parameters to be applied to a specific release of Platform Software and can be updated without needing to update either the Core Device Software or the Platform Software.

Figure 52 shows the relationship between these updatable components. Platform Software images can only be installed on a Core Device Software image that implements a specific Platform API Version.

Device configuration can only be applied to a specific version of Platform Software.

Device Software Upgrade

Upgradeable modules

The device software is divided into two parts: the Platform Software managed and updated by the platform operator and the Core Device Software managed and updated by the device manufacturer.

The Core Device Software consists of:

- bootloader(s);
- the Linux kernel;
- the Linux root filesystem containing libraries and the core device software;
- middleware required to support the operation of the device;
- presentation engine software including API bindings and data marshalling;
- an interpreter for platform scripts;
- manufacturer-supplied data;
- optionally, a default version of the Platform Software;
- user interface components and associated assets required for the manufacturer-specific setup and configuration of the device;
- the manufacturer's default configuration parameters (see section below); and
- public key certificates.

The Platform Software consists of:

- the default platform configuration;
- the top level UI application (including all images and data needed for off-line use);
- platform scripts providing soft logic for device components performing background functions and plug-in functionality for system services; and
- static data files supporting these elements.

The Platform Software is architecture independent and contains no native compiled executable code.

The device includes a default version of the Platform Software 426 so that when the

device starts for the first time the top-level UI is available.

The device may include a default version of the Platform Software 426 within the Core Device Software 428.

If the Core Device Software 428 does not include a default version of the Platform Software the device includes the default Platform Software 426 separately, as illustrated in Figure 54. Upgraded platform software 430 is outside the Core Device software.

Core Device Software upgrade

Devices support Core Device Software upgrades over broadcast using the DVB-SSU Firmware Update Method described in *D-Book* 6.2.1, section 23.6. They also support software upgrades of the software over the IP connection. Manufacturers are responsible for implementing a mechanism for secure and reliable upgrade.

Software images are encrypted in delivery over broadcast and IP and on any servers on which they are hosted.

After a successful installation of the Core Device Software the Local Storage Repository (LSR) contains

- the manufacturer's name
- the manufacturer's OUI
- model number
- Platform API version number
- Core Device Software version number

The manufacturer's software may be divided into separate parts for the purposes of upgrading.

After upgrading the Core Device Software the device checks for a newer version of the Platform Software as defined below.

Platform Software update

Devices support the updating of Platform Software using both the broadcast and broadband update mechanisms described in this section.

Devices download a new Platform Software image using either the IP Platform Software download method described below, or the DVB-SSU Platform Software download method also described below.

When a new Platform Software image has been successfully downloaded and is available locally, the device saves a local copy of the new Platform Software image.

The Platform Software image is in the format described below.

Once a new Platform Software image is available locally the device verifies that the image is signed by the platform operator, then decrypt and install it using the process described in below.

Devices store at least two versions of the Platform Software – one default version and at least one downloaded from the update server. Devices use the updated copy in preference, provided that it has been verified and successfully installed.

The device only installs Platform Software if the Core Device Software implements the Platform API Version specified in the header of the Platform Software.

The Platform Software is provided by the platform operator as a single signed and encrypted image.

Devices may need to consider splitting the software after downloading if other requirements dictate that some parts are held in flash memory and others on hard disk storage.

The user is not to be notified or asked to confirm software and configuration updates. However, the device setup may include an option through which the user can explicitly disable automatic software updates.

The device does not inform the user when a software update or configuration update fails.

IP Platform Software download method

The device may be configured to only perform configuration and software update checks during a predefined download window.

The device checks for a new Platform Software image at the regular update interval configured in the Local Storage Repository.

If the device has not successfully checked for new Platform Software for seven or more days the device ignores the download window and starts a check immediately.

If the download window is defined then the device schedules a Platform Software update check at a random time within the daily download window.

The device checks for a new Platform Software image and download it using the following method:

- The device checks for a new platform image using a HTTP/1.1 GET request with an If-Modified-Since header, quoting the modification date and time of the currently installed Platform Software image. If an Etag header was provided with a previous response, the device also uses an If-None-Match header quoting the Etag.
- The device checks for a new Platform Software image and download it using the following constructed URI:
  http://[baseuri]/[manufacturer]/[model]/[platform_api_ver]/[image_name].bin, where the values are retrieved from the Local Storage Repository using these names:
  - baseuri = platform.software.update.baseuri
  - manufacturer = hardware.manufacturer
  - model = hardware.model
  - platform_api_ver = core.software.platformapi.version
  - image_name = platform.software.update.imagename
- If a new Platform Software image is available the response is a HTTP/1.1 200 OK response with a Content-Type of application/octet-stream. The body of the HTTP response is the Platform Software image in the format described below. The device then saves a local copy of the new Platform Software image and updates the platform.software.update.lastchecked item in the LSR.
- If a new Platform Software image is not available the response is a HTTP/1.1 304 Not Modified. The device then updates the platform.software.update.lastchecked in the LSR.
- If a new Platform Software image is downloaded the device also downloads the Platform Software digital envelope (defined below) using the following URI:
  http://[baseuri]/[manufacturer]/[model]/[platform_api_ver]/[platform_software_ver].env

where: platform_software_ver is the Platform Software version number extracted from the Platform Software Image Descriptor (PSID) of the downloaded Platform Software. The PSID is defined below.

The base URIs of the software update service and Platform Software update interval can be changed by the configuration. However, in the event that a software update service responds with an error on five consecutive occasions, the device reverts to the previous location for the next attempt.

Platform Software downloads occur at a randomly selected time within the download window.

Standard back-off mechanisms for HTTP requests are implemented by the device in the event of download errors, as defined elsewhere in this document.

Once the device has successfully downloaded a Platform Software image it shall install the image using the procedure described below.

DVB-SSU Platform Software download method

Devices support the upgrade of the Platform Software using the DVB-SSU Firmware Update Method described in *D-Book* 6.2.1 section 23.6 except for the following difference:

- The DSI in the data carousel contain the platform operator's OUI rather than the manufacturer's OUI.

Given the expected time for a device to complete the download, the device must be able to perform the download as a background operation while the user is watching TV or making a recording. If the user's actions force all available tuners to retune to multiplexes which are not carrying the download then the download will be interrupted. The device is able to resume partially completed downloads rather than having to re-start from the beginning.

Platform Software packaging format

The Platform Software image is a signed, encrypted *cramfs* filesystem image.

The Platform Software packaging format describes the format of the files used to upgrade the Platform Software.

The Platform Software update package contains a Platform Software digital envelope and a Platform Software image.

Platform Software digital envelope

The Platform Software digital envelope is of type CMS Enveloped-Data with detached content, as described in [RFC 5652] section 6.

Platform Software image

The Platform Software image is of type CMS Signed-data, as described in [RFC 5652] section 5, with a pre-pended Platform Software Image Descriptor (PSID). It is encrypted as described below.

The Platform Software image is of the form:

Item	Offset (bytes)	Size (bytes)
Platform Software Image Descriptor (PSID)	0x00	0x20
{ CMS Signed-data }CEK (AES-256-CBC) (as described below and [RFC 5652] section 5)	0x20	variable

Platform Software Image Descriptor (PSID)

The Platform Software Image Descriptor (PSID) is of the form:

Item	Contents	Size (bytes)
Magic cookie	0xCA, 0xA5	0x02
Platform Software packaging format version identifier	0x00, 0x00, 0x00, 0x01	0x04
Unused	< unused >	0x0A
Required Platform API major version	API major version (e.g. 0x02)	0x01

Item	Contents	Size (bytes)
Required Platform API minor version	API minor version (e.g. 0x01)	0x01
Required Platform API revision	API revision (e.g. 0x00, 0x00)	0x02
Platform Software image major version	Platform Software major version (e.g. 0x02)	0x01
Platform Software image minor version	Platform Software minor version (e.g. 0x01)	0x01

Platform Software image revision	Platform Software revision (e.g. 0x00, 0x00)	0x02
Capabilities	0x00 (all 8 bytes)	0x08

The Platform Software packaging format version identifier is used to indicate the version of the packaging format used by the Platform Software image.

Versions of the Platform Software are identified by major, minor and revision numbers, and define the Platform API version that it is required.

The device only installs Platform Software that matches the Platform API version of the Core Device Software. The Platform Software image version number increment with each new release.

The Capabilities item is a reserved section of the Platform Software Image Descriptor (PSID) that will be used at a later date to indicate which device capabilities are compatible with a specific version of a Platform Software image.

Encapsulated Content

The eContent section of the CMS Signed-data section, as defined in [RFC 5652] section 5.2, is of the form:

Item	Offset (bytes)	Size (bytes)
Platform Software Image Descriptor (PSID)	0x00	0x20
CramFS image	0x20	Variable

The PSID is duplicated in the encapsulated content section since this part of the message is verifiable.

Signing

The platform operator provides a Platform Software signing X.509 certificate, as defined in [RFC 5280], containing an RSA 2048 bit public key in the SignerInfo section of Platform Software image.

The content section of the Platform Software image is signed using the private key paired with this public key.

Encryption

Manufacturers provide the platform operator with either a single Key Encryption Key (KEK), or a number of KEKs. Each KEK is a 2048 bit RSA public key.

The platform operator generates a new Content Encryption Key (CEK) for each distribution of the Platform Software image. The CEK is a 256 bit key.

The CEK is encrypted by the platform operator once for each KEK provided to the platform operator. Each encrypted key (i.e. {CEK}KEK) is stored in a KeyTransRecipientInfo structure of the Platform Software digital envelope.

The Platform Software image is encrypted using the CEK. The encryption algorithm used is AES-256-CBC.

Platform Software installation process

The Platform Software installation process is shown below. Further details are provided in the following sections.

1. Download the new Platform Software image and Platform Software digital envelope as described above.
2. Check the preconditions on the plaintext PSID in the Platform Software image (as described below).
3. If preconditions are met then decrypt (as described below) and verify the Platform Software image using the signature provided (as described below).

4. Check the preconditions on the verified PSID (as described below).
5. If the preconditions are met on the verified PSID then:
a. Copy the Platform Software image to a place it can be mounted from.
b. Take a copy of the signature and certificate chain to use when verifying the Platform Software image.

The next time the device leaves standby mode it shall switch to the latest locally installed version of the Platform Software image.

Under normal operation the device successfully verifies the Platform Software image using the signature provided before mounting it as a cramfs1 1 cramfs is a Linux filesystem designed to be simple, small, and to compress things well. It is used on a number of embedded systems and small devices. (http://sourceforge.net/projects/cramfs/) filesystem.

Installation notes

The Platform Software does not contain any native executable code. For added security, it is therefore recommended that the filesystem image be mounted without execute permission.

Once the image has been verified, it can be mounted into the Linux filesystem of the device, either directly, or using the loopback driver as appropriate.

If the user has disabled automatic standby on idle, the device will still alert the user that the device will enter standby and the software update will take place when no recording or other activity is taking place. The user may be presented with an option to defer the standby/upgrade procedure but not to cancel it.

If the signature verification fails, the device falls back to the last known good version of the Platform Software.

Preconditions

The device asserts the following preconditions on the PSID and the verified PSID before installing a Platform Software image and making it available for use:
1. Assert the magic cookie is 0xCA, 0xA5.
2. Assert the Platform Software packaging format version identifier is 0x00, 0x00, 0x00, 0x01.
3. Assert the required Platform API version is equal to the version of the Platform API implemented by the Core Device Software.
4. Assert the Platform Software image version is greater than the installed Platform Software image version.
5. Assert all 8 bytes of the capabilities section are 0x00.

Decryption

The Content Encryption Key (CEK) is decrypted using KEKprivate; i.e., the private key paired with KEK.

The Platform Software image is decrypted using the CEK. The algorithm used is AES-256-CBC.

KEKprivate is stored as a device secret.

Verification

Devices calculate a message digest of the signed content and verify the digital signature as described in [RFC 5652] section 5.6.

Devices assert that the Signed-data section, as described in [RFC 5652] section 5 has been signed by the platform operator according to an overarching trust model.

Certificate revocation

Manufacturers assert that no certificate in the signer's certificate chain has been revoked using the certificate revocation list (CRL) installed in the Core Device Software.

Device Configuration

The components that are involved in configuration and software updates are shown in Figure 53 and described below. The Local Storage Repository (LSR) 418 is the repository containing the device configuration and is also queried to get information about the state of the device.

For the efficient operation of the platform, a number of configuration parameters are required. A configuration mechanism is specified below that allows for configuration parameters to be adjusted by a number of configuration sources. The configuration sources are the device manufacturer 4006, the platform operator 422, the user's Internet Service Provider (ISP) 132 and the user themselves (not shown).

Introduction

For the efficient operation of the platform, a number of configuration parameters are required. A configuration mechanism is specified that allows for configuration parameters to be adjusted by a number of configuration sources. The configuration sources are the device manufacturer, the platform operator, the user's Internet Service Provider (ISP) and the user themselves. To enable this, the device configuration contains a set of defined URI prefixes from which configuration data must periodically be gathered. To these prefixes, the device appends information about its manufacturer, model, current configuration version and current Platform Software version to arrive at a complete URI to use for the configuration request. Configuration data retrieved from these URIs is signed.

A set of named configuration parameters and the configuration sources that have permission to set each of these parameters is defined by the platform operator.

The various sources of configuration data are processed in a specific order to arrive at a merged database of configuration values. The parameters that a configuration source can set are listed in the configuration signing certificate issued to the configuration source. The order the configuration sources are applied in and the parameters listed in each signing certificate determine which configuration sources are able to set and overwrite specific parameters. When manufacturer and ISP configuration files are processed, the valid parameters listed in the signing certificate are used to ensure manufacturers and ISPs only set or overwrite parameters they have permission for. This merging operation is repeated when any one of the configuration sources has changed.

Acquisition of configuration information

Configuration information is obtained from a number of configuration sources and applied in a specific order. The order that configuration sources are applied in and the set of configuration permissions are used to control which of the configuration sources is able to set specific groups of parameters.

Local configuration sources

The device contains two local sources of configuration: the manufacturer's default configuration and the platform operator's default configuration.

The manufacturer applies its default configuration to the Local Storage Repository before applying any other local or remote configuration.

The platform operator's default configuration is contained in the Platform Provisioning File provided as part of the Platform Software.

Remote configuration sources

The remote configuration sources used to configure the device are as follows and are applied in the order defined here, shown in Figure 55.

1. The Platform Configuration File 432 is provided on the network by the platform operator at a predefined location. This location defines the URI the device uses to check for updates to the platform configuration and download the new configuration file if one exists.

2. The Manufacturer Configuration File is 434 provided on the network by the manufacturer at a predefined location. This location defines the URI the device uses to check for updates to the manufacturer configuration and download the new configuration file if one exists.

3. The ISP Configuration File 7014 can be optionally provided on the network by the user's ISP if the ISP is an affiliated ISP. The device uses a single pre-defined URI to check for updates to the ISP configuration and download the new configuration file if one exists. Redirection or other means allow the file to be served by the ISP themselves.

Figure 55 illustrates how the various sources of configuration information are managed.

File format

The configuration sources listed above shall use the same file format.

Configuration files are provided as a simple XML document. The configuration file is signed using the method described below.

Authentication

The platform operator manages a configuration signing CA certificate.

Each configuration file downloaded to the device is signed by the organisation that created it using their configuration signing key and packaged with their corresponding certificate signed by the platform operator.

Devices successfully verify the signature before applying the configuration parameters. If verification of the signature fails or verification of the certificate chain fails, as defined in the overarching trust model, the configuration parameters are not applied to the device.

The signature method is CMS, as defined in [RFC 5652] with an unencrypted data section and using RSA.

The configuration signing certificate is identified as the SignerIdentifier, as described in [RFC 5652] section 5.3.

This configuration signing CA certificate is provided in the CMS Certificates section.

Certificate revocation

Manufacturers assert that no certificate in the configuration signer's certificate chain has been revoked using the certificate revocation list (CRL) installed in the Core Device Software.

Access control

The list of parameters that a configuration source is allowed to set is defined in an X.509v3 Arbitrary Extension in each configuration signing certificate. The extension allows a set of parameter names and wildcards to be specified; for example, net.delivery.* to allow an ISP to set any parameters matching that name.

The X.509v3 extension is named 'configurationPermissions' and have an Object Identifier (OID) provided by the platform operator.

The 'configurationPermissions' extension shall be of ASN.1 type SET OF < UTF8String >.

Download

Devices download new configuration data at regular intervals by using an HTTP/1.1 GET request with an If-Modified-Since header, quoting the date and time at which the last successful download of the relevant configuration file was achieved. If an Etag header was provided with a previous response, the device also uses an If-None-Match header quoting the Etag.

Devices follow HTTP redirections.

The device checks for a new configuration update and, if necessary, apply the

changes each day as specified by the update interval defined in the local storage repository. The default setting for this is provided in the platform provisioning file. Configuration updates can alter the configuration update interval for the platform operator, manufacturer and ISP. Configuration update requests only occur at a randomly selected time within the configuration and update download window. Standard back-off mechanisms are used in the event of download errors. Refer to the *IP Content Delivery for Connected Television* specification for more details.

If a device has not successfully checked for a new configuration update for seven or more days it shall perform a configuration update.

Configuration updates can change the URI of the configuration update service. If a configuration update service URI fails five times the device uses the URI provided as part of the default platform configuration.

Location

The device does not proceed with a configuration update until it has successfully downloaded a Platform Configuration File.

The device appends information about its manufacturer, model, current configuration version and current Platform Software version to the base URI to arrive at a complete URI to use for the configuration request:

http://[baseuri]/[manufacturer]/[model]/[platform_software_ver]/[config_name].xml where:

- [platform_software_ver] is the Platform Software version number extracted from the Platform
- Software Image Descriptor (PSID) of the downloaded Platform Software. The PSID is defined above.
- [config_name] is the name of the configuration to be applied retrieved from the Local Storage Repository.

The base URI of the configuration files can be changed by the configuration. However, in the event that a configuration file cannot be obtained from the modified location on five consecutive occasions, the device reverts to the default base URI for the next attempt.

The device is configured with a secondary base URI for configuration updates, and if configuration updates fail using the first base URI the device attempts the update using the secondary base URI.

Devices process manufacturer or ISP configuration files in the following way:

- If the download fails due to an authoritative response that the domain name (or a domain name referenced in an HTTP redirect) does not exist, the device treats that source as providing an empty configuration file and continue with the configuration update.
- If the download fails for any other reason (including but not limited to any non-authoritative DNS error, TCP/IP connection error, HTTP 4xx or 5xx response), devices treats this as a transient failure and continue to use the most recent successfully-merged configuration file for that configuration source, if one is available.

The URI to be used for the ISP configuration update is determined using a separate ISP discovery mechanism.

Configuration update process

When the device determines that a configuration source has changed and has downloaded the new configuration using the method described above, the device updates the configuration database using a process equivalent to that described below:

1. Start a transaction so that configuration updates can be applied atomically.
2. Initialise the configuration database with the default configuration taken from the platform provisioning file that forms part of the Core Device Software.
3. For each of the last downloaded configuration files for platform, manufacturer and ISP configuration, in that order:

a) Verify that the signature of the configuration file is valid, and the certificate is issued by the configuration certificate and has not been revoked. If successful, for each parameter:

i. Check that the parameter name matches an element in the configurationPermissions X.509 certificate extension.

ii. If the source has the permission to set this parameter or the configurationPermissions extension does not exist and the parameter has changed then update the configuration value in the database with the value from the configuration file.

4. If all configuration updates were successful then commit the configuration update transaction, otherwise return the configuration database to its previous state.

5. Activate the newly updated configuration database.

6. For all parameters that have changed, create a notification of the change.

Settings architecture

Introduction

Within the Consumer Settings User Interface (CSUI), the Settings application must display a blended view of data aggregator provided Settings as well as Original Equipment Manufacturer (OEM) specific settings.

Constraints

The system software is made up of a generic software image and a hardware specific software image. In simple terms: The generic piece contains the user interface and software logic parts, and is common to all devices. The manufacturer produces the hardware specific piece. The settings application is part of the generic software image; however it is extendible from the manufacturer software image to permit customisation of device model specific features. The two software images can be developed and deployed independently, thus the blending of settings has to be done at runtime on the device.

It is preferable that the Consumer Settings User Interface Look and Feel (CSUI LAF) is able to change over time, so the implementation should reduce dependencies on specific UI implementation.

There is a low barrier to entry for articulating settings, but there is also support for more fanciful set-ups.

Manufacturers can override generic Settings with their specific implementations.

Architecture

An example of the architecture is shown in Figure 56. The idea is that there is an XML schema (Settings Descriptor) 442 that describes a collection of settings in terms of a hierarchical structure (that can map to various User Experience (UX) navigation paradigms such as tree views, cascade list views, tabs) and logically refer to visual controls with defined parameters. The platform produces one Settings Descriptor 438 and the manufacturer produces one Settings Descriptor 440, the Settings Application shall default to the platform Descriptor 438 and merge the manufacturer one 440 in. An example fragment of XML is given in Appendix 2.

In one example there are no locale specific resource strings within the Descriptor, just references to the XML Localisation Interchange File Format (XLIFF) resource file.

The IDs are used for the merge step, to logically identify settings elements to be overridden. In one example, three merge operations are supported:

- Merge 444 - no clash. add setting
- Replace 446 - replace Aggregated Setting with Manufacturer version
- Delete 448 - remove Aggregated Setting

These merge options are shown schematically in Figure 57.

The class denotes by XML schema must comply with a standard interface thus all controls (whether GenericSettings or CustomSettings - it is merely a semantic difference,

they are all treated equally).

Implementation details

The setting nodes support the concept of multiple settings being stored in a single library Shockwave Flash (SWF) in addition to simpler one settings per SWF scheme. The rational is that certain 'stock' settings controls may share code for simplicity of development; by storing everything in one SWF can remove the need for external dependencies.

An example of how this could be implemented is that the Settings application will load the 'libraryFile' using Loader or a similar construct and then use 'getDefinitionByName' to resolve 'class' attribute. Example code for how this could be implemented is given in Appendix 3.

Figure 58 shows an example screen shot of the settings user interface. It should be noted that the range of settings accessible for the user to change is different to those that remote entities, such as manufacture and content providers, can change.

Further CREDS (Content Rights and Entitlement Display System) Aspects

CREDS is a system for indicating entitlement to content in a distributed merchant environment. The system is operated through a central search system. Even without the user being aware of his particular entitlement, the content that is available without additional cost to the user can be identified to him. To achieve this, each merchant (or provider) specifies for their content items whether the items are part of a package of subscription. Each time a user logs in, the system asks the provider whether the user has entitlement to content. The system does not however know directly what the user owns. Each merchant provides the information on the content that can be provided to a user. This concept is extensible to content that can either be purchased or consumed, and can further be applied to virtual media. For instance the purchase of an e-book can be handled by the same system. The system can be designed to show any content the user has entitlement to. It is possible to link the system to other media.

Assuming that some content providers make content available on a subscription basis, the UI ought to display which subscription plan each content item belongs to. This allows the user to determine which content belongs to a plan the user has already subscribe to (hence which content can be played immediately at no further cost); and which content the user needs to pay additional fees to view.

An exemplary display might list the following four content items with subscription information:

Gone With The Wind	£0.99 / BT Gold subscription
9MM	Lovefilm® Premier subscription
Top Gear	£0.99 / BBC WorldWide subscription
39 Steps	Netflix® Movie Deals subscription

The user has information that may not be helpful, and cannot immediately discern whether when any of these titles is selected it will play or it will request signup, registration, or payment first. The process of accessing content is laborious and inconvenient, and the user may not be inclined to consume any commercial content.

It would be very helpful for the user if it were clearly indicated which the content the user already owns (or, put formally, has an *entitlement* to) and is able to play instantly at no cost; and which content the user needs to sign up to or purchase first.

Continuing with the example from above, we will assume a scenario where the user is actually a subscriber to the BT Gold and Netflix® Movie Deals packages. A much more helpful display distinguishes content the user has entitlement to:

Gone With The Wind	✔ BT Gold

39 Steps	✔ Netflix® Movie Deals
Also available	
Top Gear	£ 0.99 / BBC WorldWide subscription
9MM	£ Lovefilm® Premier subscription

As can be seen, content that the user is able to play immediately at no additional cost – including free, ad supported and subscription content – is clearly shown in the UI, allowing users to seamlessly roam all available content rather than being presented with endless signup pages or having to remember which packages they own, when those packages expire, etc.

The user is additionally presented with content that they do not *yet* have an entitlement for, and can then make clear purchase decisions which could include signing up to that package or buying that individual video as needed.

The system for indicating entitlement to content in a distributed merchant environment is operated through a central search system. The content that is available without additional cost to the user can be shown, and the user does not need to keep track of subscription details for casual content consumption. On the basis of a set-top box platform, the user may have access to content as part of Internet Service Provider (ISP) subscription. Additional content is available free to air. Certain content may be available against payment, and other content may be available on subscription (e.g. Lovefilm® Netflix®, etc.). The freely available content may often be sufficient for the user's demands, and only occasionally does the need to buy additional content arise. Instead of showing all content regardless of entitlement, it is useful to distinguish content that is free and content that requires extra payment.

The CCO platform does not sell content to viewers. However, because it wishes to enable Content Providers to build business models on top of the platform, the metadata systems must be capable of modelling the pricing information for display to the users.

The premises for CREDS are:

- The CCO does not store user identifying information, or track user entitlement data. This key design principle has significant implications on the feature set that can be supported by this design. For example, it makes it impossible to implement a server-side "free to me" filter when browsing or searching content.
- User privacy is important. The design does therefore not call for the client to send large amounts of identifying information to CCO, such as a complete entitlements cache. This reinforces the impossibility of server-side "free to me" filtering.
- User interface performance is important. This does not specifically rule out or dictate any individual features, but is of great importance when considering overall scope of the pricing feature.
- The main user interface browses content, not products. The metadata structures and user experience have been based around hierarchies of content, and this suits free providers well. It would not be feasible to re-structure this to base browsing around a product-based paradigm, and that would also not suit all partners. However, it may be possible to introduce additional product-led browsing, such as a 'Special Offers' section of the user interface.
- The presented solution is only of a limited scope; however the pricing feature may be a significant feature.

In Figure 94 the Content Providers 1000 submit information about their content and its pricing to the server 128 via the Business-to-Business interface 142. The client device 130 may then query this data using the Business-to-Consumer interface 152. The client UI app may additionally query dynamic pricing and entitlement information direct from a CP using the Pricing Interface 9400. Finally, the CP client app may communicate with the CP's own backend systems in whatever way they choose 9402.

A 'product' is a purchasable 'unit'. A Product is a collection of content entities to which a user may purchase an Entitlement. A product may be defined in terms of specific titles – one or more. A product may be defined in terms of a rule or set of rules to group a set of titles. Ultimately products are defined in terms of logic applied to content metadata, for instance:

- WHERE id = 00001122
- WHERE provider = 'Channel4' AND classifier = 'Comedy'

An Offer 3504 (Figure 59) is a purchase proposition for a specific Product. An offer is a *time-boxed* combination of a product definition 3500 and purchase proposition 3502, where:

- The product definition 3500 sets out the rules for capturing the titles being offered
- The purchase proposition 3502 sets out the terms under which the product is being offered

An 'entitlement' 3506 is a right to view/consume a title 3508, based on uptake of an offer. The user has entitlement to any piece of content that the user 'owns' as part of a subscription or other service.

A Product is a linking record, used to group content entities for the purposes of presenting an Offer for that group. It includes:

- An identifier, which is used to reference the Product throughout the platform
- A description of each Offer for that Product
- The URL on a Content Provider Pricing Web Service where the client may query the user's entitlement to the Product
- Optionally, the URL on a Content Provider Pricing Web Service where the client may dynamically query the available offers for the Product

An offer must include certain information:

- An identifier for the offer, which is opaque to the systems, and is passed through the Business to Business (B2B) and Business to Consumer (B2C) interfaces, to be interpreted by the Content Provider's application
- A title for the offer (required for subscriptions, optional for other offer types)
- A short title, which may be used as custom text for a "purchase" action button in certain user interfaces
- The price of the offer, if no dynamic pricing URL is provided for the Product.
- A synopsis (description) for the offer, which may be a description of the offer's terms, for example
- Images associated with the offer (currently only used for subscriptions)
- A set of classifiers. The important classifier here is one describing the type of the offer, as outlined in more detail below. Additionally, genre-type classifiers may be used to place the offer into a category, in a possible future scenario where an offer-browsing section of the UI may be added

As an On-demand Publication is the basic playable entity, the simplest Product is a Product containing a single On-demand Publication, which may be played by a user who is entitled to the Product. Additionally, more complex Products are supported by this design:

- A Product containing multiple On-demand Publications, any of which may be played by a user who is entitled to the Product.
- As well as On-demand Publication(s), a Product may contain one or more Series or Brands. These are not playable assets, and so do not entitle a user to play any content; rather they may be included in a Product for convenience. In such a case, these entities are indicated in the UI as free to a user who is entitled to the Product.

Editorial Versions and Episodes may not be included in a Product.

Eligible content entities may be placed into an arbitrary number of Products. However, if an entity is placed into multiple Products with the same type of Offer, the UI may display only the one with the lowest.

An Offer is a purchase proposition for a given Product. Products are made available according to one or more of the following purchase paradigms: Transactional, Subscription, Free, or Ad-Funded. The types of Offer supported in the embodiment presented here are:

- Free. This is the default proposition where no other Offers or Products are defined. To offer something for free, the Content Provider need not define an Offer or Product.
- Rental. This offers the entitlement to watch an item(s) for a defined, non-recurring period (e.g. 24 hours).
- Subscription. This offers the entitlement to watch an item(s) for a longer period of time, (e.g. 30 days) usually on a continual basis through recurring payments.
- Ownership. This offers the entitlement to watch an item forever (subject to it still being available from the content provider).

Rental, Subscription and Ownership offers may be defined as with or without advertisements. This allows a CP to submit two packages with the same Product contents and the same basic type of offer but with a full-price and a lower, advertising-supported price.

The basic format for an Offer is one whereby a price and some terms are defined as a purchase proposition for a Product. If the user purchases that offer, they become entitled to the contents of the Product. This is a Per-Product Offer, which leads to a Per-Product entitlement.

For convenience, an additional format of Offer is defined, the Per-entity Offer. In this case, the purchase proposition is for a single item. For example, a CP may wish to offer a large number of their content items, each for a 99p rental. They may group these into a single logical Product, because the purchase proposition for each item is the same. However, if a user purchases the offer for one of these items, the entitlement shall only apply to that item, not all items in the Product. This is a Per-entity Offer. In other words, a Per-Product Offer means "buy all these things for this price", whereas a Per-entity Offer means "buy any of these things for this price".

Content Providers can make content only available to certain users, through features such as Closed User Groups (CUGs) and Geographical targeting metadata. It should be noted that such restrictions may not be applied to Packages, so it is not possible to offer different prices for the same content to users in different locales or CUGs. However, the availability of the content within a Product dictates the visibility of an Offer; if none of the content within a Product is available to a particular user because of his location for example, then the Offer is not available to him either.

The following user interfaces may be used to display pricing and entitlements information.

Programmes in the carousel:

The carousel is a simple browse view, in which content entities are represented as images in a horizontally-scrolling list. The amount of data displayed about an entity is kept to a minimum, because otherwise the display may be confusing to users. Therefore, the pricing data displayed in this view is simple.

The following illustrates which data may be included. A Programme may be badged with:

- A simple play icon for free content (where one or more Publications of the Programme are free)
- A simple play icon for content to which the user is already entitled (where the user is entitled to one or more Publications of the Programme)
- A simple "pay content" icon for content for which the user will have to pay
- One rental price (the lowest price with or without adverts)
- One subscription price (the lowest price with or without adverts) or a subscription icon
- One purchase price (the lowest price with or without adverts)
- Some combination of the above prices

Roll-up

In the carousel view, rolled-up Series and Brands representing a multitude of individual Programmes may also be displayed alongside Programmes. No pricing or entitlements data from the child Programmes is rolled-up to the Series or Brand. However, the Series or Brand itself may be a member of one or more Product(s), in which case pricing or entitlement information for the Series or Brand itself may be displayed. A Series or Brand may be badged with:

- Nothing for a Series/Brand which is not a member of any Products
- Nothing for a Series/Brand which is a member of a Product to which the user is already entitled
- A simple "pay content" icon for a Series/Brand which the user may purchase an entitlement to
- One rental price for the Series/Brand (the lowest price with or without adverts)
- One subscription price for the Series/Brand (the lowest price with or without adverts) (or a subscription icon)
- One purchase price for the Series/Brand (the lowest price with or without adverts)
- Some combination of the above prices

For example, a Series is offered for £9.99 for rental, and each Programme in that series has a Publication which is available for a 99p rental. Depending on the user's entitlements, they may see a price or a play icon (or no icon for the Series, as this is not a playable entity) against each item when it appears. The same treatment could apply to a Brand as well as a series.

Action Panel

The Action Panel is a display where more information about a particular entity is presented. For Programmes, this panel is where Offers are presented. Here, there is more screen real-estate, and so more detailed information can be displayed. Options of what can be shown here include:

- A button for each available Offer (limited to one per Offer type)
- A button for each Offer, further limited, perhaps to the cheapest transactional price and the cheapest subscription price
- A description of each of the Offers, plus a single "buy" button, which passes the user to the CP player to select an Offer

Additional Offers may or may not be shown on a "more offers" tab of the action panel.

There are many ways of implementing the CREDS function. In the following section one possible approach is described.

The system is composed of three parts:

1. At the point that content providers push their content metadata into the metadata aggregation system (MAS), they include not just the price point (for pay-per-download content) but also the name of any subscription packages that the content is available as part of.
2. When the UI has a list of programmes to display in the UI, instead of just listing all the price points and subscription names, it first makes a call to each of the content providers associated with the subscription that each result belongs to, to determine if the user is a member of that subscription.
3. The UI then sorts and filters the results based on content that the user has an entitlement to vs. content that the user needs to purchase.

In further detail:

1. Ingesting content into the MAS: In a conventional system, when a content provider sends programme metadata to the MAS, the provider is able to include an optional price point, plus a URL where the user device is able to do a real-time lookup of that price point at the point the programme is displayed as a search result, e.g.:

TopGear Episode 12
£0.99

https://bbc.com/packagecheck.aspx

The data that the content provider is able to specify additionally includes a set of optional subscription package names, along with a user-friendly description for each of those packages, e.g.

TopGear Episode 12
£0.99
bbcww_premium / BBC WorldWide Premium Subscription
https://bbc.com/packagecheck.aspx

This tells the MAS that TopGear Episode 12 is available either for individual file purchase for £0.99, or is available as part of the bbcww_premium package.

2. Determining if the user has a package entitlement: In order to fulfil the real-time lookup of whether a given user is a member of any of their subscription packages, each participating content provider who wishes their content to be flagged as part of the CRED system would need to implement a web service that takes as input a package name and user credentials, and returns as a response:
   - a flag indicating whether the user is a current subscriber to that package or not
   - if yes, the date and time that the user's subscription to this package expires

   The UI can then make a call to the content provider for each listed package, to check whether the user is a member of that package. The procedure here is not dissimilar to that already envisaged as part of the dynamic price lookup plan. In the example above, the user device would make a call to
   https://bbc.com/packagecheck.aspx
   passing it the package name ("bbcww_premium") along with any user credentials stored in the user cookie associated with that domain.
3. Presenting the results in the UI: Now, anytime that the UI displays file search results, on-demand category lists, etc., instead of listing all the programme titles and price points, the UI sorts and filters the results based on content that the user has an entitlement to vs. content that the user needs to purchase.

In the above described implementation, each provider determines if a particular content item is part of a user's package of subscription content. When a user logs in, the system goes to the provider to ask whether the user is entitled to the content. There is no need for an ownership list, or for the system to compile information on each content item the user has entitlement to.

The same concept is applicable to other content that can either be purchased or directly consumed, for instance virtual media such as e-books.

CCO metadata interfaces and processing

As illustrated in Figure 94, the Content Providers 1000 may submit pricing metadata to the CCO 128-1 via the Business-to-business interface 142, and this data (often in a denormalised form) is made available to client devices 130 via the Business-to-consumer interface 152. The form this process takes is described in more detail here.

Business-to-business interface

The Content Providers may submit Product-Offer Records as a Package Fragment in the TV-Antyime Business-to-business interface. These fragments describe both a Product and its associated Offer(s), and are identified by a unique identifier (a CRID). It should be noted that packages themselves do not have availability dates. It is up to the Content Provider to manage the availability of their offers, amending or deleting them as necessary using the B2B interface.

The Package fragments (9410 Figure 95) do not directly list the content entities which are included in the Product being represented. This is because the list of entities

could become very large, for example with large subscription products. If updating the product definition involved re-submitting the entire list this would be technically onerous for both the CP and CCO. Instead, Product Membership Fragments 9412 are supplied in addition to the Package fragments 9410 and the content description fragments 9414 themselves. These Product Membership Fragments 9412 are the "glue" which joins content entities and Products. Each one contains the CRID of one content entity, limited to On-demand Publications and Group Records (Collection, Series or Brand), and the CRID(s) of the Package(s) to which that entity belongs.

Figure 95 illustrates how the Product Membership Fragments 9412 may be used to place multiple On-demand Publications 4914 into multiple Packages 9410 in different combinations.

The Package fragment contains inline information about each Offer which is available for the Product. The offer information represented is as described above. The Offer may include a private identifier, which may be of any format chosen by the Metadata Originating Party. The Package also includes information as to whether it contains Per-Product Offer(s) or Per-entity Offer(s).

Denormalisation and processing

CCO is required to do some processing on pricing information internally. The pricing information supplied in a highly normalised form at the B2B must be denormalised so that it may be exposed on the B2C against the content entities to which the prices are attached.

The first processing to be done is some ingest business logic and validation. The number of Products to which any entity can belong is limited, and Product Membership Fragments containing too many Product IDs are rejected. Additionally, a Package Fragment may only contain one of each type of Offer, and any duplication causes the Package to be rejected.

Denormalisation is performed so that simplified pricing information is presented at the Programme level, based upon the pricing information provided for its child On-demand Publications. However, no denormalisation takes place upwards from the Programme level. In other words, Publication pricing is not indicated at Series or Brand level in the B2C.

No inheritance is performed on pricing information. If a Series or Brand is included in a Product, this membership is indicated against that entity in the B2C but not inherited by child entities. Entitlements to these group entities do not enable the viewer to play any assets. Instead, the inclusion of a Series or Brand in a Product simply causes it to be indicated as purchased to a viewer who has purchased the Product.

Business-to-consumer interface

The B2C interface utilises a dedicated endpoint to expose pricing information. Additionally, some summarised information is provided against content entities. This allows the client device to offer a way to browse the contents of a Product (e.g. when "buy series" is presented, the user could click to see what episodes that includes).

The B2C interface offers a dedicated endpoint for retrieving Offers. It returns offers for a Brand, Series, On-demand Publication or a Programme. In the latter case, the list of Offers returned is the union of all Offers for all currently available Publications of that Programme.

The Offers endpoint returns an Atom document in the same way as all other B2C XML endpoints. Each entry in the feed describes an offer, including some information about the Product to which it applies, using the following format:

```
<entry>
        <yv:entityType>offer</yv:entityType>
        <id>{the CP-supplied ID of the Offer}</id>
        <title>{the Offer title}</title>
        <yv:shortTitle>{an optional short title, used to populate an action button in the UI}</yv:shortTitle>
```

<summary>{an optional brief description of the Offer, such as its terms}</summary>
<yv:publicationId>{where the endpoint is called with a Programme ID, each Offer includes this element, containing the CRID and IMI of the child Publication (concatenated, separated with a #) to which the Offer applies}</yv:publicationId>
<yv:productId>{the CCO ID of the Product to which this Offer applies}</yv:productId>
<yv:productCRID>{the CP-supplied CRID of the Product to which this Offer applies}</yv:productCRID>
<yv:offerType>{the type of this Offer (rental, subscription, ownership, with or without adverts}</yv:offerType>
<yv:price>{the price of this Offer}</yv:price>
<yv:currency>{the currency of this Offer's price}</yv:currency>
<yv:offersURL>{the URL on a CP Pricing Web Service where the current Offers for the Product may be queried}</yv:offersURL>
<yv:entitlementsURL>{the URL on a CP Pricing Web Service where the user's entitlement to the Product may be queried}</yv:entitlementsURL>
</entry>

Programme

The B2C interface presents two views of the Programme entity, a full representation and a summary. The Programme Summary is used to populate the Carousel view in the user interface. Only basic information is required in order to badge the Programme with pricing information, and that information is based on Offers made for any of the child On-demand Publications. Up to three elements are included, one for each type of Offer (rental, subscription, ownership). The element text is the price of the lowest available offer of that type, from any available On-demand Publication of the Programme. If no Offers of a particular type are available, the relevant XML element is excluded from the feed.

For example, a Programme with an SD rental available for 99p, an HD rental available for £1.99, a subscription package available for £9.99 and an SD ownership offer would have the following elements:

<yv:rentalOffer>0.99</yv:rentalOffer>
<yv:subscriptionOffer>9.99</yv:subscriptionOffer>
<yv:ownershipOffer>1.99</yv:ownershipOffer>

In addition, the client device calculates if the user is already entitled to one or more Publications of the Programme. To do this, it uses the CRIDs and IMIs of each On-demand Publication and the Product CRIDs for each Offer which includes any of those Publications. These are indicated with zero or more <yv:ondemandId> and zero or more <yv:productCRID> elements.

Under circumstances a currency can be included for each Offer. If Offers are available in multiple currencies, a mechanism is included to convert currencies and determine the lowest price.

The full Programme need not include any pricing information, as the client device is expected to query the Offers endpoint in order to retrieve all offers when displaying full Programme information.

When a Series or Brand is displayed in the user interface, pricing and entitlement information may be displayed for the Series or Brand itself. The information required is similar to the Programme summary, being a simplified form of all the available offers.

Up to three elements are included, one for each type of Offer (rental, subscription, ownership). The element text is the price of the lowest available offer of that type. If no Offers of a particular type are available, the relevant XML element is excluded from the feed.

For example, a Series with an SD ownership Offer available for £9.99, an HD ownership Offer available for £14.99, a subscription package available for £12.99 and no

rental Offers would include the following:

<yv:ownershipOffer>9.99</yv:ownershipOffer>

<yv:subscriptionOffer>12.99</yv:subscriptionOffer>

In addition, the client device needs to calculate if the user is already entitled to the Series or Brand. To do this, it needs the CCO Product ID for each Per-Product Offer to which the Series/Brand belongs. These is indicated with zero or more <yv:productCRID> elements.

Client metadata handling

As CCO does not store identifying user information, it is necessary for the client device to ascertain whether the user is entitled to each Product. In order to be able to calculate which content is free to the client, the client device needs to keep a cache of the user's entitlements.

In order to cache Per-Product entitlements, the cache must contain:

- The CRID of the Product to which the entitlement applies
- An (optional) expiry time for the entitlement

For Per-entity entitlements, the cache instead needs to cache:

- The CRID and IMI of the On-demand Publication to which the entitlement applies
- An (optional) expiry time for the entitlement

For each Programme in a browse or search view, it is then possible for the client device to compare the Product CRIDs and the CRIDs and IMIs of Publications to those stored in the entitlements cache. Where a match is found, the user is entitled to a Publication, and thus the parent Programme is marked as free-to-me. The same comparison may be done for Series and Brands, using only Product CRIDs; if any CRIDs stored against the Series or Brand match those stored in the entitlements cache, then the entity is marked as free-to-me.

In order to allow entitlements management locally to the device, and to enable a Content Provider to manage entitlements without requiring a Pricing Web Service, an Application Programming Interface (API) is exposed on the device which allows client applications to add, remove and query entitlements from the cache. The basic methods are getEntitlement(), setEntitlement(), removeEntitlement(), though variants for each may be required in order to manage entitlements based on both Product CRIDs and Publication CRIDs/IMIs.

- The getEntitlement() method accepts a CRID (or CRID/IMI) and return the expiry of the entitlement, or a response indicating that no entitlement exists.
- The setEntitlement() method accepts a CRID (or CRID/IMI), a type (rental, subscription, ownership), and an expiry date-time. It need only return a success/failure notification.
- The removeEntitlement() method accepts a CRID (or CRID/IMI) and return a success/failure notification.

Modifying an entitlement is achieved using setEntitlement, whereby if an entitlement already exists with the same type and CRID (or CRID/IMI) then it is simply overwritten. The security model ensures that an app only has access to read/remove entitlements it has set.

There are four possible filtered views of content, which could be made available in a browse or search listing.

- Free: Only content which is cost-free is displayed. This means content which is free to everyone. Programmes with any free Publication are included, as are rolled-up Series or Brands which have any free Programmes.
- Paid: This view shows content which has an associated cost, be it transactional or subscription-based. Programmes with any paid Publication are included, as are rolled-up Series or Brands which have any paid Programmes.
- Free to me: This filter shows only content which is free to a particular user, based upon their entitlements. It may be described as the results of the Free filter, plus any content to which the user already owns an entitlement. Programmes with any free

(to the particular user) Publication are included, as are rolled-up Series or Brands which have any free (to the particular user) Programmes.

- Paid to me: Content which is available to the particular user for a cost. It may be described as the results of the Paid filter, minus any content to which the user already owns an entitlement. Programmes with any paid (to the particular user) Publication are included, as are rolled-up Series or Brands which have any paid (to the particular user) Programmes.

Free-to-me and Paid-to-me are supported by a client-side comparison of the content's packages and the entitlements cache. Server-side free-to-me and Paid-to-me can additionally be supported in an alternative embodiment. Sorting by price could be supported if server interaction were enabled.

Entitlements API

In one example, to allow entitlements management locally to the receiver device, and to enable a Content Provider to manage entitlements without requiring a compatible Pricing Web Service, an Application Programming Interface (API) is exposed on the device which allows client applications to add, remove and query entitlements from the store.

The basic methods will be getEntitlement(), setEntitlement(), removeEntitlement(). The getEntitlement() method accepts an identifier (i.e. a CRID or a CRID/IMI) and returns the expiry of the entitlement, or a response indicating that no entitlement exists. The setEntitlement() method accepts a CRID (or CRID/IMI), an offer type type (rental, subscription, ownership), an entitlement type (ondemand or product) and an expiry date-time. It need only return a success/failure notification.

The removeEntitlement() method accepts a CRID (or CRID/IMI) and returns a success/failure notification. Modification of an existing entitlement may be achieved using setEntitlement(). If an entitlement already exists with the same type and CRID (or CRID/IMI) then it is simply overwritten.

Content Provider application hand-off

When a user plays a Publication, or requests to make a purchase, the existing application hand-off mechanism is used. This employs a key-value pair method for passing data to the CP application. The pricing information which is passed is the CP-supplied ID of the Offer which the user has selected.

Content Provider Pricing Web Service

Content Providers may wish to provide a Pricing Web Service (PWS), which enables client devices to dynamically query pricing-related information direct from the CP. Two types of dynamic information may be provided:

- Dynamic Offers – in this scenario, the CP may provide up-to-date Offers, tailored to the particular user and the time of the request. (9404 Figure 94)
- Dynamic Entitlements – in this scenario, the CP provides a means by which a client device can query a user's entitlement to a Product. (9406 Figure 94)

The dynamic Offers service is an XML web service which accepts a URL parameter product, in which the client device may provide a Product CRID, or multiple Product CRIDs separated by pipe characters (|). The PWS returns an XML response in the Atom format, as used by the B2C Offers endpoint. The following B2C elements are however not required and are absent from a PWS response:

- yv:productId (the CP has no knowledge of CCO Product IDs, and so cannot provide this information
- yv:publicationId
- yv:offersEndpoint

Multiple Offers may be returned for each Product, each one being represented as an entry in the Atom feed. It should be noted that Offers are queried from a PWS using a Product CRID. This means that Offers may only be returned for Products which are already

defined in CCO. CPs are therefore not able to use a PWS to create new Products outside of CCO. Similarly, because the Offers returned apply to Products and not individual Entities, a PWS may be used to make a new offer for a Per-entity Product, but not for individual entities within it.

The dynamic Entitlements service is an XML web service which accepts a URL parameter product, in which the client device may provide a Product CRID, or multiple Product CRIDs separated by pipe characters (|). The PWS returns an XML response in the Atom format. Each entry in the feed represents a Product, and the <id> element of the entry contains the Product CRID. For each Product queried, there are four possible conditions:

1. If the user is not entitled to that Product, then no entry for that Product appears in the feed. This means that if the user is entitled to none of the Products queried, the response is an empty atom feed.
2. If the Product is offered in a Per-Product manner (i.e. if entitlement to the Product entitles the user to all entities within that Product) and the user is entitled, the Product is included in the response. All that is required is an entry with the Product CRID:

```
<entry>
        <id>crid://...</id>
</entry>
```

3. If the Product is offered in a Per-entity manner (i.e. if the user purchases entitlement to a single Publication within the Product, not the whole Product) then the response includes the CRID and IMI (separated by a #) of each Publication to which the user is entitled:

```
<entry>
        <id>crid://...</id>
        <yv:publicationId>crid://...#imi</publicationId>
        <yv:publicationId>crid://...#imi</publicationId>
        <yv:publicationId>crid://...#imi</publicationId>
</entry>
```

Based upon the response, the client device can then update its entitlements cache with the entitlements provided.

User identification

A possible mechanism for the PWS to identify a device is via a CP Portal that must be launched once, whereby a negotiation can take place with CP backend, resulting in a user ID (unique to the user and specific to the CP) which may be stored on the device. This CP-specific user ID may be stored on the device as a cookie, an LSR value, or an additional table in the entitlements cache.

Security

The PWS need not apply any security or encryption. This is because the requests and responses never actually entitle a user to play any content; rather they simply affect the display of items in the user interface. Should a user or another malicious party intercept and alter the responses from a PWS, the user would not be able to play any content to which they are not entitled, as final entitlement checks are carried out privately by a CP's application and media or DRM servers at playback time.

CREDS: Entitlements and Offers – Examples

Following examples illustrate viewer scenarios relating to entitlement:

- The viewer understands which content can be played immediately at no further cost.
- The viewer understands which content can be played immediately as a result of CP packages to which the user has subscribed.
- The viewer understands which content cannot be played immediately without incurring further cost.
- The viewer understands the offers available for purchasing content.

- The viewer can select from the offers available for purchasing content, quickly accept the offer and then view the content.

Following examples illustrate content provider scenarios relating to entitlement:

- The content partner can offer products on a free-to-all basis.
- The content partner can offer products on a transactional (e.g. pay-per-view) basis.
- The content partner can offer products on a subscription basis.
- The content partner can offer products on an explicitly ad-funded basis.
- The content partner can offer products on a time-limited discounted basis, clearly indicating this to the viewer.
- The content partner can construct products containing a single title, and present these products as purchasable items in an appropriate part of the listings.
- The content partner can construct products containing many titles, and present these products as purchasable items in an appropriate part of the listings.
- The content partner can quickly update pricing for specific products.
- The content partner can dynamically price content on a per-user, per-title basis.
- The content partner can clearly define and present price promotions for products.
- The content partner can clearly signpost a title's membership of a purchased or available subscription, so as to reinforce the value of the content partner's subscription packages.

Figure 60 illustrates an overview of a system with offer/entitlement features.

Figure 77 shows a sequence diagram of a system with offer/entitlement features. A generic example of pricing/packaging logic may include the following steps:

```
Get list of packages
For each package in list: check package types
if (package_type "free" is not found) then
    Update & Query entitlements cache
if (entitlement does not exist) then
        Where (package type == 'transactional' || 'ad funded') then
            For each package in list: get price for package
                if (price != null) then
                    'store' [package, static price]
            For each package in list : get price url for package
                if (price URL != null) then
                    lookup price on CP pricing server (or could just pass the URL
                    back, and call out from the client)
                    'store' [package, dynamic price]
Where (package type == 'subscription') then
            For each package in list : store subscription details
            'store' [package, image url, subscription url]
Present page -> play button is disabled;
Subscription packages -> image is presented for each subscription package
Transactional & Ad funded packages :
                if one price exists then present this price
                if two prices exist (i.e. static & dynamic)
                    if dynamic price = static price then present this price
                    if dynamic price < static price then 'special offer' (present both, with
                    static price struck through)
                    if dynamic price > static price then ERROR
if (package_type "free" is found || existing entitlement is found) then
    present page -> play button is enabled; no further pricing information is presented.
```

Figure 61 illustrates a scenario where the content is free. This may be implemented via content metadata, for instance:

```
<Product id="456">
    <Title>Fish Called Wanda</Title>
    ...
    <Packages>
        <Package package_type="free" />
    </Packages>
</Product>
```

Figure 62 shows an example of a display presented to the user in the scenario where the content is free. Because content is free the play button is rendered. Because content is free there is no further pricing information presented.

Figure 63 illustrates a scenario where the content is pay-per-view, with a static price. In this case the content metadata would reflect this, for instance:

```
<Product id="456">
    <Title>Fish Called Wanda</Title>
    ...
    <Packages>
        <Package package_type="transactional">
            <Name>FishCalledWanda_T_0299</Name>
            <Price>2.99</Price>
        </Package>
    </Packages>
</Product>
```

Figure 64 shows an example of a display presented to the user in the scenario where the content is pay-per-view, with a static price. Because the viewer does not own an entitlement the play button does not appear. Because the content is available on a transactional basis, with a static price, that price is presented. Figure 65 illustrates the process of a purchase transaction. On 'Select' the viewer is taken to the relevant supplier's portal to complete the transaction, and thereon to view the content. Thereafter, if the entitlement persists (for 24 hours, for example), when the viewer returns to the listing within the application they are presented with the screen shown in Figure 63 (i.e. no price is presented, and the play button is presented). Once the entitlement expires the viewer is presented with the original screen (Figure 64).

Figure 66 illustrates a scenario where the content is pay-per-view, with a dynamic price. In this case the content metadata would reflect this, for instance:

```
<Product id="456">
    <Title>Fish Called Wanda</Title>
    ...
    <Packages>
        <Package package_type="transactional">
            <Name>FishCalledWanda_T</Name>
            <Pricing_URL>
http://creds.lovefilm.co.uk/price?user_id=123&product_id=456
            </Pricing_URL>
        </Package>
    </Packages>
</Product>
```

Figure 67 shows an example of a display presented to the user in the scenario where the content is pay-per-view, with a dynamic price. The viewer is unaware as to the dynamic nature of the pricing – it appears exactly as it did in the previous (static) scenario. The process of a purchase transaction is same as in the previous (static) scenario.

Figure 68 illustrates a scenario where the content is pay-per-view, with and without advertisements. In this case the content metadata would reflect this, for instance:

```
<Product id="456">
```

```
<Title>Fish Called Wanda</Title>
...
<Packages>
    <Package package_type="ad-funded">
        <Name>FishCalledWanda_A</Name>
        <Pricing_URL>
http://creds.lovefilm.co.uk/price?user_id=123&product_id=456
        </Pricing_URL>
    </Package>
    <Package package_type="transactional">
        <Name>FishCalledWanda_T</Name>
        <Pricing_URL>
http://creds.lovefilm.co.uk/price?user_id=123&product_id=456
        </Pricing_URL>
    </Package>
</Packages>
</Product>
```

Figure 69 shows an example of a display presented to the user in the scenario where the content is pay-per-view, with and without advertisements. The process of a purchase transaction is same as in the previous scenarios (static and dynamic price).

Figure 70 illustrates a scenario where the content belongs to a single subscription package, to which the viewer is already subscribed. In this case the content metadata would reflect that it belongs to a subscription package, for instance:

```
<Product id="456">
    <Title>Fish Called Wanda</Title>
    ...
    <Packages>
        <Package package_type="subscription">
            <Name>Love Film Gold</Package_Name>
        </Package>
    </Packages>
</Product>
```

Figure 71 shows an example of a display presented to the user in the scenario where the content belongs to a single subscription package, to which the viewer is already subscribed. As the entitlement exists the play button is presented. As the entitlement exists because of an existing subscription, the logo for that subscription is presented.

Figure 72 illustrates a scenario where the content belongs to a single subscription package, to which the viewer is not subscribed. In this case the content metadata reflects that it belongs to a subscription package, for instance:

```
<Product id="456">
    <Title>Fish Called Wanda</Title>
    ...
    <Packages>
        <Package package_type="subscription">
            <Name>Love Film Gold</Package_Name>
        </Package>
    </Packages>
</Product>
```

Figure 73 shows an example of a display presented to the user in the scenario where the content belongs to a single subscription package, to which the viewer is not subscribed. As the entitlement does not exist the play button is not presented. The logo for that subscription is presented, which when selected takes the viewer to the portal page where they can subscribe. Figure 74 illustrates the process of a subscription transaction, similar to the purchase transactions described above.

Figure 75 shows an example of a display presented to the user in a scenario where the content belongs to multiple subscription packages. In this case the content metadata reflects this, for instance:

```
<Product id="456">
    <Title>Fish Called Wanda</Title>
    ...
    <Packages>
        <Package package_type="subscription">
            <Name>Love Film Silver</Package_Name>
        </Package>
        <Package package_type="subscription">
            <Name>Love Film Gold</Package_Name>
        </Package>
    </Packages>
</Product>
```

Figure 76 shows an example of a display presented to the user in a scenario where there are multiple offers (transactional and subscription) for the content. In this case the content metadata reflects this, for instance:

```
<Product id="456">
    <Title>Fish Called Wanda</Title>
    ...
    <Packages>
        <Package package_type="subscription">
            <Name>Love Film Silver</Package_Name>
        </Package>
        <Package package_type="subscription">
            <Name>Love Film Gold</Package_Name>
        </Package>
        <Package package_type="transactional">
            <Name>FishCalledWanda_T_0299</Name>
            <Price>2.99</Price>
        </Package>
        <Package package_type="ad funded">
            <Name>FishCalledWanda_A_0099</Name>
            <Price>0.99</Price>
        </Package>
    </Packages>
</Product>
```

Mechanisms are provided for cases where there is no user ID for the content provider. In the user interface, the screens that need to deal with offer/entitlement information are defined. Under circumstances, the amount of information that is presented to the user is reduced, to improve ease of use. Further purchasing or upsell options (e.g. title is part of a 'box set') may be presented. Special provisions may be included for purchasable series, or other collections within the brand/series/episode hierarchy.

Further ISP Discovery Aspects

Devices support remote configuration by the platform operator, Internet Service Providers (ISPs) and OEMs. The device discovers which ISP network it is connected to and downloads the ISP configuration using the following process. First, the device reads the location of the ISP Discovery Service (IDS) from the local configuration on the device. The device then makes a call to the IDS requesting the device configuration. The IDS uses the IP address of the request to determine the ISP and redirects the device to a URL that was provided to the device by the IDS. The URL provided to the device is the location of the ISP Configuration Service (ICS) that the ISP hosts to return XML configuration to the device.

Next, the device receives the ISP configuration and applies the configuration parameters to the configuration and data store on the device. The ISP Discovery Service (IDS) is hosted by the platform operator and is called every time the device checks for new ISP configuration.

ISP Configuration

An ISP that enables the features described here operates an ISP Configuration Service (ICS) to enable it to configure devices on their network. This section describes the ICS, the features it enables on the device and the web service interface to be implemented by an ISP wanting to enable such functionality.

Configurable Features

The list of features that the ISP can enable by providing configuration via the ICS is as follows:

- The location of the ISP VOD portal application
- Customise the help text so that the viewer knows how they can contact the ISP to get support
- Configure the location of the ISP post-setup welcome video that when configured shall play at the end of the device setup process
- Configure identifiers that represent the viewer or specific ISP content sets that are available to the viewer. These identifiers are sent to the Metadata Aggregation Service (MAS) and the search service so that ISP content sets available to the viewer appear in search results and other on-demand content lists returned by the Metadata Aggregation Service (MAS).
- Enable and configure the remote diagnostics of the device by the ISP
- Enable and configure the end-point URLs for other ISP provided services. e.g. IP Channels or MQT URLs.
- (optionally) Other ISP configuration information

The ICS and web service mechanism described may be used to authenticate the device to provide authoritative information that is relied upon to authenticate other ISP services.

Figure 78 shows the data flow of ISP configuration parameters 451 and the components on the device 130 that use the configuration parameters provided by the ICS 7008.

ISP Configuration Service (ICS)

The ICS can be as simple as a web server that hosts an XML configuration file where the configuration is the same for every device or it can be a web service that automatically generates a unique configuration for every device.

The ICS Web Service API

The ICS web service API is the interface that the device uses to download ISP configuration from a web service. The device stores the ETag for the latest ISP configuration update and sends that with every request. If the ISP configuration for the device has not changed, the ICS responds with a HTTP 304 Not Modified status code and an empty body. If the ICS does not want to provide ISP configuration to a specific device, it responds with a HTTP 204 No Content status code and an empty body. If the ICS configuration download fails due to an authoritative response that the domain name (or a domain name referenced in an HTTP redirect) does not exist, the device treats the ISP configuration as providing no ISP configuration. If the ICS configuration download fails for any other reason (including but not limited to any non-authoritative Domain Name Server (DNS) error, Transmission Control Protocol / Internet Protocol (TCP/IP) connection error, HTTP 4xx or 5xx response), devices treat this as a transient failure and continue to use the most recent successfully-merged configuration from the ISP.

ISP Configuration Location

The device checks for new configuration when it boots and again after a configurable update interval has expired. The platform operator and ISP can also configure a software update window. All software and configuration updates except for the configuration update that happens at boot occur within the software update window. By default the software update window is configured to be the whole day.

If the configuration for the device has changed, it downloads the new configuration and applies it to the device. The URI that is used to check and download the configuration is created by appending information about the device and the configuration name to the base URI. The resultant URI is as follows:

[baseuri]/[manufacturer]/[model]/[device_id]/[core_sw_ver]/[platform_software_ver]/[config_name]

Where:

[baseuri] is obtained from the isp.config.update.baseuri parameter in the LSR. The baseuri can be configured to point to testing, staging or live environments as required.

- [manufacturer] is the manufacturer's name, URL encoded and obtained from the "oem.name" item in the Local Storage Repository.
- [device_id] is the unique device ID. This ID is tied to the device and shall remain the same after a factory reset or software upgrade.
- [core_ sw _ver] is the manufacturer's Core Device Software version number. i.e. the version of the manufacturer's software/firmware image.
- [platform_software_ver] is the Platform Software version number extracted from the Platform Software Image Descriptor (PSID) of the downloaded Platform Software in the format [major_version].[minor_version].[revision] which are fields of the PSID as defined in 'Consumer Device software Management' above.
- [config_name] is the name of the configuration to be applied. This value is retrieved from the Local Storage Repository item named "isp.config.update.configname" e.g. latest.xml.cms

Configuration Format

The body of the HTTP response returned by the ICS shall be the same format as all other configuration sources for the device so that the same software on the device can be used to update the data aggregation system, ISP and OEM configuration.

The XML schema for the ISP configuration format is seen below:

```
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns="http://refdata.youview.com/schemas/youview-config/2010-05-05"
targetNamespace="http://refdata.projectYouView.info/schemas/youview-
config/2010-05-05">
<xsd:annotation>
<xsd:documentation xml:lang="en">
</xsd:documentation>
</xsd:annotation>
<xsd:element name="config" type="Config"></xsd:element>
<xsd:complexType name="Config">
<xsd:sequence>
<xsd:element name="item" maxOccurs="unbounded">
<xsd:complexType>
<xsd:simpleContent>
<xsd:extension base="xsd:string">
<xsd:attribute name="name" type="xsd:string"></xsd:attribute>
</xsd:extension>
</xsd:simpleContent>
</xsd:complexType>
</xsd:element>
</xsd:sequence>
<xsd:attribute name="version" type="xsd:int"></xsd:attribute>
</xsd:complexType>
</xsd:schema>
```

The Local Storage Repository (LSR) is a simple key/value store that stores all parameters as strings. Also, these values are represented as strings when they are encoded in the XML of the ISP configuration. It is therefore necessary to describe the format of each of the parameter types so that when creating and reading these values the format of the string can be used.

The data formats for the configuration parameters are described in the table below.

Data Format Name	Data Format	Description
string	any string	
int	32bit integer	
uint	16bit integer	
double	64bit	
boolean	boolean = "0" | "1"	1 for true or 0 for false. Any other value is invalid and not true or false
enum	Enum = [enum_value] enum_value = string that must be one of a set pre-defined valid strings for each enum parameter	e.g. the hardware.display.analogue.shape parameter must contain either the string "WIDE" or "SQUARE"
uri	any URL	
time_t	64bit integer	Seconds since '00:00:00 1970-01-01 UTC', i.e. date +%s, e.g. 1281543694
time_of_day	hh:mm:ss	The time of day using the 24hr clock and 2 digits for hours, minutes and seconds i.e. date +%T e.g. 17:22:08
version_number	version_number = major ["." minor] ["." revision] major = uint minor = uint revision = int	e.g. 3 or 3.1 or 3.1.13

An example of the XML schema for the ISP configuration is seen below:

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE c:config SYSTEM "youview-config.dtd">
<c:config xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:c="http://refdata.youview.com /schemas/youview-config/2010-05-
05" xsi:schemaLocation="http://refdata. youview.com /schemas/youview-
config/2010-05-05 ../../cantec.config/schema/youview-config.xsd">
<item name="platform.ui.mainmenu.ispmenuitem.label">ISP Name</item>
<item
name="platform.ui.mainmenu.ispmenuitem.applicationurl">http://www.isp
.com/youview/application.swf</item>
<item
name="platform.ui.mainmenu.ispmenuitem.overcolour">0xCC0000</item>
<item
name="platform.ui.mainmenu.ispmenuitem.imageurl">http://www.isp.com/y
ouview/images/ispLogo.png</item>
<item
name="platform.ui.mainmenu.ispmenuitem.overimageurl">http://www.isp.c
om/youview/images/ispLogoOver.png</item>
</c:config>
```

Authentication

The configuration XML returned by the ICS may be signed or encrypted.

Access Control

The device only applies ISP configuration parameters that have a name matching one following namespaces:

- isp.*
- platform.software.update.window.*
- platform.ui.mainmenu.ispmenuitem.*

Where the * indicates any configuration parameters at that level in the hierarchy and any child parameters.

ISP Discovery Service (IDS)

The ISP Discovery Service process is illustrated in Figure 79. The ISP Discovery Service (IDS) 7004 is used by the device 130 to determine the ISP network that the device 130 is connected to and redirects the device to the ISP Configuration Service (ICS) 7008 for that ISP. The base URI is configured by the Platform Operator and contains the location of the ISP Discovery Service 7004. The device 130 has no knowledge of the ISP discovery service 7004 and simply makes a HTTP request for the ISP configuration and follows a redirect. The URI used by the device to download ISP configuration is described later in further detail.

The IDS 7004 looks up the device's IP address, based on the HTTP request and maps it to an Autonomous System (AS) number 460. It then sends an HTTP 302 redirect response 468, redirecting the client to a new URI 470. The IDS redirects to a URI where the base URI of the HTTP request is replaced by the base URI that was provided by the ISP. For example:

http://config.yourviewer.com/ids/config/manufacturer/model/deviceid/2.43/3.1.1/latest.xml
is redirected to:
http://config.isp.com/isp-config-service/manufacturer/model/deviceid/2.43/3.1.1/latest.xml

Note: everything after and including the /manufacturer is the same in both URIs. The base URI provided by the ISP is http://config.isp.com/isp-config-service/

A mapping database from IP addresses to AS numbers is collected automatically from Border Gateway Control (BGP) information and the database is updated automatically weekly. The ISP provides the CCO with AS numbers and the Base URI of the web service that shall serve requests to each of those AS numbers. The CCO configures the IDS 7004 with the new ISP's registered AS numbers and the base URI of the corresponding configuration service. The default location for the ISP Discovery Service base URI is configured in the device Platform Provisioning File (PPF). This provisioning file contains all of the default configuration parameters that the device needs when it starts for the first time.

The IDS is configured with a white list of AS numbers that are registered by ISPs running an ISP Configuration Service. This or other methods may be used for example to prevent DNS NXDOMAIN hijacking from redirecting a request for ISP configuration on ISP networks that do not operate an ICS. If a device 130 calls the IDS 7004 from a IP address that is not allocated to one of the AS numbers that the IDS is configured with 464, then the IDS returns a HTTP 204 No Content response 466 and the device 130 is not redirected to any ICS.

IP -> ASN database override mechanism (optional)

The data aggregation server/system (CCO) does not necessarily provide ISPs an interface and override mechanism for fixing problems in the IP -> ASN database. Instead the provider of the database may optionally provide fixes for the database – for example, within a certain time period. The process that is followed is outlined below.

Operational scenarios and processes

The following is a list of possible operational scenarios and the process that is followed in each of these scenarios. This section is indicative only and included only to paint a picture of the operational procedures required to run the ISP discovery service.

A new ISP becomes affiliated:

1. The ISP provides the operations team with all AS numbers they have registered that include IP addresses that may be allocated to a device or home gateway. This ISP

also provides the [baseuri] of the ICS that serves the device configuration.
2. The operations team configures the IDS to add the specific mappings and therefore redirection from AS number to ICS baseuri.
3. The platform operator test team and ISP test end-to-end configuration of devices connected to the ISP network.

An ISP is removed from the affiliated list:
1. The operations team removes the specific mappings for all AS numbers belonging to that ISP from the configuration of the IDS.
2. The platform operator test team tests that devices on that ISP network receive a "no content" response from the IDS

An IP address does not map to the correct ASN:
1. ISP raises a ticket with the operations team to correct the IP -> ASN mapping with details of the specific IP addresses and the AS number they should belong to.
2. The operations team checks the ASN database against the appropriate region internet registry records to confirm the error.
3. The operations team contacts the IP -> ASN database provider to request that they fix their database and supply CCO with a new database.
4. If the time that it takes for the database provider to create this fix is outside of an acceptable threshold the operations team modifies the supplied IP -> ASN database and reconfigure the IDS to use the new database.
5. When the new IP -> ASN database arrives the operations team verifies that the fix has been added to the database and reconfigures the IDS to use the provided database.

ISP wants to see the current IP->ASN database to help resolve a problem:
1. When an ISP wants to verify the contents of the IP -> ASN database they can request a copy of the provided database by raising a ticket with the platform operations team.

The ICS baseuri changes and OEM implementation does not change:
There are two types of changes that could occur in this case.

A. The host or domain name part of the ICS baseuri changes.
   - The ISP may configure their DNS to forward requests to the baseuri, or
   - The ISP may ask the operations team to change the configuration of the IDS to use the new URL.

B. The part of the ICS baseuri that is not part of the hostname or domain name changes, i.e. the part after the first "/".
   - The ISP configures its infrastructure to perform a redirect to the new location.
   - The ISP may also optionally tell the operations team to change the configuration of the IDS to use the new URL.

Further Geographical content targeting aspects

A Service may be targeted at a number of geographical areas. Geographical targeting metadata may indicate that the Service is available exclusively to end users in a specific area, or it may simply indicate that the Service carries content that is editorially relevant to that area. Only end users in the specified area(s) are able to discover content that is part of an exclusively targeted Service. Non-exclusively-targeted Services may be given increased prominence in a particular end user's content guide.

- Geographical targeting metadata may be present in Editorial Version Records (*ProgramInformation* Fragment).
- A Service may be targeted at zero or more geographical places.

- Each geographical place is specified using a separate <TargetPlace> element within an overall <TargetingInformation> parent element.
- The href attribute of the <TargetPlace> element is a controlled term from YouViewTargetRegionCS.
- If the exclusive attribute of the <TargetPlace> element has the value true then the Service is available only to clients located in the target place specified in the element.
  If the exclusive attribute is omitted or has the value false then the Service is editorially targeted at the target place specified in the element.
- If no geographical targeting metadata is provided, the Service is assumed to be applicable to clients in all places.

Geographical content targeting metadata is not inherited from any parent Fragment.

Geographical targeting metadata may be supplied for any type of *ServiceInformation* Fragment:

- For Linear Services, geographical targeting metadata determines which results from the linear schedule are returned by the search engine.
- For On-demand Portal Services, geographical targeting metadata determines whether the Service is listed in the content guide as seen by an end user based in a particular geographical location.
- For Content-owning Services, geographical targeting metadata determines whether the Service is listed in the content guide as seen by an end user based in a particular geographical location.

High-level requirements: Use Cases

Two Use Cases have been identified:

1. Target a content item (or set of items) exclusively at a particular geographical region (or set of regions). This is useful for indicating that the Content Provider only holds content rights in a limited geographical territory (or territories).
2. Target a content item (or set of items) generally at a particular geographical region (or set of regions). This is useful for indicating that the content item is most relevant to a limited geographical territory (or territories) and the user experience may use this to promote content most relevant to the end user's current location at the expense of less relevant content.

In addition it is useful to be able to signal geographical availability at a less granular level: entire Series, Brands and even Services.

Other possible domains with regional relevancy include:

- retail catchment
- traffic & travel
- weather
- local news (print)

High-level requirements: Examples

1. Linear Service "ITV1 (Granada)" has a formal rights restriction to the UK (exclusive), but is editorially targeted at North West England, the Southern Lake District and the Isle of Man (non-exclusive).
2. IP Channel (Linear Service) "BBC Radio Humberside" is editorially targeted at listeners in East Yorkshire and North Lincolnshire.
3. On-demand Portal Service "ITV Player" is exclusively targeted at users in England, Wales and the Scottish Borders.

High-level requirements: Required granularity

The granularity of geographical regions to be supported is:

1. Universal (available to all countries in the world).

2. Countrywide (all nations within a particular country), e.g. United Kingdom.
3. Nation (one particular nation or autonomous region), e.g. Wales.

High-level requirements: Additional characteristics

- The system of labelling is hierarchical such that content can be targeted at a fine-grained region or at a more coarse-grained parent region depending on circumstances.
- A client located in a fine-grained region can discover content targeted at a more coarse-grained parent region.
- It is possible to extend the regional hierarchy to arbitrary depths of finer-grained subregions as required.

The ISP discovery services described above may be used to determine the geolocation of a user. Alternatively, when an antenna is connected, the country can be determined from the Freeview broadcast signalling.

High-level design: Geographical reference data set

Geographical regions are identified using a term from a private Controlled Vocabulary. The absence of any regional targeting metadata indicates that an item is available universally to the entire world. The region code GB indicates that content is targeted at all users in the United Kingdom. The region codes GB-ENG, GB-NIR, GB-SCT and GB-WLS indicate that content is targeted at all users within a particular nation. Region codes GB-???-* are used to indicate that content is targeted at all users within a particular United Kingdom television transmission region.

High-level design: Inheritance

Exclusive Geographical targeting metadata and non-exclusive Geographical targeting metadata and Closed User Group targeting metadata are dealt with independently of one another. Targeting metadata is inherited from Content-owning Service to Brands, to Series, to Episode and to Editorial Version. In cases of multiple inheritance, targeting metadata is inherited from the most specific Service. For example, if a Brand Record points to Service X and a Series Record overrides this by pointing to Service Y, the Series Record and all its children inherit their targeting metadata from Service Y. Targeting metadata is inherited by Broadcast Publication Records from the immediate parent Linear Service Record. Targeting metadata is not relevant to On-demand Publication Records. Any targeting metadata declared on an On-demand Portal Service is implicitly inherited by On-demand Publication Records, but cannot be overridden. If any other Record declares its own targeting metadata, these values completely replace anything stated higher up the hierarchy. Regional sub-division (based on television transmission regions), e.g. Border, Grampian, can be implemented.

High-level design: TV-Anytime representation

1. The TV-Anytime Extended Metadata Description provides a type called `TargetingInformationType` which enables a content item to be targeted at users with particular terminal capabilities, network capabilities, accessibility preferences, and so on. This schema type may be extended to include zero or more `<TargetPlace>` elements.
2. Each `<TargetPlace>` element specifies one target region. The content of this element is a controlled term from the vocabulary YVTargetRegionCS. The `<TargetPlace>` element specifies that the content is exclusively available to the regions listed by setting the `exclusive` attribute to `true`. If the `exclusive` attribute is absent or set to `false`, then the set of regions listed is interpreted as an indication of the preferred geographical region only.

3. The `TargetingInformationType` can be applied to an Extended Basic Content Description in *ProgramInformation* and *GroupInformation* Fragments. The `InstanceDescriptionType` may be extended to include a `<TargetingInformation>` element so that individual Publication Records can provide targeting metadata. Similarly, the `ServiceInformationType may be extended` to include a `<TargetingInformation>` element so that individual *ServiceInformation* Fragments can provide targeting metadata.

Possible schemes for Geolocation include:

- Postcode-based, possibly to Post-town level
- DTT regions, e.g. (each a separate scheme)
  - BBC UK TV regions
  - BBC UK radio regions
  - ITV regions
  - <other DTT licence-holder> regions
- Postal:UK/England/RH2
- ISO:CODE
- Geog:UK/England/Surrey/Richmond
- TV:UK/Digital/Anglian
- Radio:UK/Digital/other

Normative guidelines with inheritance rule

The implementation may under some circumstances not support inheritance of any kind.

Content may optionally be targeted at a number of geographical areas. Geographical targeting metadata may indicate that the content is available exclusively to end users in a specific area, or it may simply indicate that the content carries content that is editorially relevant to that area.

Only end users in the specified area(s) are able to discover content that is exclusively targeted. Non-exclusively-targeted content may be given increased prominence in a particular end user's content guide.

- Geographical targeting metadata may be present in Brand Group, Series Group, Episode Group or Editorial Version Records (GroupInformation Fragments or ProgramInformation Fragment).
- Each Fragment may be targeted at zero or more geographical places.
- Each geographical place is specified using a separate <TargetPlace> element within an overall <TargetingInformation> parent element.
- The href attribute of the <TargetPlace> element is a controlled term from YouViewTargetRegionCS.
- If the exclusive attribute of the <TargetPlace> element has the value true then the content is available only to clients located in the target place specified in the element. If the exclusive attribute is omitted or has the value false then the content is editorially targeted at the target place specified in the element.

The following inheritance rules apply to Geographical content targeting metadata:

- If present, the Geographical targeting metadata completely replaces all Geographical targeting metadata declared in any parent Group(s) or Service(s).
- If no Geographical targeting metadata is provided, the Fragment inherits the Geographical targeting metadata of its closest parent Episode, Series, Brand or Service Record recursively up the hierarchy.
- If no Geographical targeting metadata is provided by a Fragment, and none is inherited from any parent Group or Service, the content is assumed to be applicable to clients in all places.
- In cases of "multiple inheritance", Geographical targeting metadata from the closest parent Service overrides that which would otherwise be inherited from any parent

Group(s).

Example: If a Series Group Record declares a Content-owning Service that overrides that of its parent Brand Group, then targeting metadata is taken in preference from the overriding Content-owning Service associated with the Series Group. This targeting metadata applies to the Series Group and to all its Episode Group and Editorial Version descendents. If the Content-owning Service associated with the Series declares no targeting metadata, then none is inherited. This is still deemed to override any targeting metadata that would otherwise have been inherited from the parent Brand Group Record.

Examples

(1) ITV (Granada) Linear Service targeted generally at viewers in North West England, the South Lakes and the Isle of Man:

```
<ServiceInformation
serviceId="http://syndication.itv.com/services/ITV1/granada"
xsi:type="yv:ExtendedServiceInformationType">
  <Name>ITV1 Granada</Name>
  <Owner>ITV</Owner>
  <ServiceURL>dvb://233a..204b</ServiceURL>
  <ServiceDescription>[Service synopsis if
required]</ServiceDescription>

  <!-- (Elements excluded for brevity of example) -->

  <yv:TargetingInformation
xsi:type="yv:ExtendedTargetingInformationType">
          <yv:TargetPlace exclusive="true"
href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
09-21#GBR"/>
          <yv:TargetPlace
href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
09-21#GBR-ENG-north_west"/>
          <yv:TargetPlace
href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
09-21#GBR-ENG-south_lakes"/>
          <yv:TargetPlace
href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
09-21#GBR-IOM"/>
  </yv:TargetingInformation>
</ServiceInformation>
```

(2) ITV Player On-demand Service targeted exclusively at viewers outside Scotland and Northern Ireland.

```
<ServiceInformation
serviceId="http://syndication.itv.com/services/ITVPlayer"
xsi:type="yv:ExtendedServiceInformationType">
  <Name>ITV Player</Name>
  <Owner>ITV</Owner>
  <ServiceURL>crid://itv.com/itvplayer</ServiceURL>
  <ServiceDescription>Catch up on top TV shows for up to 30
days.</ServiceDescription>

  <!-- (Elements excluded for brevity of example) -->

  <!-- This service is exclusively targeted at all ITV regions except
STV (Central), STV (North) and UTV. -->
  <!-- The target regions must be enumerated individually, either as
whole Nations (e.g. England, Wales) -->
  <!-- or as subregions (e.g. the Scottish Borders which lie within
the Border transmission region). -->
  <yv:TargetingInformation
xsi:type="yv:ExtendedTargetingInformationType">
          <yv:TargetPlace exclusive="true"
href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
09-21#GBR-ENG"/> <!-- Whole of England -->
```

```
            <yv:TargetPlace exclusive="true"
        href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
        09-21#GBR-WLS"/> <!-- Whole of Wales -->
            <yv:TargetPlace exclusive="true"
        href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
        09-21#GBR-CHA"/> <!-- The Channel Islands -->
            <yv:TargetPlace exclusive="true"
        href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
        09-21#GBR-IOM"/> <!-- The Isle of Man -->
            <!-- GBR-NIR excluded -->
            <!-- GBR-SCT excluded -->
            <yv:TargetPlace exclusive="true"
        href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
        09-21#GBR-SCT-west_borders"/>   <!-- Scottish Borders (West) -->
            <yv:TargetPlace exclusive="true"
        href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
        09-21#GBR-SCT-east_borders"/>   <!-- Scottish Borders (East) -->
          </yv:TargetingInformation>
        </ServiceInformation>
```

(3) STV Player On-demand Service targeted exclusively at viewers in Scotland (Central and North)

```
        <ServiceInformation
        serviceId="http://syndication.itv.com/services/STVPlayer"
        xsi:type="yv:ExtendedServiceInformationType">
          <Name>STV Player</Name>
          <Owner>STV</Owner>
          <ServiceURL>crid://itv.com/stvplayer</ServiceURL>
          <ServiceDescription>Watch your favourite STV programmes on demand -
        with free 30 day catch up on STV Player</ServiceDescription>

          <!-- (Elements excluded for brevity of example) -->

          <!-- This service is exclusively targeted at the STV (Central) and
        STV (North) transmission regions. -->
          <yv:TargetingInformation
        xsi:type="yv:ExtendedTargetingInformationType">
            <yv:TargetPlace exclusive="true"
        href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
        09-21#GBR-SCT-central"/> <!-- Scottish Borders (Central) -->
            <yv:TargetPlace exclusive="true"
        href="http://refdata.youview.com/mpeg7cs/YouViewTargetRegionCS/2010-
        09-21#GBR-SCT-north"/>   <!-- Scottish Borders (North) -->
          </yv:TargetingInformation>
        </ServiceInformation>
```

Further Closed User Groups Aspects

Closed User Group Service targeting

A Service may optionally be targeted at a number of Closed User Groups. Only clients that are members of at least one of the declared Closed User Groups are able to see the Service. A Service may be targeted and zero or more Closed User Groups. Each Closed User Group is specified using a separate `<TargetUserGroup>` element within an overall `<TargetingInformation>` parent element. The `href` attribute of the `<TargetUserGroup>` element is a controlled term from YVInternetServiceProviderCS or a term from a private vocabulary controlled by the Metadata Originating Party. If no Closed User Group targeting metadata is provided, the Service is available to all clients.

Closed User Group targeting metadata may be supplied for any type of *ServiceInformation* Fragment:

- If a Linear Service is targeted at one or more Closed User Groups, the search engine then only returns results from its schedule if the client is a member of one of those groups.
- An On-demand Portal Service that is targeted at one or more Closed User Groups is only listed in the content guide if the client is a member of one of those groups.
- A Content-owning Service that is targeted at one or more Closed User Groups is

only listed in the content guide if the client is a member of one of those groups.

Closed User Group content targeting

Content may optionally be targeted at a number of Closed User Groups. Only clients that are members of at least one of the declared Closed User Groups are able to discover content that is targeted in this way. Closed User Group targeting metadata may be present in Editorial Version Records (*ProgramInformation* Fragment). Each Fragment may be targeted at zero or more Closed User Groups. Each Closed User Group is specified using a separate `<TargetUserGroup>` element within an overall `<TargetingInformation>` parent element. The `href` attribute of the `<TargetUserGroup>` element is a controlled term from YVInternetServiceProviderCS or a term from a private vocabulary controlled by the Metadata Originating Party. Closed User Group content targeting metadata is not inherited from any parent Fragment.

High-level requirements: Use Cases

1. Content Partners and Internet Service Providers want to be able to restrict browsing and searching of their content and services to their ISP customers only. For example, certain BT Vision on-demand content items are only discoverable by customers connected to BT Broadband.
2. Content Providers want to be able to restrict browsing and searching of their content and services to members of arbitrary user groups defined by them. This Use Case is a generalisation of the first.

Such arrangements may be internal to a single organization, or may be the result of business arrangements between two or more.

High-level design

Any Content or Service Record in the Logical Metadata Model can be tagged with one or more Closed User Group labels. The presence of a Closed User Group label indicates that visibility of the Record is limited to those clients that present an appropriate token to the metadata browse/search service. Labelling may not be required on individual Publications.

Logical Metadata Model Record	Applicability of Closed User Group label
Service Record	✓
Brand Record	✓
Series Record	✓
Episode Record	✓
Editorial Version Record	✓
On-demand Publication Record	Under circumstances
Broadcast Publication Record	Under circumstances

The Metadata Aggregation Service ingests and stores Closed User Group labels against their respective Records in its denormalised model. Ultimately, the objective is to decorate each denormalised Programme with a set of Closed User Group tags.

Closed User Group labels follow an additive inheritance pattern from Service to Brand-Series-Episode-Editorial Version. In other words, the set of Closed User Groups can be expanded as the hierarchy is traversed downwards. It is not possible to restrict the set of applicable Closed User Groups in this direction of traversal. The absence of any Closed User Group label indicates that the Record is discoverable by all.

High-level design: Client aspects

The client device is responsible for maintaining a set of Closed User Groups to which it belongs. In cases of multiple inheritance, targeting metadata is inherited from the most specific Service. For example, if a Brand Record points to Service X and a Series Record overrides this by pointing to Service Y, the Series Record and all its children inherit their targeting metadata from Service Y. Targeting metadata is inherited by Broadcast Publication Records from the immediate parent Linear Service Record. Targeting metadata is not relevant to On-demand Publication Records. Any targeting metadata declared on an On-demand Portal Service is implicitly inherited by On-demand Publication Records, but cannot be overridden. If any other Record declares its own targeting metadata, these values completely replace anything stated higher up the hierarchy.

High-level design: TV-Anytime representation

- Closed User Groups may be signalled against any *Service*, *GroupInformation* or *ProgramInformation* Fragment.
- The element used to signal membership of a Closed User Group is `TargetingInformation/TargetUserGroup` and the schema type for this element is specified in `ExtendedTargetingInformationType` in a platform-specific extended schema.
- The content of the `<TargetUserGroup>` element is a single, fully-qualified term identifier from an MPEG-7 Classification Scheme.
- No additional attributes are required.
- The `<TargetingInformation>` element can already be used inside a `<BasicDescription>` parent, so this covers *GroupInformation* and *ProgramInformation* Fragments. The `<TargetingInformation>` element is simply instantiated with the appropriate extended schema type using `xsi:type`.

The standard TV-Anytime *Service* Fragment does not necessarily allow targeting information to be provided. The platform-specific extension schema therefore defines a derivative schema type called `ExtendedServiceInformationType` to add a `<TargetingInformation>` element to the *Service* Fragment. Each Fragment must be instantiated.

High-level design: Service aspects

Whenever the client makes a request to the back-end metadata browse/search services it presents a set of Closed User Group tokens in the request. The presence of these Closed User Group tokens in the request causes the metadata browse/search service to return in its response additional items that are restricted to the Closed User Group(s) specified in the request. Closed User Groups are a discoverability convenience designed to avoid listing items in the User Experience that a particular end user will never be able to consume. The inclusion of a restricted item in a particular view is not a guarantee that the content can be consumed, merely an indication that it may be consumable. Additional considerations, such a digital rights management, may mean that the end user is not entitled to consume the content without payment and/or subscription.

High-level design: Controlled Vocabularies

Every Closed User Group is uniquely identified by a term from a Controlled Vocabulary in the form of an MPEG-7 Classification Scheme. The platform may define a centrally controlled vocabulary for certain Closed User Group domains. Some Content Partners may also be Internet Service Providers. Content Partners are at liberty to define additional Application-specific controlled vocabularies within their own name space.

Further Assured Delivery Aspects

Assured delivery

Assured Delivery relates to the hosting of content such that it can be delivered over the Business to Consumer (B2C) interface by means that meet the requirements of the Minimum Quality Threshold (MQT). This mechanism can not reflect the performance of the ISP network, which is assumed to always provide sufficient capacity to carry the delivery of all content.

This following describes the end to end solution for how the platform content guide application can identify if content is available with Assured Delivery. This allows such content to be suitably tagged in the platform content guide, which may be taken into consideration by the viewer when selecting content.

Whether or not a content item is available with Assured Delivery depends on where it is hosted (assumed to be a Content Delivery Network (CDN)) and the way which content hosted in that CDN is carried by the relevant ISP. The dependency on ISP means that the same content item may be available with Assured Delivery for one viewer but not for another, e.g. if they are using different ISPs.

System overview

Figure 16 shows the data flow overview for a single item of content.

There are two main sources of information that the device uses to establish whether Assured Delivery is available.

The Content Provider 1000 passes descriptive metadata to the Metadata Aggregation Server (MAS) 128-2 across the Business-to-Business (B2B) metadata interface 142. Within this metadata is information describing the Content Delivery Networks CDNs 1100 from which the content item is available and the bit rate required to deliver it. The device retrieves this information from the MAS 128-2 over the Business-to-Consumer (B2C) metadata interface 152 as described below.

Separately the Internet Service Provider (ISP) 132 hosts a configuration file which gives details of the CDNs 1100 from which Assured Delivery is offered to the device, as described below.

The information above can be used by an application running on the consumer device 130 to determine whether Assured Delivery is available for a given content item. The rules for performing this calculation are not baked into the B2C metadata or the ISP configuration which allows the definition of Assured Delivery to evolve over time.

Metadata

Controlled vocabulary

To ensure that the device can successfully utilise CDN information provided in the B2C metadata and ISP configuration, the platform defines a controlled vocabulary to uniquely identify every CDN that may be used for assured delivery.

B2B

In one example, to signal that a content item is available with assured delivery the Content Provider must provide a list of CDNs and the minimum bit rate necessary to present the content item at a quality level consistent with the defined Minimum Quality Threshold (MQT).

CDN availability is signalled in an OnDemandProgram Fragment by using controlled terms from the YouViewContentDistributionNetworkCS in the <Genre> child element of <InstanceDescription>.

The minimum bit rate (measured in bit/s) is signalled in an OnDemandProgram Fragment in the <BitRate> child element of the <AVAttributes>. The <AVAttributes> element is a child element of the <InstanceDescription> element mentioned above.

If the platform default player is to be used for playback the Content Provider must provide at least one Media locator per entry in the CDN list. Media locators can be included in the <OtherIdentifier> child element of the <InstanceDescription> element of an

OnDemandProgramFragment. The authority attribute of the <OtherIdentifier> element must be one of the controlled terms in the YouViewContentDistributionNetworkCS.

If a Content Provider player is to be used for playback the inclusion of Media locators is optional.

The full details can be found in the Business-to-business metadata contribution technical interface specification below.

B2C

On-demand Publications can contain:

- Multiple yv:cdn elements
  A list of CDNs from which the content item can be obtained
- bitrate attribute of the media:content element
  The minimum bit rate necessary to present the content item at a quality level consistent with the defined MQT
- Multiple yv:mediaURL elements
  A list of Media locators for the content item

For reasons of convenience and/or efficiency, Programme and Programme summaries can contain the following information denormalised from the set of currently available On-demand Publications:

- Multiple yv:cdn elements
  A list of CDNs from which the content item can be obtained
- yv:minimumBitrate element
  The minimum bit rate necessary to present the content item at a quality level consistent with the defined MQT.

Full details can be found in the Business-to-consumer metadata interface specification below.

CDN Carriage by the ISP

The ISP configuration file may contain zero or more entries that identify CDNs that can offer assured bit rates up to an identified maximum.

Such entries shall be formatted as follows:

Key	Value
assured_delivery	<CDN name from controlled vocabulary>:<maximum assured bit rate in bit/s>

In scenarios where an ISP has carriage arrangements with specific CDNs, these are explicitly listed. An example value for such an entry might be 'GBR-bt_wcc:1500000'. The maximum assured bitrate may vary for each entry, i.e. on a per CDN basis.

It is also possible that an ISP may carry any upstream CDN up to a given assured bit rate. In this case there is an entry with the value 'GBR-generic:<maximum assured bitrate>'. The presence of such an entry does not preclude entries for specific CDNs where the carriage arrangements allow for a higher maximum assured bitrate.

Client-side logic

Tagging Assured Delivery content in the platform content guide

The platform content guide can use the information provided by the B2C feed together with the entries in the ISP configuration file to identify content that is available with Assured Delivery. Such content may then be tagged in the platform content guide, which may be taken into consideration by the viewer when selecting content.

If the simple media locator in the programme structure is populated the content item cannot be played with assured delivery.

If there is no list of CDNs associated with the content item, it cannot be played with assured delivery.

If a CDN associated with the content item in the B2C metadata can be matched with a

CDN listed in the ISP configuration file and if the bit rate associated with that CDN's entry in the ISP configuration file exceeds the minimum bit rate required for assured delivery as provided by the B2C metadata for the content item, then the content item is available with Assured Delivery.

Note: It is possible that this condition can be met by more than one of the CDNs associated with the content item in the B2C metadata.

The platform content guide does not pass the result of the CDN matching process to a Content Provider player. However, the Content Provider player may have access to the ISP configuration information and the Programme and Publication structures describing the content.

Selecting the correct media source in the platform default player

The platform default player always attempts to play a content item with Assured Delivery where possible. If more than one Assured Delivery source is available the one with the highest Assured Delivery bit rate (as signalled in the ISP configuration) will be used.

If more than one Assured Delivery source offers the highest Assured Delivery bit rate then the platform default player makes an arbitrary decision as to which to use.

Supporting Minimum Quality Threshold (MQT) indication and streaming

A Controlled Vocabulary is defined to uniquely identify every relevant Content Distribution Network (CDN) that may be used for assured delivery.

For the ISP:

- An ISP configuration mechanism exists that allows ISPs to provide periodically updated configuration information to devices on their network. This mechanism can be used by an ISP to deliver different configurations to different customers, if the ISP so wishes, or it can be used to deliver the same configuration to groups of customers.
- Every participating ISP uses the ISP configuration mechanism to provide each device with a list of CDNs from which assured rate delivery is possible to that device. The list consists of the terms from the Controlled Vocabulary and corresponding maximum bitrate values for which delivery is assured. This list may change each time the ISP configuration is refreshed.
- The ISP may also indicate that all content is offered for assured rate delivery up to a specified bitrate value by listing "*" as one of the items in the list.

For the content provider:

- When a media asset is published for the platform by a content provider, it is distributed to a number of CDNs. This list of CDNs, expressed using the same Controlled Vocabulary, is included in the technical metadata published to the Metadata Aggregation Service for the On-demand Publication, along with the bitrate required to stream that item of content in a manner consistent with the MQT criteria: this is carried in the <BitRate> element of the On-demand Publication. For an adaptive bitrate stream, the indicated bitrate is the lowest quality level available that exceeds the MQT quality level. HD assets are described as separate On-demand Publications and generally have a higher target bitrate than SD ones.
- Target bitrate information is carried in the B2C metadata format in the /feed/entry/media:content[@bitrate] field and the CDN list is carried in elements of /feed/entry/ media:category whose scheme attribute begins "http://refdata.projectcanvas.info/mpeg7cs/CanvasContentDistributionNetworkCS".

For the device manufacturer:

- For each streaming session that uses the MediaRouter interface, the device measures the average incoming data rate during periods of streaming where only one stream is being buffered and the device is not itself limiting the incoming data

rate, ignoring the first five seconds of any such period.

- If, at the end of the streaming session, a measurement M has been made, the device updates settings Rhist and Mcount in the local storage repository as follows:

  If Mcount does not exist, Mcount = 0

  If Mcount < 10, Mcount = Mcount + 1

  Rhist = (Mcount-1)/Mcount * Rhist + (1/Mcount) * M

This algorithm has the effect of building up a simple average over the first few measurements whilst continuing to follow long term changes in the bitrate after that. If the measurements were to change abruptly to a new value, Rhist would move two thirds of the way towards the new stable value after 10 measurements had been incorporated.

- The values referred to as Mcount and Rhist are given appropriate names in the local storage repository.

Indication in UI

When the UI shows information about a particular asset, it compares the list of CDNs through which the asset is available (as provided in the metadata) with the list of CDNs providing assured delivery (as provided through the ISP configuration mechanism. If there is an intersection between the two sets for which the asset bitrate is less than the CDN assured rate, an 'assured delivery' icon is presented in the user interface. If the 'assured delivery' icon is not appropriate, the UI can calculate an estimated buffering time Tb from the asset bitrate Rasset, the asset duration Tasset and the device's historical bitrate Rhist as follows:

If Rasset < Rhist, Tb = 0

If Rasset > Rhist, Tb = Tasset * (Rasset/Rhist - 1)

No margin for error is included here since the purpose is solely to provide an estimate to present to the user. If Rhist is not available (for example in a new device), no indication of buffering time is possible.

Playback

1. When an item of content is selected, the appropriate content provider player application is launched.
2. The content provider player application is responsible for determining which CDN to use if many are available. The CDN list is not necessarily provided to the application; in this case the application uses its own mechanisms to perform the 'media selection' task, determining the best location from which to stream the content.
3. The content provider player is passed the set of matching CDNs and their assured bitrates when it is launched. Under circumstances an extra launch parameter is added e.g. cdnmatches.projectcanvas.info, "GB/bt-wcc@2000;GB/akamai@1400". This would require constraining the termId so that it cannot contain "@" or ";".
4. With this mechanism, the 'default player' could not by itself do 'play now'. Under circumstances additional information could be conveyed to allow the default player to support 'play now'. This may involve using multiple publications but other options are possible.
5. The player application is responsible for presenting the media in a manner that complies with the MQT requirements, making use of the buffer APIs to determine when to start playback.

Further considerations:

- ISP needs to actively participate in maintaining a list of CDNs and exposing this to the receiver device. It is not possible to present the 'assured delivery' icon in the case where a receiver device is connected to a non-participating ISP.
- Content providers need to actively participate in publishing information about which CDNs a particular media asset has been published to, as well as the bitrate of the asset. While this offers a highly granular (per asset) approach that meets the

content provider's requirements, it puts a particular onus on the content provider to ensure ongoing accuracy of information. If, for example, a media asset is subsequently withdrawn from a particular CDN, the metadata must be republished to reflect this fact. Otherwise, the consumer may be disappointed by a poorer quality viewing experience than advertised for that asset.

- The accuracy of this system depends to some extent on the latency of two independent distribution chains: the media distribution chain (via the CDN provider) and the metadata distribution chain (via the Metadata Aggregation Service). To prevent false indications, it is necessary to ensure that metadata does not overtake the corresponding media and advertise the availability of an asset with MQT before the CDN has had time to acquire and/or distribute the media to all parts of its network.

Business-to-consumer (B2C) interface

The following outlines examples of the specification of the business-to-consumer interface for the TV platform. That is to say, it describes the means by which a receiver device / media client device (such as a set-top box) communicates with certain parts of a data aggregation server/system (CCO). The CCO encompasses a number of services, of which those used for content metadata are described in further detail below.

Basic architecture

The Content Guide application is the main user interface by which a user may browse and search content from across different Content Providers. It requires information about the available content, which originates from the Content Providers. Two layers of abstraction are provided to simplify the retrieval of this data.

- The metadata from multiple Content Providers is submitted to CCO so that the receiver device may enquire as to all the content on the platform from a single source.
- The client receiver device includes a managed component called the client Metadata Broker, which handles the retrieval and parsing of metadata on behalf of the Content Guide application (and possibly other third-party applications).

The present description specifies the technical interface between these two components, i.e. the Business-to-Consumer (B2C) metadata distribution interface by which the client Metadata Broker communicates with the back-end CCO metadata services. Content Providers submit metadata to CCO using the Business-to-Business (B2B) metadata contribution interface. The Content Guide application communicates with the Metadata Broker over an internal inter-process communication mechanism called the System API.

Enhanced metadata services

CCO comprises a number of different services, some of which supply enhanced metadata using the B2C concept. The metadata services may be considered as two functional units: the Metadata Aggregation Service and the Search Service. Here the required functionality is further decomposed into additional logical services, listed below. By specifying these services separately, the CCO provider has more flexibility to implement each service on independent systems or to combine them in any permutation.

The services supplying metadata in the B2C format include:

- Browse service
- Search service
- Search Suggestions service
- Recommendations service
- Linear Event Resolution service
- Linear Service Resolution service
- Schedule service

These services are described in further detail below.

Interface Design

The B2C interface has been designed in accordance with the following basic principles:

- Reducing client load – Whist being careful to distribute the complexity of the system, it is most often the case that the more complex data processing takes place in the back-end (i.e. in CCO) where possible. This is because the receiver devices may be very resource-constrained. In addition, if the value of a metadata field needs to be recomputed infrequently (e.g. episode count in a series) then it makes sense to perform the calculation on the server side rather than requiring potentially millions of receivers to perform the same computation separately. One example of this is denormalisation; there must be some 'flattening' of the strongly normalised and hierarchical data model used by the B2B interface into a simpler denormalised form for consumption by the application. This denormalisation ought to be done by CCO and the denormalised form cached there, rather than each receiver undertaking the same data manipulation. This leads to a requirement that the B2C interface convey a fairly denormalised representation of the data.
- Client-agnostic – this is particularly difficult to achieve when also attempting to be concise and efficient in the B2C interface. However, as a general rule the B2C interface shall not assume a particular user interface layout. Multiple client devices are supported.
- Server-agnostic – it is important that the system retains flexibility in procurement and operation of back-end services. For example it must be able to change suppliers for the CCO components in future. Similarly, the existing CCO service provider is able to change implementation components whilst still supporting the same B2C interface. This means a number of things:
  - The B2C format is specified such that it may be implemented by any provider.
  - The B2C format does not rely on proprietary technologies, formats, XML namespaces etc.
  - It is simple to transition to a different URL by changing the HTTP endpoint locations to which the receiver device makes requests for metadata.
- Flexible – the design of the request interface in particular aims to provide flexibility around current and future user interface decisions. It does this by specifying filters and sort options for data requests which may be combined in any order, such that it is easy to request different views onto the data in order to populate different user interface elements.

Denormalised data model

Broadly speaking, content description metadata is published in a hierarchy of entities such as Brands, Series and Episodes. Entities are then grouped into sets of user-facing Aggregations such as Categories.

The basic unit shown in many user interface lists of content is a Programme. This conceptual entity is in fact constructed from data denormalised from two principal metadata fragments in the normalised Logical Metadata Model: an Episode and an Editorial Version. (The two are kept separate in the B2B in order to align with upstream data models.) A single Programme appears on the B2C interface for every Editorial Version fragment, although much of the metadata is, in fact, inherited from its parent Episode fragment and this is duplicated in each Programme derived from that Episode. For example, an Episode-level synopsis will cascade down to each Programme when combined with the data for the Editorial Version. Except where the distinction between Episode and Editorial Version is relevant, the denormalised concept of a Programme is used here.

Each Programme has one or more associated On-demand Publications and/or Schedule Events. Multiple On-Demand Publications of the same Programme might signify

alternatives such as Standard Definition (SD), High Definition (HD), Audio Described (AD) or signed. In addition, each Programme may be a member of a Series, and/or a Brand. For example, "Doctor Who, Series 4, Midnight" is a Programme with an Episode title of "Midnight", belonging to a Series called "Series 4", belonging to a Brand called "Doctor Who". It is possible for a denormalised Programme to belong to a Series but have no Brand, or a Brand with no Series. For example, "Eastenders, Thursday 18th March 2010" is an Episode entitled "Thursday, 18th March 2010" belonging to a Brand called "Eastenders". Eastenders has no (user-facing) series; it is simply a Brand with some child Episodes.

Finally, it is possible for a denormalised Programme to have no parents at all. It is envisaged that films would be represented this way. For example, "Slumdog Millionaire" might be listed as a Programme with that title, but with no associated Series or Brand.

B2C HTTP interface specification

In one example, the Business-to-Consumer interface is provided as a web service that complies with HTTP 1.1 [IETF RFC 2616]. All requests are made using the GET method.

The service fully supports the cache control headers specified by HTTP 1.1.

No security requirements are placed on the interface; it is an open web service.

Most of the services described by this specification return responses in an XML format based upon Atom. This format is described below. The Search Suggestions service uses a different format, described below.

B2C HTTP interface specification: Request URL format

The client of the B2C interface makes requests to URL endpoints in order to retrieve data. The CCO supplier provides URL templates which allow the client to construct and customise the endpoint URL for each request.

URL templates:

A template is a string containing placeholders which are replaced by other strings when the template is processed. This processing allows the client device to insert object identifiers and view parameters, which comprise filtering and sorting options, in order to create the required URL. The various URL templates may be retrieved from the local configuration on the client device; each is stored as a key–value pair. In order that the appropriate URL templates can be provided in the configuration service, the CCO provider specifies a URL template for each endpoint, and also one for each view parameter. In some cases, the templates may in fact just be simple strings, as they may have no placeholders in them.

Placeholders:

Placeholders in URL templates take the following form:
${placeholder-name}

Generally, each placeholder is replaced either with the processed output of another template, or with a piece of data such as the ID of the entity being queried. The placeholder ${view} is a special case, as it is replaced by zero or more processed view parameter templates, separated by ampersands.

An example endpoint template is provided below:
http://browse.youview.com/Programmes?${view}

The placeholder ${view} placeholder is replaced with the zero or more processed templates for any view parameters the client may wish to apply. The resultant URL may look something like this:
http://browse.youview.com/Programmes?byId=abc124&sort=title:asc

The placeholders in some templates may be replaced with multiple terms separated by Boolean operators. The Valid Operators column of the filter tables for each service

indicates which operators may be used with each filter.

The OR operator is represented in URLs as a pipe character: |

The AND operator is represented in URLs as a plus symbol: +

For example, the following filter requests both paid and free content, by matching entities with a paid flag of 0 OR 1:

Paid=0|1

B2C HTTP interface specification: Metadata language selection

The Logical Metadata Model supports the provision of metadata in multiple languages. The Metadata Publishing Party may specify the language of metadata supplied at the B2B contribution interface, both on a fragment (record) level and on a field level. The record-level language is taken to be the default language for that record, and if one is not supplied then the default language is assumed to be English (eng). Although the CCO may be able to store metadata in multiple languages for the same entity, this interface specification is not predicated on such an implementation.

The client device may request metadata from certain services in a given language by applying the appropriate filter. The ${lang} placeholder is replaced with a specific language code from ISO 639-2 ("alpha-3"). The filters for each service are described alongside the specifications for each service.

In general, if metadata is available in the requested language, then that metadata is returned. If metadata is not available in the requested language, then the metadata is returned in the content's default language.

A result set may contain some entities with metadata available in the requested language and some entities without metadata in the requested language. In this case, the most appropriate language is returned for each individual entity, even where this means a single B2C response contains multiple languages of metadata side-by-side. Similarly, if a single entity has some fields available in the requested language and some fields not available in that language, the languages of individual fields may differ; where available, the fields are returned in the requested language, and where not available the default language is returned.

Below it is described how the XML response format supports these multiple language responses.

B2C HTTP interface specification: Sort Options

Some of the services allow the client to request data in various sort options. Where specified, the sort options correspond to the following list:

Term	Sort Fields	Notes
title	Primary sort title Secondary sort title Tertiary sort title	Applies to all entities except ondemand. For descriptions of primary, secondary and tertiary titles, see below.
soa	Start of availability	Categories, Services and Schedule Events are returned in an undefined order, as they have no SOA.
expiry	End of availability	Categories, Services and Schedule Events are returned in an undefined order, as they have no EOA.
broadcast	Schedule slot	Does not apply to Categories, Services, or Applications. Schedule slot is optional on Programme and On-demand, so if not present, items appear at bottom of list
index	Series index Episode index	Applies only to Programmes and Series.

relevance	Relevance	Applies only to Search Service requests.
popularity	Popularity	Applies only to Programmes.

Where sorting options do not apply to types of entity being requested, the order in which the entities are returned is undefined. In the case where a request is made with a sort option which is only applicable to some of the returned entities, the entities to which the sorting does not apply appear after those to which it does. For example, if the summaries feed were called with no entity filter and a requested sorting of broadcast, any Services in the response would appear after the Programmes and in an undefined order, as Services have no schedule slot.

Title sorting:

For the title sort option above, three titles are used: primary, secondary and tertiary. Programmes have multiple titles due to the hierarchy in which they sit. The following table describes the titling assignments for different archetypes of Programme.

	One-off Commission	**Continuing Brand**	**Unbranded Series**	**Branded Series**
Primary Title	Programme title	Brand title	Series title	Brand title
Secondary Title	n/a	Programme title	Programme title	Series title
Tertiary Title	n/a	n/a	n/a	Programme title

Other entities - such as Services, Applications and Categories - do not sit in such a hierarchy. In these cases, the primary title is the entity's own title, and secondary and tertiary titles are empty. This is the same as a Programme which is a one-off commission.

B2C HTTP interface specification: Status codes and error responses

Appropriate HTTP 1.1 status codes are used to indicate the success or failure of any request made over the interface. Three cases are specified:

- A successful request which results in data to be returned. In this case, the data is provided in the format defined by this specification, and with a status code of `200 (OK)`.
- A successful request is made, but matches no data (e.g. an object with a particular identifier is requested, but no such object exists). This results in a `200 (OK)` status code, and a valid response document. Depending on the service, this is either an empty response document (Search Suggestions Service) or a valid XML Atom document containing zero `<entry>` elements (all other services).
- An invalid request is made, for example a parameter is used on an endpoint which does not support it, or an invalid parameter is used. In this case, an HTTP response with a `400 (Bad Request)` status code is returned. Optionally, services which supply an Atom response may return an Atom document containing a reason for the error within a `<summary>` element and zero `<entry>` elements.

B2C XML response format specification

Many of the CCO services return a response in the Atom XML format. For these services, each response is a feed conforming to the Atom specification [IETF RFC 4287].

Each Atom feed contains one or more `<entry>` elements, and each of these is

used to represent an entity from the Logical Metadata Model. The type of entity represented by each <entry> is defined using an entity type element. See below for details.

The Atom specification requires that each <entry> element must have either a <content> child element or a <link rel="alternate" href="..."/>. Because neither is required in this profile of Atom, an empty <content> element is provided.

Each entry also has an <updated> element, which specifies the last time the corresponding record was altered. The content is a W3C specification date-time.

B2C XML response: XML instance document structure

Each feed declares and uses only the namespaces listed in the following table:

W3C Atom	http://www.w3.org/2005/Atom
Yahoo! MediaRSS	http://search.yahoo.com/mrss/
Amazon OpenSearch	http://a9.com/-/spec/opensearch/1.1/
B2C	http://refdata.youview.com/schemas/ClientMetadata/2010-09-27

The B2C namespace is used for all custom elements. The namespace URL is http://refdata.youview.com/schemas/ClientMetadata/{date}, where {date} is the date of the corresponding version of the specification. This allows future revisions to be made without breaking backwards compatibility.

Each feed has a unique identifier, carried in the <id> element, which is the URL of the feed. Each feed has a descriptive title carried in the <title> element, and may optionally provide a <subtitle> in addition. Each feed carries an <updated> element which specifies the generation time of the feed.

The OpenSearch elements <os:totalResults>, <os:startIndex> and <os:itemsPerPage> is used to indicate the scope of the result set.

Finally, for requests to the Search Service only, the additional OpenSearch element <os:Query> (with a role parameter of "request") is used to indicate the search term in the response.

The following XML indicates these required fields.

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Basic definition of the feed and its namespaces -->
<feed
xmlns="http://www.w3.org/2005/Atom"
xmlns:media="http://search.yahoo.com/mrss/"
xmlns:os="http://a9.com/-/spec/opensearch/1.1/"
xmlns:yv="http://refdata.youview.com/schemas/ClientMetadata/2010-09-
21"
xml:lang="eng">
<!-- The ID, location, author, date and contents of the feed -->
<id>{the url of this feed}</id>
<title>{some descriptive title of this feed}</title>
<subtitle>{optional: additional information about this
feed}</subtitle>
<updated>{the time the feed was generated}</updated>
<author>
<name>YouView</name>
<uri>{Service Base URL}</uri>
</author> <!-- Pagination information -->
<os:totalResults>{total number of entries in the un-paginated
feed}</os:totalResults>
<os:startIndex>{index of the first item in this feed (starting at
1)}</os:startIndex>
<os:itemsPerPage>{number of items in this feed}</os:itemsPerPage>
<!-- Search Query information, for Search Serice requests only -->
<Query role="request" searchTerms="{query term}" />
<!-- The main feed contents go here (one or more <entry> elements) --
>
```

```
</feed>
```

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<feed
xmlns="http://www.w3.org/2005/Atom"
xmlns:media="http://search.yahoo.com/mrss/"
xmlns:os="http://a9.com/-/spec/opensearch/1.1/"
xmlns:yv=" http://refdata.youview.com/schemas/ClientMetadata/2010-09-
21"
xml:lang="eng">
<id>http://browse.youview.com/Programmes?byCategory=1001</id>
<title>Programmes feed</title>
<subtitle>Category: 1001</subtitle>
<updated>2010-03-26T09:46:33Z</updated>
<author>
<name>YouView</name>
<uri>http://browse.youview.com</uri>
</author>
<os:totalResults>10</os:totalResults>
<os:startIndex>1</os:startIndex>
<os:itemsPerPage>10</os:itemsPerPage>
<entry>
{entry info here}
</entry>
</feed>
```

B2C XML response: XML and Data formats

Except where otherwise specified, the following data and formatting conventions apply to all Atom XML format response documents supplied by the B2C interface.

- All Boolean values are represented as 0 or 1 (as opposed to the alternative notation of true or false).
- Date-time values use the W3C date-time format, and all times are specified in the UTC (Zulu) time zone. For example 2010-01-01T00:00:00Z.
- Where no data is available, XML elements are excluded from the feed. For example, for a Programme with no parent Series or Brand, the `<yv:seriesId>` and `<yv:brandId>` elements would not appear.

B2C XML response: Metadata language representation

No distinction is made between each `<entry>` or field within each `<entry>` based upon the language of metadata it contains. No signalling is required to indicate which elements contain text in the requested language and which contain text in some other default language.

Example:

Suppose a request is made for the first three programmes in a particular category and the preferred language is specified as Welsh. Two of the programmes have Welsh metadata available, whereas the other one does not (it only has English metadata). In this case, the B2C response contains three `<entry>` elements, of which one contains English metadata and two contain Welsh metadata.

Further suppose that one of the entities with Welsh metadata has only a Welsh title, and fields such as the synopses are in English. In this case, the title is returned in Welsh and the synopses in English. The total result set then contains an entry with all-English metadata, one with all-Welsh metadata, and one with a mix of Welsh and English fields. This example is shown in the simplified XML extract below.

```
<entry>
<content />
<yv:entityType>programme</yv:entityType>
<updated>2010-03-26T18:07:54Z</updated>
```

```
<id>001</id>
<yv:serviceId>123123</yv:serviceId>
<title>Pobol y Cwm</title>
<summary>Mae Indeg yn creu trwbwl yn stiwdio Cwm FM. Indeg causes
mayhem at Cwm FM.</summary>
</entry>
<entry>
<content />
<yv:entityType>programme</yv:entityType>
<updated>2010-03-26T18:07:54Z</updated>
<id>002</id>
<yv:serviceId>123123</yv:serviceId>
<title>Yr Wythnos</title>
<summary>News from Wales.</summary>
</entry>
<entry>
<content />
<yv:entityType>programme</yv:entityType>
<updated>2010-03-26T18:07:54Z</updated>
<id>003</id>
<yv:serviceId>123123</yv:serviceId>
<title>Eastenders</title>
<summary>As Lucas identifies a body at the morgue, the family fear it
could be the missing Denise. Meanwhile, Peggy persuades Phil not to
run, and Darren finds a friend in Abi.</summary>
</entry>
```

B2C XML response: Entities in the XML response format

The XML format B2C interface exposes Atom feeds with zero or more `<entry>` elements. Those elements each express a metadata entity. The type of entity which is being represented by an `<entry>` is specified in an `<entityType>` element like so: `<yv:entityType>...</yv:entityType>`

In the above, "`yv`" is the specific B2C XML namespace, and the text within the element is from a controlled vocabulary, listed in the following table. The table also illustrates how the entity types map into client System API structures.

B2C Entity Type	System API Structure	Notes
application	Metadata::Application	An Application. Exposed as a summary only.
brand	Metadata::Summary (of type Brand)	An editorial Brand.
scheduleevent	Metadata::Publication Metadata::ScheduleEvent	A linear Schedule Event, which is a Broadcast Publication of a Programme.
category	Metadata::Summary (of type Category)	A Category.
editorialcollection	Not mapped	Included to allow future addition of this entity. Not currently specified, nor mapped into the System API.
ondemand	Metadata::Publication	An On-demand Publication of a Programme.
programme	Metadata::Programme Metadata::Summary (of type Programme)	A Programme, compiled from an Editorial Version and an Episode.
series	Metadata::Summary (of type Series)	A Series of Programmes.
service	Metadata::Service	A linear, on-demand or owning Service. Exposed as a summary

		only.

Each entity has an identifier element, which contains the CCO record identifier for the entity. The composition of this ID is an implementation decision of the CCO provider, but it is composed only of valid URL characters, such that it may be used subsequently to query the same entity.

<id>12345</id>

That identifier is regarded as internal to the platform. However, in order to allow flexibility for the CCO provider, who may wish for example to include a prefix which defines the scope of the ID to make it globally unique, they may supply a template which specifies the segment of this string which contains the internal record identifier.

Template Name	**Description**	**Placeholders in Template**
record-id	Defines the format of the contents of <id> elements in the XML B2C interface.	${id}

The following sections provide more detail on the representation of individual entity types.

Application

This entity describes a player, portal, or other application. It is used to populate an Application structure in the System API, has an entityType of application.

Fields:

LMM Field Ref.	**B2C XML Element**	**Content**	**Cardinality**	**Notes**
Record. identifier	id	string	1	The CCO record identifier of this Application.
Description. fullTitle	title	string	1	The Application's title.
Description. shortSynopsis	summary	string	1	A brief description of the Application.
Description. mediumSynopsis	yv:description	string	0..1	A medium-length description of the Application.
Description. longSynopsis	yv:longDescription	string	0..1	A longer description of the Application.
Guidance. codes	media:rating	string	0..1	Denton or BBFC codes. Subject to the controlled vocabulary provided with the B2B specification. The CS term shall be the element's content, while the CS name space is the scheme attribute.
Guidance. longExplanation	yv:guidanceText	string	0..1	Description of why guidance has been applied.

Group. owningService	yv:serviceId	string	1	The CCO record identifier of the Content-owning Service to which this Application belongs.
Content. identifiers	yv:identifierType1 yv:identifierValue1 etc	string	0..*	Private identifiers including the launch URL of the Application.
Group. availability. start	yv:availabilityStart	datetime	1	This element shall indicate the start of the availability window of the Application.
Group. availability. end	yv:availabilityEnd	datetime	1	This element shall indicate the start of the availability window of the Application.

Example XML:

```
<entry>
<content />
<yv:entityType>application</yv:entityType>
<updated>2010-01-01T00:00:00Z</updated>
<id>123456</id>
<title>BBC iPlayer</title>
<summary>Making the unmissable unmissable.</summary>
<yv:description>BBC iPlayer. Making the unmissable unmissable.</yv:description>
<yv:longDescription>BBC iPlayer brings you the last 7 days of BBC programming. Making the unmissable unmissable.</yv:longDescription>
<media:rating scheme="http://bbc.co.uk/refdata/mpeg7cs/DentonContentWarningCS/2010/04/19">G</media:rating>
<yv:guidanceText>Some programmes may be unsuitable for children.</yv:guidanceText>
<yv:serviceId>123123</yv:serviceId>
<yv:identifierType1>http://refdata.youview.com/mpeg7cs/YouViewIdentifierTypeCS/2010-05-24#resourceLocator</yv:identifierType1>
<yv:identifierValue1>http://www.bbc.co.uk/iplayer/youview.swf</yv:identifierValue1>
<yv:availabilityStart>2010-01-01T16:00Z</yv:availabilityStart>
<yv:availabilityEnd>2010-01-08T16:00Z</yv:availabilityEnd>
</entry>
```

Brand

This entity describes a Programme Brand, and is used to populate a Summary structure (of type Brand) in the System API. It has an entityType of brand.

Fields:

LMM Field Ref.	**B2C XML Element**	**Content**	**Cardinality**	**Notes**
Record.identifier	id	string	1	The CCO record identifier of this Brand Group.
Description.fullTitle	title	string	1	The title of this Brand.
Description. shortSynopsis	summary	string	1	A short editorial description of this Brand.
Group.owningService	yv:serviceId	string	1	The CCO record identifier of the Content-owning Service which owns this Brand.

Group.childCount	yv:childCount	integer	1	The Brand's total number of descendent Programmes with available On-demand Publications.

Example XML

```
<entry>
<content /> <yv:entityType>brand</yv:entityType>
<updated>2010-01-01T00:00:00Z</updated>
<id>456789</id>
<yv:serviceId>123123</yv:serviceId>
<title>Doctor Who</title>
<summary>The Doctor, the last of the Time Lords, has adventures in space and time.</summary>
<yv:childCount>2</yv:childCount>
</entry>
```

Category

This entity provides basic information about a category itself. It is used to populate a Summary structure (of type Category) in the System API, and has an entityType of category.

Fields:

LMM Field Ref.	B2C XML Element	Content	Cardinality	Notes
Record.identifier	id	string	1	The CCO identifier for this Category.
Description. fullTitle	title	string	1	The title of this Category.
Category. hasSubCategories	yv:hasSubCategories	Boolean	1	Indicates to the client that there are sub-categories of this category, to enable arbitrary depths of category browsing.
Category.adult	yv:adult	Boolean	1	Indicates that the contents of this category contain adult material.

Example XML:

```
<entry>
<content />
<yv:entityType>category</yv:entityType>
<updated>2010-01-01T00:00:00Z</updated>
<id>789789</id>
<title>Drama</title>
<yv:hasSubCategores>1</yv:hasSubCategories>
<yv:adult>0</yv:adult>
</entry>
```

On-demand Publication

This entity type describes an On-demand Publication of a Programme. It populates a Publication structure in the System API, and has an entityType of ondemand.

Fields:

LMM Field Ref.	B2C XML Element	Content	Cardinality	Notes
Record.identifier	id	string	1	The CCO record identifier of this Publication.
AVAttributes.bitRate.target	media:content [@bitrate]	integer	1	Target bitrate (in bits/second) of this Publication's associated asset(s).
AVAttributes.bitRate.minimum	media:content/ yv:minBitrate	integer	0..1	Minimum bitrate (in bits/second) of this Publication's associated asset(s).
Publication.serviceRef	yv:serviceId	string	1	The CCO record identifier of the On-demand Service to which this Publication belongs.
Publication.publishedDuration	media:content [@duration]	integer	1	The duration of this Publication measured in seconds.
AVAttributes.mediaType	media:content [@medium]	string	1	The media type of the Publication, according to the controlled vocabulary specified in the Yahoo Media RSS specification version 1.5.0.
AVAttributes.audio.mixType	media:content [@channels]	integer	1	The number of audio channels used, i.e. 1 (mono), 2 (stereo) or 6 (5.1 surround).
AVAttributes.audio.dubbingLanguage	media:content/ yv:audioDubbing Language	string	0..1	Indicates the language in which this Publication has been dubbed. The absence of this element indicates that there is no dubbing.
AVAttributes.audio.audioDescription Language	media:content/ yv:audioDescription Language	string	0..1	The language of the embedded audio description. The absence of this element indicates that no audio description is present.
AVAttributes.video.aspectRatio	media:content/ yv:aspectRatio	string	1	The aspect ratio of the content, which shall be either "16:9" or "4:3".
AVAttributes.video.highDefinition	media:content/ yv:hd	Boolean	1	A Boolean flag to indicate whether this Publication is in High Definition or not.
AVAttributes.video.colour	media:content/ yv:colour	Boolean	1	A Boolean flag to indicate whether this Publication is colour or not.
AVAttributes.subtitles.language	media:content/ yv:subtitlesLanguage	string	0..1	Indicates the language of any associated subtitles. The absence of this element indicates the absence of subtitles.
AVAttributes.signing.langua	media:content/	string	0..1	Indicates the language of any signing provided in this Publication. The

ge	yv:signing Language			absence of this element indicates that no signing is present.
Broadcast.start	yv:scheduleSlot	datetime	0..1	The start time of the canonical Schedule Event (if one is specified).
OnDemand.canonicalBroadcast.serviceRef	yv:linearServiceId	string	0..1	The CCO record identifier of the Linear Service referred to by the canonical Schedule Event (if one is specified).
OnDemand.availability.start	yv:availabilityStart	datetime	1	The start of the availability window of the On-demand Publication.
OnDemand.availability.end	yv:availabilityEnd	datetime	1	The end of the availability window of the On-demand Publication.
OnDemand.availability.actual	yv:mediaAvailable	Boolean	1	A Boolean flag to indicate whether the Content Provider has expressed that this Publication is "actually available" (i.e. has an available media asset)
Price.amount	yv:price	decimal number	0..1	Indicative price of the content, if paid content. The absence of this element indicates that the Publication is free to view.
Price.currency	yv:currency	string	0..1	Currency of the price. "GBP" (United Kingdom Pounds).
Publication.otherIdentifiers	yv:identifierType1 yv:identifierValue1 etc	strings	0..*	Identifiers which may be private to the Content Provider, or may be of a standard type. Those of a standard type must use a type string from the YouViewIdentifierTypeCS, supplied with the B2B interface.
Description.classifiers	yv:cdn1 yv:cdn2 etc	strings	0..*	Terms indicating the Content Distribution Networks on which this Publication is made available. Each element contains a term from YouViewContentDistribution NetworkCS, provided with the B2B specification. Used both for Minimum Quality Threshold signalling, and optionally for providing media URLs in conjunction with the yv:mediaURL elements. The term ID unspecified, when matched to a Media URL, indicates distribution is not via one of the known CDNs.
OnDemand.mediaLocator OnDemand.cdnMediaLocators	yv:mediaURL1 yv:mediaURL2 etc	strings	0..*	URLs indicating the location of the media asset for this Publication on the corresponding CDNs (as listed in the correspondingly-numbered yv:cdn elements). These URLs need only be provided for content which is to be played using the default player application (content played using a CP's own application generally uses private identifiers instead). A pair of yv:cdn and yv:mediaURL elements may also be used to indicate the URL for an asset to be

				served directly by the CP without use of a CDN ("over the top" delivery) by the provision of a term in YouViewContentDistribution NetworkCS to indicate such a case.

Example XML:

```
<entry>
<content />
<yv:entityType>ondemand</yv:entityType>
<id>75317531</id>
<yv:serviceId>123123</yv:serviceId>
<media:content bitrate="5000" duration="3600" medium="video" channels="2">
<yv:minBitrate>3500</yv:minBitrate>
<yv:audioDubbingLanguage>eng</yv:audioDubbingLanguage>
<yv:audioDescriptionLanguage>eng</yv:audioDescriptionLanguge>
<yv:aspectRatio>16:9</yv:aspectRatio>
<yv:hd>1</yv:hd>
<yv:colour>1</yv:colour>
<yv:subtitlesLanguage>eng</yv:subtitlesLanguage>
<yv:signingLanguage>bsl</yv:signingLanguage>
</media:content>
<yv:availabilityStart>2010-01-01T16:00Z</yv:availabilityStart>
<yv:availabilityEnd>2010-01-08T16:00Z</yv:availabilityEnd>
<yv:mediaAvailable>1</yv:mediaAvailable>
<yv:identifierType1>http://youview.com/identifiers/crid.programme</yv:identifierType1>
<yv:identifierValue1>crid://bbc.co.uk/654321</yv:identifierValue1>
<yv:scheduleSlot>2010-01-01T00:00</yv:scheduleSlot>
<yv:linearServiceId>888222</yv:linearServiceId>
<media:category
scheme="http://refdata.youview.com/mpeg7cs/YouViewContentDistributionNetworkCS/2010-
05-07">GB/bt-wcc</media:category>
<yv:price>0.99</yv:price>
<yv:currency>GBP</yv:currency>
<yv:cdn1>
http://refdata.youview.com/mpeg7cs/YouViewContentDistributionNetworkCS/2010-05-
07#GB/akamai</yv:cdn1>
<yv:mediaURL1>http://akami.com/498732165</yv:mediaURL1>
</entry>
```

Programme

This entity type describes a Programme, which is derived from Editorial Version with some additional denormalised information (including from its parent Episode). It is used to populate a Programme structure in the System API. It has an entityType of programme.

Fields:

LMM Field Ref.	B2C XML Element	Content	Cardinality	Notes
Record.identifier	id	string	1	The CCO record identifier of this Programme.
Description.fullTitle	title	string	1	The title of this Programme.

Description. classifiers	yv:cdn1, yv:cdn2 etc	strings	0..*	A union of all the Content Distribution Networks on which available (in-window) child On-demand Publications are available. Each element contains a term from YouViewContentDistribution NetworkCS, provided with the B2B specification. Used for Assured Delivery signalling.
AVAttributes . bitRate	yv: minBitrate	integer	1	The lowest target bitrate of any currently available child On-demand publication. Used for calculating Assured Delivery.
[Series] Record.ident ifier	yv:seriesId	string	0..1	The CCO record identifier of the parent Series (if any).
[Brand] Record.ident ifier	yv:brandId	string	0..1	The CCO record identifier of the parent Brand (if any).
[Top-level Editorial Object] Record.ident ifier	yv:topGrou pId	string	0..1	The CCO record identifier of the Brand or Series at the top level of this content hierarchy. Not present if this Programme has no parent Groups.
[Series] Description. fullTitle	yv:seriesTit le	string	0..1	The title of the parent Series (if any).
[Brand] Description. fullTitle	yv:brandTit le	string	0..1	The title of the parent Brand (if any).
Group. owningServi ce	yv:serviceI d	string	1	The CCO record identifier of the Content Owning Service which owns this Programme.
Description. shortSynopsi s	summary	string	1	A short editorial description of this Programme.
Description. mediumSyn opsis	yv:descripti on	string	0..1	A medium-length editorial description of this Programme,
Description. longSynopsi s	yv: longDescri ption	string	0..1	A long editorial description of this Programme.
Description. originalProd uction Languages[]	yv: production Languages	string	0..1	A comma-separated list of languages (using ISO 639-2 Alpha-3 language codes as elsewhere) in which the Programme was originally produced.
Version. productionD ate	yv: production Date	date	0..1	W3C date indicating when the Programme was produced.
Version. productionT erritory	yv: production Territories	string	0..1	Comma-separated list of ISO 3166 Alpha-3 country codes indicating the country or countries in which the Programme was produced.

Guidance.codes	media:rating	string	0..1	Denton or BBFC codes. Subject to the controlled vocabulary provided with the B2B specification. The CS term is used as the content of the element, while the CS name space is used as the scheme attribute.
Guidance.longExplanation	yv:guidanceText	string	0..1	A description of why guidance has been applied.
Version.duration	yv:duration	integer	1	The advertised duration of this Programme in seconds
Publication.free	yv:paidContent	Boolean	1	A simple denormalisation of the pay status of child On-demand Publications. "1" if all available Publications have a pay flag set, otherwise "0".
AVAttributes.video.highDefinition	yv:hd	Boolean	1	A simple denormalisation of the status of child On-demand Publications. "1" if any available publication is HD, otherwise "0".
AVAttributes. signing	yv:signing	Boolean	1	A simple denormalisation of the status of child On-demand Publications. "1" if any available publication has signing (in any language), otherwise "0".
AVAttributes.signing	yv:signing	Boolean	1	A simple denormalisation of the status of child On-demand Publications. "1" if any available publication has signing (in any language), otherwise "0".
AVAttributes.audio.audioDescription	yv: audioDescription	Boolean	1	A simple denormalisation of the status of child On-demand Publications. "1" if any available publication has AD (in any language), otherwise "0".

Example XML:

```
<entry>
<content />
<yv:entityType>programme</yv:entityType>
<updated>2010-03-26T18:07:54Z</updated>
<id>654321</id>
<title>Midnight</title>
<yv:brandId>456789</yv:brandId>
<yv:seriesId>987654</yv:seriesId>
<yv:topGroupId>456789</yv:topGroupId>
<yv:seriesTitle>Series 4</yv:seriesTitle>
<yv:brandTitle>Doctor Who</yv:brandTitle>
<yv:serviceId>123123</yv:serviceId>
<summary>As part of a well-deserved holiday, the Doctor takes a bus tour on the planet Midnight. Little does he know that something is knocking on that bus' wall...</summary>
<yv:longDescription>As part of a well-deserved holiday, the Doctor takes a bus tour on the planet Midnight. Little does he know that something is knocking on that bus' wall... While Donna stays getting pampered, the Doctor goes onto a plane/spaceship without her. Everything is fine until the knocking on the wall begins. With a woman on the ship who has the ability to turn all his powers against him, passengers who are willing to throw him out of the ship and a unknown alien possesing everyone, will the Doctor and passengers ever get out alive? </yv:longDescription>
<yv:description>While Donna stays getting pampered, the Doctor goes onto a plane/spaceship without her. Everything is fine until the knocking on the wall begins. With a
```

woman on the ship who has the ability to turn all his powers against him, passengers who are willing to throw him out of the ship and a unknown alien possesing everyone, will the Doctor and passengers ever get out alive?</yv:Description>
<yv:productionLanguages>eng</yv:productionLanguages>
<yv:productionTerritories>gbr</yv:productionTerritories>
<yv:productionDate>2010-01-01T00:00:00Z</yv:productionDate>
<media:rating
scheme="http://bbc.co.uk/refdata/mpeg7cs/DentonContentWarningCS/2010/04/19
">G</media:rating>
<yv:guidanceText>Contains scenes involving violence.</yv:guidanceText>
<yv:duration>2700</media:duration>
<yv:paidContent>0</yv:paidContent>
<yv:hd>1</yv:hd>
<yv:signing>1</yv:signing>
<yv:audioDescription>0</yv:audioDescription>
<yv:cdn1>http://refdata.youview.com/mpeg7cs/YouViewContentDistributionNetworkCS/2010-05-07#GB/bt-wcc</yv:cdn1>
<yv:minBitrare>5000<yv:minBitrate>
</entry>

Programme (summary)

This entity provides basic information about a Programme. It is used to populate a Summary structure (of type Programme) in the System API. The entity type is programme, just as with the full Programme entity, but this variant displays a simpler view of it than the full Programme specified above.

Fields:

LMM Field Ref.	B2C XML Element	Content	Cardinality	Notes
Record.identifier	id	string	1	The CCO record identifier of this Programme.
Description. fullTitle	title	string	1	The title of this Programme.
Description. classifiers	yv:cdn1, yv:cdn2 etc	string	0..*	A set of classifiers which describe the Programme. The current use case is for listing Content Distribution Networks, denormalised from all available child On-Demand Publications. A controlled term from the vocabulary YouViewContentDistributionNetworkCS, supplied with the B2B specification, where the CS name space is the scheme attribute and the term is the element content.
AVAttributes. bitRate	yv: lowestTargetBitrate	integer	1	The lowest target bitrate of any currently available child On-demand publication. Used for ca
[Series] Description. fullTitle	yv: seriesTitle	string	0..1	The title of the parent Series (if any).
[Brand] Description. fullTitle	yv: brandTitle	string	0..1	The title of the parent Brand (if any).

Description.shortSynopsis	summary	string	1	A short editorial description of the Programme.
Group.owningService	yv:serviceId	string	1	The CCO record identifier of the Content Owning Service which owns this Programme.
Version.duration	yv:duration	integer	1	The advertised duration of this Programme in seconds
Guidance.codes	media:rating	string	0..1	Denton or BBFC codes. Subject to the controlled vocabulary provided with the B2B specification. The CS term is used as the content of the element, while the CS name space is used as the scheme attribute.
Publication.free	yv: paidContent	Boolean	0..1	A simple denormalisation of the pay status of child On-demand Publications. "1" if all available Publications have a pay flag set, otherwise "0".
AVAttributes.video.highDefinition	yv:hd	Boolean	1	A simple denormalisation of the status of child On-demand Publications. "1" if any available publication is HD, otherwise "0".
AVAttributes.subtitles	yv:subtitles	string	0..1	A simple denormalisation of the status of child On-demand Publications. "1" if any available publication has subtitles, otherwise "0".
AVAttributes.signing	yv:signing	Boolean	1	A simple denormalisation of the status of child On-demand Publications. "1" if any available publication has signing (in any language), otherwise "0".
AVAttributes.audio.audioDescription	yv: audioDescription	Boolean	1	A simple denormalisation of the status of child On-demand Publications. "1" if any available publication has AD (in any language), otherwise "0".

Example XML

```
<entry>
<content />
<yv:entityType>programme</yv:entityType>
<updated>2010-03-26T18:07:54Z</updated>
<id>654321</id>
<yv:serviceId>123123</yv:serviceId>
<title>Midnight</title>
<yv:seriesTitle>Series 4</yv:seriesTitle> <yv:brandTitle>Doctor Who</yv:brandTitle>
<summary>As part of a well-deserved holiday, the Doctor takes a bus tour on the planet Midnight. Little does he know that something is knocking on that bus' wall...</summary>
<media:rating
scheme"http://bbc.co.uk/refdata/mpeg7cs/DentonContentWarningCS/2010/04/19">
G</media:rating>
<yv:paidContent>0</yv:paidContent>
<yv:hd>1</yv:hd>
<yv:subtitles>1</yv:subtitles>
```

<yv:signing>1</yv:signing>
<yv:audioDescription>0</yv:audioDescription>
<yv:cdn1>http://refdata.youview.com/mpeg7cs/YouViewContentDistributionNetworkCS/2010-10-22#GBR-bt_wcc</yv:cdn1>
<yv:lowestTargetBitrare>5000<yv:lowestTargetBitrate>
<yv:duration>2700</media:duration> </entry>

Schedule Event

This entity type describes a linear publication; that is to say, a schedule event. It populates a Publication structure in the System API and has an entityType of scheduleevent.

Fields:

LMM Field Ref.	B2C XML Element	Content	Cardinality	Notes
Record.identifier	id	string	1	The CCO record identifier of this Publication.
Description.classifiers	media:category	string	0..*	A set of classifiers which describe the Publication. The current use case is for DVB Genre Codes. A controlled term from the vocabulary DTGContentCS or FreesatContentCS, included with the B2B Specification, where the CS name space is the scheme attribute and the term is the element content.
Description.shortTitle	title	string	1	The title of this Schedule Event. Used for populating EPG views.
Description.mediumSynopsis	yv:description	string	0..1	An editorial description of the content.
Publication.serviceRef	yv:serviceId	string	1	The CCO record identifier of the Linear Service to which this Publication belongs.
Publication.publishedDuration	media:content [@duration]	integer	1	The duration of the linear event, in seconds.
AVAttributes. mediaType	media:content [@medium]	string	1	The media type of the Publication, according to the controlled vocabulary specified in the Yahoo Media RSS specification version 1.5.0.
AVAttributes. audio.mixType	media:content [@channels]	integer	1	The number of audio channels used, i.e. 1 (mono), 2 (stereo) or 6 (5.1 surround).
AVAttributes.audio.Language	media:content [@lang]	string	1	Indicates the language of the main audio.
AVAttributes.audio.dubbingLanguage	media:content/ yv:audioDubbing Language	string	0..1	Indicates the language in which this Publication has been dubbed. The absence of this element indicates that there is no dubbing.

AVAttributes .audio.audio Description Language	media:content/ yv: audioDescription Language	string	0..1	The language of the embedded audio description. The absence of this element indicates that no audio description is present.
AVAttributes . video. aspectRatio	media:content/ yv:aspectRatio	string	1	The aspect ratio of the content, which shall be either "16:9" or "4:3".
AVAttributes . video. highDefinition	media:content/ yv:hd	Boolean	1	A Boolean flag to indicate whether this linear event is in High Definition or not. This element shall not be present for audio-only content.
AVAttributes . video.colour	media:content/ yv:colour	Boolean	1	A Boolean flag to indicate whether this linear event is in colour or not. This element shall not be present for audio-only content.
AVAttributes . subtitles.language	media:content/ yv:subtitlesLanguage	string	0..1	Indicates the language of any associated subtitles provided with this linear event. The absence of this element indicates the absence of subtitles.
AVAttributes . signing.language	media:content/ yv:signingLanguage	string	0..1	Indicates the language of any signing provided in this Publication. The absence of this element indicates that no signing is present.
Broadcast.start	yv:scheduleSlot	datetime	1	The start time of the linear event.
[On-demand] Record.identifier	yv:onDemandId	string	0..1	The Content Provider may indicate on the B2B interface that a particular On-demand Publication provides the catch-up for this schedule event. If such an indication has been made, the CCO Record Identifier of that On-demand Publication appears here.
OnDemand. availability.start	yv:availability Start	datetime	0..1	The start of the availability window of the associated On-demand Publication, if one is indicated.
OnDemand. availability.end	yv:availability End	datetime	0..1	The end of the availability window of the associated On-demand Publication.
OnDemand. availability. actual	yv: mediaAvailable	Boolean	0..1	A Boolean flag to indicate whether the Content Provider has expressed that the corresponding On-demand Publication (if one has been indicated) is "actually available" (i.e. has an available media asset).
Publication. otherIdentifiers	yv: identifierType1 yv: identifierValue1	strings	0..*	Identifiers which may be private to the content provider, or may be of a standard type. Those of a standard type must use a type string from the YouViewIdentifierTypeCS, supplied with

	etc			the B2B interface.
Publication.free	yv:paidContent	Boolean	1	A flag to indicate that viewing this broadcast requires payment. "1" indicates that payment is required, "0" indicates that viewing is free.
Broadcast.airingAttributes. repeat	yv:repeat	Boolean	0..1	"1" indicates that this broadcast is a repeat, "0" indicates the first showing of this content.
Guidance.codes	media:rating	string scheme attribute	0..1	Denton or BBFC codes. Subject to the controlled vocabulary provided with the B2B specification. The CS term shall be the element's content, while the CS name space is the scheme attribute.
Guidance.longExplanation	yv:guidanceText	string	0..1	A description of why guidance has been applied.

Example XML

```
<entry>
<content />
<yv:entityType>scheduleevent</yv:entityType>
<updated>2010-01-01T00:00:00Z</updated>
<id>75307530</id>
<yv:serviceId>123123</yv:serviceId>
<title>Doctor Who – Midnight</title>
<yv:description> While Donna stays getting pampered, the Doctor goes onto a plane/spaceship without her. Everything is fine until the knocking on the wall begins. With a woman on the ship who has the ability to turn all his powers against him, passengers who are willing to throw him out of the ship and a unknown alien possesing everyone, will the Doctor and passengers ever get out alive?</yv:description>
<media:content duration="3600" medium="video" channels="2" lang="eng">
<yv:audioDubbingLanguage>eng</yv:audioDubbingLanguage>
<yv:audioDescriptionLanguage>eng</yv:audioDescriptionLanguge>
<yv:aspectRatio>16:9</yv:aspectRatio>
<yv:hd>1</yv:hd>
<yv:colour>1</yv:colour>
<yv:subtitlesLanguage>eng</yv:subtitlesLanguage>
<yv:signingLanguage>bsl</yv:signingLanguage>
</media:content>
<yv:scheduleSlot>2010-01-01T00:00</yv:scheduleSlot>
<yv:onDemandId>452386</yv:onDemandId>
<yv:availabilityStart>2010-01-01T16:00Z</yv:availabilityStart>
<yv:availabilityEnd>2010-01-08T16:00Z</yv:availabilityEnd>
<yv:mediaAvailable>0</yv:mediaAvailable>
<yv:identifierType1>http://refdata.youview.com/mpeg7cs/YouViewIdentifierTypeCS/2010-05-24#groupId.programConcept</yv:identifierType1>
<yv:identifierValue1>crid://bbc.co.uk/654321</yv:identifierValue1>
<media:rating
scheme="http://bbc.co.uk/refdata/mpeg7cs/DentonContentAlertCS/2007/09/10">G</media:rating>
```

<yv:paidContent>0</yv:paidContent>
<yv:repeat>1</yv:repeat>
<yv:guidanceText>Contains scenes involving violence.</yv:guidanceText>
</entry>

Schedule Event (Summary)

This entity type describes a linear publication; that is to say, a schedule event. It populates a ScheduleEvent structure in the System API and has an entityType of scheduleevent.

Fields:

LMM Field Ref.	B2C XML Element	Content	Cardinality	Notes
Record.identifier	id	string	1	The CCO record identifier of this Schedule Event.
[Programme] Record.identifier	yv:programmeId	string	0..1	The CCO record identifier of the parent Programme, supplied only if that Programme contains enhanced metadata supplied by the CP to CCO.
Publication. serviceRef	yv:serviceId	string	1	The CCO record identifier of the Linear Service to which this Schedule Event belongs.
Description. shortTitle	title	string	1	The title of this Broadcast Publication. Used for populating EPG views.
Publication. publishedDuration	media:content [@duration]	integer	1	The duration of the linear event, in seconds.
Broadcast. start	yv:scheduleSlot	datetime	1	The start time of the linear event.
[On-demand] Record.identifier	yv:onDemandId	string	0..1	The CCO record identifier of an On-demand Publication which the Content Provider has indicated provides the catch-up for this schedule event.
OnDemand. availability. start	yv:availability Start	datetime	0..1	The start of the availability window of the associated On-demand Publication.
OnDemand. availability. end	yv: availabilityEnd	datetime	0..1	The end of the availability window of the associated On-demand Publication.
OnDemand. availability. actual	yv: mediaAvailable	Boolean	0..1	A Boolean flag to indicate whether the Content Provider has expressed that the corresponding On-demand Publication is "actually available" (i.e. has an available media asset)
Publication. otherIdentifiers	yv: identifierType1 yv: identifierValue1 etc	strings	0..*	Identifiers which may be private to the content provider, or may be of a standard type. Those of a standard type must use a type string from the YouViewIdentifierTypeCS, supplied with the B2B interface.

Example XML:

```
<entry>
<content />
<yv:entityType>scheduleevent</yv:entityType>
<updated>2010-01-01T00:00:00Z</updated>
<id>75307530</id>
<yv:programmeId>654321</yv:programmeId>
<yv:serviceId>996633</yv: serviceId >
<title>Doctor Who – Midnight</title>
<media:content duration="3600 />
<yv:scheduleSlot>2010-01-01T00:00</yv:scheduleSlot>
<yv:availabilityStart>2010-01-01T16:00Z</yv:availabilityStart>
<yv:availabilityEnd>2010-01-08T16:00Z</yv:availabilityEnd>
<yv:onDemandId>753753</yv:onDemandId>
<yv:mediaAvailable>1</yv:mediaAvailable>
<yv:identifierType1>http://youview.com/identifiers/EventLocator
</yv:identifierType1>
<yv:identifierValue1>dvb://233a..2045;1ab6</yv:identifierValue1>
<yv:identifierType2>http://refdata.youview.com/mpeg7cs/YouViewIdentifierTypeCS/2010-05-
24#groupId.programConcept</yv:identifierType2>
<yv:identifierValue2>dvb://233a..2045;1ab6</yv:identifierValue2>
</entry>
```

Series

This entity provides the information describing a Series. It is used to populate a Summary structure (of type series) in the system API. It has an entityType of series.

Fields:

LMM Field Ref.	B2C XML Element	Content	Cardinality	Notes
Record.identifier	id	string	1	The CCO record identifier of this Series.
Description. fullTitle	title	string	1	The title of this Series.
Group. parentGroup	yv:brandId	string	0..1	The CCO record identifier of the parent Brand (if any).
[Brand] Description. fullTitle	yv:brandTitle	string	0..1	The title of the parent Brand (if any).
Description. shortSynopsis	summary	string	0..1	A short editorial description of the Series.
Group. owningService	yv:serviceId	string	1	The CCO record identifier of the Content Owning Service which owns this Series.
Group. childCount	yv:childCount	integer	1	The number of descendent Programmes of this Series with available On-demand Publications.

Example XML:

```
<entry>
<content />
<yv:entityType>series</yv:entityType>
<updated>2010-01-01T00:00:00Z</updated>
<id>987654</id>
<yv:serviceId>123123</yv:serviceId>
<title>Series 4</title>
<yv:brandId>456789</yv:brandId>
<yv:brandTitle>Doctor Who</yv:brandTitle>
<summary>Series 4 of The Doctor's adventures.</summary>
<yv:childCount>2</yv:childCount>
</entry>
```

Service

This entity provides information about a Service. It is used to populate a Service structure in the System API. It has an entityType of service.

Fields

LMM Field Ref.	B2C XML Element	Content	Cardinality	Notes
Record.identifier	id	string	1	The CCO record identifier of this Service.
Service. mediaPlayer	yv:player	string	0..1	The CCO record identifier of the Application associated with this Service.
Service. parentService	yv:parentId	string	0..1	The CCO record identifier of the parent Service of this Service. Allows a hierarchy of services by denoting another service which is the parent of this one.
Service. providerName	yv:providerName	string	1	The name of the Content Provider who provides this Service.
Description. fullTitle	title	string	0..1	The title of this Service.
Description. shortTitle	yv:shortTitle	string	0..1	A shortened title for this Service.
Description. shortSynopsis	summary	string	0..1	A short description of this Service.
Description. mediumSynopsis	yv:description	string	0..1	A medium-length description of this Service.
Description. longSynopsis	yv: longDescription	string	0..1	A longer description of this Service.

Example XML:

```
<entry>
```

```
<yv:entityType>service</yv:entityType>
<updated>2010-01-01T00:00:00T</updated>
<id>123123</id>
<yv:parentId>001002<yv:parentId>
<yv:player>123456</yv:player>
<yv:providerName>BBC</yv:providerName>
<title>BBC One</title>
<yv:shortTitle>BBC1</yv:shortTitle>
<summary>The BBC's flagship entertainment channel.</summary>
<yv:description>BBC One brings you the best entertainment from the BBC.</yv:description>
<yv:longDescription>BBC One is the BBC's flagship channel, bringing you the best
entertainment from the BBC.</yv:longDescription>
</entry>
```

B2C: Browse Service

The Browse Service supplies the metadata to support browse journeys through the user interface, such as browsing content by category.

It provides a number of endpoints, which are preconceived views onto the metadata. The difference between these endpoints lies in the type(s) of entity or entities returned. The output from each endpoint is further customisable through the use of additional view parameters (filters and sort options) which may be applied as part of the request URL.

B2C Browse Service: Request specification

Requests are made to the Browse Service using the HTTP interface specified above.

The endpoints required from the Browse Service are listed below. In almost all use cases, some additional filter is applied, such as the ID of a particular entity to return, or the ID of a parent entity or category. Available filters are listed below.

Endpoint Template Name	**Description**	**Placeholders in Template**	**Type(s) Returned**
categories	Summaries of Categories themselves.	${view}	category
summaries	Summaries of various entities. For example, category browsing is achieved using this feed, filtered by category.	${view}	brand series programme (summary) service application
programmes	Full information about a Programme (or multiple Programmes).	${view}	programme
ondemands	A list of On-demand Publications.	${view}	ondemand
scheduleevents	A list of Schedule Events.	${view}	scheduleevent

Any of the Browse endpoints may need to be filtered or sorted in additional ways. The endpoint URL templates include a ${view} placeholder where additional filter parameters can be added, which are replaced by one or more processed view parameter templates, separated by ampersands.

The view parameter templates themselves are supplied by the CCO provider, reflecting the URL structure of the implementation.

Filters & Sorting:

The following table lists the filters which apply to the Browse Service endpoints. Each filter may only be used against certain endpoints, and may not be applied to others. The Applicable Endpoint Templates column lists the endpoints to which the filters apply, using the template names defined above.

The placeholders in some templates may be replaced by multiple terms separated by Boolean operators. The Valid Operators column indicates which operators may be used with each filter. The OR operator is represented in URLs as a pipe character (|). The AND operator is represented in URLs as a plus symbol (+).

If no filter is applied to an endpoint, all entities of the appropriate type are returned.

Filter Template Name	Description	Placeholder (s) in Template	Valid Values	Valid Operators	Applicable Endpoint Templates
browse. entity	Specifies the type(s) of entity which should be returned.	${entity}	"programme" "series" "brand" "service" "application"	OR	summaries
browse. id	Return only one entity, with the specified ID, or multiple entities, where the IDs are pipe-separated (e.g. to request abc and def insert abc|def)	${id}	Any CCO record identifier	OR	summaries programmes ondemands scheduleevents
browse. programme	Returns Publications belonging to a given parent Programme.	${programme-id}	Any CCO Programme record identifier		ondemands scheduleevents
browse. brand	Return content which belongs to the specified Brand.	${brand-id}	Any CCO Brand record identifier		summaries programmes
browse. series	Return Programmes which belong to the specified Series.	${series-id}	Any CCO Series record identifier		summaries programmes
browse. service	Return entities whose yv:serviceId matches the service ID supplied.	${service-id}	Any CCO Service record identifier		summaries programmes ondemands scheduleevents
browse. category	Return entities which belong to the specified category, or sub-categories of the specified category.	${category-id}	Any CCO Category record identifier.	OR	summaries programmes categories
browse. language	Allows the client to request metadata in a particular language (where available).	${lang}	"eng" (English) "cym" (Welsh) "gla" (Scots Gaelic)		summaries programmes
browse. paid	Requests content which is specifically defined as paid or	${paid}	"0" (Return free content only)	OR	summaries programmes

	free. Excluding this filter returns both paid and free content.		"1" (Return paid content only)		
browse. adult	Return adult content or exclude it. If the filter is not present, all endpoints shall default to excluding adult content for all requests.	${adult}	"0" (Return non-adult content only) "1" (Return adult content only)	OR	categories summaries programmes
browse. paginate	Index of the first and last results to be returned, in order to paginate results. If not supplied, endpoints shall default to returning items 1 to 10.	${start} ${end}	Any integer.		categories summaries programmes ondemands scheduleeven ts
browse. location	This parameter allows the client to specify its location, for the purposes of accessing content only available to, or targeted at, certain regions. The client may provide one or more location terms, to the finest granularity which it is able to supply. The CCO service then matches based on these base terms, but also match on prefixes further up the hierarchy. (e.g. a client supplying the term GBR-ENG-london shall also be provided with metadata about content targeted at GBR-ENG and GBR).	${location}	Any term from TargetRegio n CS, supplied with the B2B interface specification .	OR	summaries programmes
browse. include	This filter enables the Closed User Groups feature, which allows certain users to see content not available to the whole user base. The filter allows the client to specify a list of terms. Additional content	${terms}	Terms from Internet Service ProviderCS, supplied with the B2B interface specification .	OR	summaries programmes ondemands

	may then be included in results, based the matching term being applied to that content. For example, terms may include the name of the ISP to which the client is connected, causing results to include content available only to a specific ISP.				
browse. access	Allows the client to request Programmes with certain access services, or with none ("base"). The default to be used in the absence of this filter to return all Programmes.	${access}	"base" "signed" "ad" "subtitles"	OR	summaries
browse. format	Allows the client to request Programmes with certain format options. The default to be used in the absence of this filter to return all Programmes.	${format}	"hd" "sd"	OR	summaries
browse. medium	Request content in a particular medium (for example, audio or video).	${medium}	Terms from the Yahoo Media RSS specification version 1.5.0 medium attribute.	OR	summaries
browse. groupby	Specifies that results should be grouped by some common parameter; the parent brand or series, or the top level editorial object. The default is to apply no grouping.	${groupby}	"brand" "series" "topGroup"		summaries
browse. inwindow	Return or exclude Programmes, Series and Brands based on availability of descendent On-demand Publications. For Applications, return or exclude based	${window}	One of the following terms: "now" (have a past or absent start of availability and a future	OR	summaries

	upon the entity's own availability window. Availability windows do not apply to Services. Options are within availability window, coming soon or return everything regardless of availability. The default shall be "now".		or absent end of availability) "soon" (have a future start of availability and a future or absent end of availability) "all"		
browse. available	Return or exclude Programmes, Series and Brands based on actual asset availability of descendent On-demand Publications. For Applications, return or exclude based upon the entity's own actual availability. Availability does not apply to Services. The default shall be to return all content (1 OR 0)	${available}	"1" (return only actually available items) "0" (return only items which are not available)	OR	summaries
browse. sort	Sort the results by the specified parameter, such that the client may render results without re-sorting. If this parameter is absent, the order is undefined. For example, if the template were: sort=${param}:${order} Then sorting by title a-z would produce the following filter: sort=title:asc	${param} ${order}	${param} shall be the sort parameter: "title" (uses top level group sort title) "soa" (start of availability) "expiry" (end of availability) "broadcast" (date-time of broadcast) "index" (series or episode number) ${order} shall be one of the following terms: "asc" "desc"		categories summaries programmes ondemands scheduleeven ts

B2C Browse Service: Response specification

Responses from the Browse Service shall be according to the XML response format detailed above. Each endpoint shall return an XML instance document containing zero or more <entry> elements, each representing an entity. The types of entities returned depend on the endpoint, as specified above.

B2C: Search Service

The Search Service supplies metadata for search journeys in the user interface.

The Search Service provides a single endpoint for submitting search queries. The output from the search endpoint is further customisable through the use of additional view parameters (filters) which may be applied as part of the request URL.

B2C Search Service: Request specification

Requests are made to the Search Service using the HTTP interface detailed above. The Search Service endpoint template is as follows:

Endpoint Template Name	Description	Placeholders in Template	Type(s) Returned
search	The query endpoint for search requests. The query placeholder is the point at which the (URL-encoded) search query is to be inserted.	${query.search} ${view}	brand series programme (summary) service application

The template includes the placeholder ${query.search} which the client replaces with the query string. Terms may be specified using AND or OR operators, using the same separator characters as with Boolean operators in other browse and search filters. Terms separated by a (URL encoded) space (with no special operator) are treated as an AND query.

The search endpoint may need to be filtered in additional ways. The endpoint URL template includes a ${view} placeholder where additional filter parameters can be added, which are replaced by one or more processed view parameter templates separated by ampersands. The view parameter templates themselves are supplied by the CCO provider in the same manner as the endpoint template.

Filters & Sorting:

The following table lists the filters which apply to the Search Service.

The placeholders in some templates may be replaced by multiple terms separated by Boolean operators. The Valid Operators column indicates which operators may be used with each filter. The OR operator is represented in URLs as a pipe character (|).The AND operator is represented in URLs as a plus symbol (+).

Filter Template Name	Description	Placeholder(s) in Template	Valid Values	Valid Operators
search. scope	Specifies the scope of search to be performed. Differently scoped searches matches the search term(s) against different fields in the data. If this filter is not used, the scope shall be "default".	${type}	“default” “castcrew”	

search. entity	Specifies the type(s) of entity which should be returned.	${entity}	"programme" "series" "brand" "service" "application"	OR
search. brand	Return content which belong to the specified Brand.	${brand-id}	Any CCO Brand record identifier	
search. series	Return Programmes which belong to the specified Series.	${series-id}	Any CCO Series record identifier	
search. service	Return entities whose yv:serviceId matches the service ID supplied.	${service-id}	Any CCO Service record identifier	
search. category	Return entities which belong to the specified category.	${category-id}	Any CCO Category record identifier.	OR
search. language	Allows the client to request metadata in a particular language (where available).	${lang}	"eng" (English) "cym" (Welsh) "gla" (Scots Gaelic)	
search. paid	Requests content which is specifically defined as paid or free. Excluding this filter shall return both paid and free content.	${paid}	"0" (Return free content only) "1" (Return paid content only)	OR
search. adult	Return adult content or exclude it. If the filter is not present, all endpoints shall default to excluding adult content for all requests.	${adult}	"0" (Return non-adult content only) "1" (Return adult content only)	OR
search. access	Allows the client to request Programmes with certain access services, or with none ("base"). The default to be used in the absence of this filter to return all Programmes.	${access}	"base" "signed" "ad" "subtitles"	OR
search. format	Allows the client to request Programmes with certain format options. The default to be used in the absence of this filter to return all Programmes.	${format}	"hd" "sd"	OR
search. medium	Request content in a particular medium (for example, audio or video).	${medium}	Terms from the Yahoo Media RSS specification version 1.5.0 medium attribute.	OR
search. groupby	Specifies that results should be grouped by some common parameter; the parent brand or series, or the top level editorial object. The default is to apply no grouping.	${groupby }	"brand" "series" "topGroup"	
search. paginate	Index of the first and last results to be returned, in	${start} ${end}	Any integer.	

	order to paginate results. If absent, endpoints shall default to returning items 1 to 10.			
search. location	This parameter allows the client to specify its location, for the purposes of accessing content only available to, or targeted at, certain regions. The client may provide one or more location terms, to the finest granularity which it is able to supply. The CCO service then matches based on these base terms, but also match on prefixes further up the hierarchy. (e.g. a client supplying the term GBR-ENG-london shall also be provided with metadata about content targeted at GBR-ENG and GBR).	${location}	Any term from the TargetRegionCS supplied with the B2B interface specification.	OR
search. include	This filter enables the Closed User Groups feature, which allows certain users to see content not available to the whole user base. The filter allows the client to specify a list of terms. Additional content may then be included in results, based the matching term being applied to that content. For example, terms may include the name of the ISP to which the client is connected, causing results to include content available only to a specific ISP.	${terms}	Terms from YouViewInternetServiceProviderCS, supplied with the B2B interface specification.	OR
search. inwindow	Return or exclude Programmes, Series and Brands based on availability of descendent On-demand Publications. For Applications, return or exclude based upon the entity's own availability window. Availability windows do not apply to Services. Options are within availability window, coming soon or return	${window}	One of the following terms: "now" (have a past or absent start of availability and a future or absent end of availability) "soon" (have a future start of availability and a future or absent end of availability) "all"	OR

	everything regardless of availability. The default shall be "now".			
search. available	Return or exclude Programmes, Series and Brands based on actual asset availability of descendent On-demand Publications. For Applications, return or exclude based upon the entity's own actual availability. Availability does not apply to Services. The default shall be to return all content (1 OR 0)	${available}	"1" (return only actually available items) "0" (return only items which are not available)	OR
search. sort	Sort the results by the specified parameter, such that the client may render results without re-sorting. If this parameter is absent, the sorting shall be by decreasing relevance. For example, if the template were: sort=${param}:${order} Then sorting by title a-z would produce the following filter: sort=title:asc	${param} ${order}	${param} is the sort parameter: "title" (uses top level group sort title) "soa" (start of availability) "expiry" (end of availability) "broadcast" (date-time of broadcast) "index" (series or episode number) "relevance" (search relevance) ${order} shall be one of the following terms: "asc" "desc"	

B2C Search Service: Response specification

Responses from the Search Service are according to the XML response format detailed above. The endpoint returns an XML instance document containing zero or more <entry> elements, each representing an entity.

B2C: Search Suggestions Service

The Search Suggestions Service provides suggestions of popular search terms based upon a small number of letters supplied by the client receiver device. It has one endpoint, for making search suggestion queries. The output from the endpoint is further customisable through the use of additional view parameters which may be applied as part of the request URL.

B2C Search Suggestions Service: Request specification

Requests are made to the Search Suggestions Service using the HTTP interface detailed above.

The Search Suggestions Service endpoint template is as follows:

Endpoint Template Name	**Description**	**Placeholders in Template**	**Type(s) Returned**

suggestions	The query endpoint for search suggestion requests. The query placeholder is the point at which the (URL-encoded) search query is to be inserted.	${query.suggestions} ${view}	Simple list of terms. See below.

The template includes the placeholder ${query.suggestions} which the client replaces with the query string.

The search suggestions endpoint may need to be filtered in additional ways. The endpoint URL template includes a ${view} placeholder where additional filter parameters can be added, which are replaced by one or more processed view parameter templates. The view parameter templates themselves are supplied by the CCO provider in the same manner as the endpoint template.

Filters & Sorting:

The following table lists the filters which apply to the Search Suggestions Service.

The placeholders in some templates may be replaced by multiple terms separated by Boolean operators. The Valid Operators column indicates which operators may be used with each filter. The OR operator is represented in URLs as a pipe character (|).The AND operator is represented in URLs as a plus symbol (+).

Filter Template Name	**Description**	**Placeholder(s) in Template**	**Valid Values**	**Valid Operators**
suggestions. paginate	Index of the first and last results to be returned, in order to paginate results. If this filter is absent, suggestions 1 to 10 are returned.	${start} ${end}	Any integer.	
suggestions. include	This filter enables the Closed User Groups feature, which allows certain users to see content not available to the whole user base. The filter allows the client to specify a list of terms. Additional suggestions may then be included in results, based the matching term being applied to the suggested content. For example, terms may include the name of the ISP to which the client is connected, causing results to include content available only to a specific ISP.	${include}	Any exclusive content label provided to the client device by configuration. N.B. These sets may include for example content only available by customers of a particular ISP or application.	OR
suggestions. location	This parameter allows the client to specify its location, for the purposes of accessing content only available to, or targeted at, certain regions. The client may provide one or more location terms3, to the finest granularity which it is able to supply. The CCO service then matches based on these base terms, but also matches on prefixes further up the hierarchy.	${location}	Any term from the YouViewTarget RegionCS, supplied with the B2B interface specification.	OR

	(e.g. a client supplying the term GBR-ENG-london shall also be provided with metadata about content targeted at GBR-ENG and GBR).			
suggestions. adult	Return suggestions for adult content or exclude them. If the filter is not present, the default shall be to exclude adult content for all requests.	${adult}	"0" (Return non-adult content only) "1" (Return only adult content)	OR
suggestions. inwindow	Return suggestions for content which is within availability window (has a past or absent start of availability and a future or absent end of availability), coming soon (has a future start of availability and a future or absent end of availability) or all content. The default shall be to return only suggestions for content which has in-window On-demand Publications ("now").	${window}	One of the following terms: "now" "soon" "all"	OR

No language filtering is available for the Search Suggestions Service. All titles (in any language) may be provided as suggestions, subject to the same rules as those in the default language.

Search suggestions are always sorted according to relevance, in a descending order (the most relevant result appears first).

B2C Search Suggestions Service: Response specification

The simpler nature of the data returned by the Search Suggestions Service leads to a requirement for a simpler data format than the XML format described elsewhere.

The response from the Search Suggestions Service is a plain-text set of search terms in a simple newline-separated list.

Example:

Top Gear
Top Gun
Topsy Turvy
Toploader In Concert

B2C: Recommendations Service

The Recommendations Service accepts a CCO Programme Record Identifier, and returns metadata about related or recommended content, based upon the ID supplied.

The Recommendations Service provides one endpoint, for making recommendation requests. The output from the endpoint is further customisable through the use of additional

view parameters (filters) which may be applied as part of the request URL.

B2C Recommendations Service: Request specification

Requests are made to the Recommendations Service using the HTTP interface detailed above.

The Recommendations Service endpoint template is as follows:

Endpoint Template Name	Description	Placeholders in Template	Type(s) Returned
recommend	The recommendations endpoint accepts a record identifier for a Programme, and returns related or recommended Programmes, optionally rolled-up into Series and/or Brands.	${recommend.programme}	programme (summary) series brand

The template includes the placeholder ${recommend.programme} which the client replaces with the CCO record identifier of the Programme on which to base the recommendations.

The Recommendations Service endpoint may need to be filtered in additional ways. The endpoint URL template includes a ${view} placeholder where additional filter parameters can be added, which are replaced by one or more processed view parameter templates. The view parameter templates themselves are supplied by the CCO provider in the same manner as the endpoint template.

Filters & Sorting:

The following table lists the filters which apply to the Recommendation Service.

Filter Template Name	Description	Placeholder(s) in Template	Valid Values	Valid Operators
recommend. language	Allows the client to request metadata in a particular language (where available).	${lang}	"eng" (English) "cym" (Welsh) "gla" (Scots Gaelic)	
recommend. access	Allows the client to request Programmes with certain access services, or with none ("base"). The default to be used in the absence of this filter to return all Programmes.	${access}	"base" "signed" "ad" "subtitles"	OR
recommend. format	Allows the client to request Programmes with certain format options. The default to be used in the absence of this filter to return all Programmes.	${format}	"hd" "sd"	OR
recommend. groupby	Specifies that results should be grouped by some common parameter; the parent brand or series, or the top level editorial object. The default is to apply no grouping.	${groupby}	"brand" "series" "topGroup"	
recommend. paginate	Index of the first and last results to be returned, in order to paginate results. If absent, endpoints shall default to returning items 1 to 10.	${start} ${end}	Any integer.	

recommend. location	This parameter allows the client to specify its location, for the purposes of accessing content only available to, or targeted at, certain regions. The client may provide one or more location terms4, to the finest granularity which it is able to supply. The CCO service then matches based on these base terms, but also match on prefixes further up the hierarchy. (e.g. a client supplying the term GBR-ENG-london shall also be provided with metadata about content targeted at GBR-ENG and GBR).	${location}	Any term from YouViewTargetRegionCS, supplied with the B2B interface specification.	OR
recommend. include	This filter enables the Closed User Groups feature, which allows certain users to see content not available to the whole user base. The filter allows the client to specify a list of terms. Additional content may then be included in results, based the matching term being applied to that content. For example, terms may include the name of the ISP to which the client is connected, causing results to include content available only to a specific ISP.	${terms}	Terms from YouViewInternetServiceProviderCS, supplied with the B2B interface specification.	OR
recommend. inwindow	Return or exclude Programmes based on availability of descendent On-demand Publications Options are to return items within availability window, items which are coming soon or all items regardless of availability. The default shall be “now”.	${window}	One of the following terms: “now” (have a past or absent start of availability and a future or absent end of availability) “soon” (have a future start of availability and a future or absent end of availability) “all”	OR
recommend. available	Return or exclude Programmes based on actual asset availability of descendent On-demand Publications. The default shall be to return all Programmes (1 OR 0)	${available}	“1” (return only actually available items) “0” (return only items which are not available)	OR

Returned entities are sorted according to the algorithms of the Recommendations Service. No sorting options are provided to the client.

B2C Recommendations Service: Response specification

Responses from the Recommendations Service are according to the XML response format detailed above. The endpoint returns an XML instance document containing zero or more <entry> elements, each one representing a Programme, Series or Brand entity.

B2C: Highlights Service

The Highlights Service accepts a CCO Category Record Identifier, and returns metadata about highlighted or promoted content within that category. It enables the platform to feature certain content for prominent display in the user interface.

The Highlights Service provides one endpoint, for making highlight requests. The output from the endpoint is further customisable through the use of additional view parameters (filters) which may be applied as part of the request URL.

B2C Highlights Service: Request specification

Requests are made to the Highlights Service using the HTTP interface detailed above.

The Highlights Service endpoint template is as follows:

Endpoint Template Name	Description	Placeholders in Template	Type(s) Returned
highlights	The highlights endpoint accepts a record identifier for a category, and returns highlighted Programmes, optionally rolled-up into Series and/or Brands.	${highlights.category}	programme (summary) series brand

The template includes the placeholder ${highlights.category} which the client shall replace with the CCO record identifier of the category from which the highlighted items shall be selected.

The Highlights Service endpoint may need to be filtered in additional ways. The endpoint URL template includes a ${view} placeholder where additional filter parameters can be added, which shall be replaced by one or more processed view parameter templates. The view parameter templates themselves shall be supplied by the CCO provider in the same manner as the endpoint template.

Filters & Sorting:

The following table lists the filters which apply to the Recommendation Service.

Filter Template Name	Description	Placeholder(s) in Template	Valid Values	Valid Operators
highlights.language	Allows the client to request metadata in a particular language (where available). See above.	${lang}	“eng” (English) “cym” (Welsh) “gla” (Scots Gaelic)	
highlights.access	Allows the client to request Programmes with certain access services, or with none (“base”). The default to be used in the absence of this filter is to return all Programmes.	${access}	“base” “signed” “ad” “subtitles”	OR

highlights.format	Allows the client to request Programmes with certain format options. The default to be used in the absence of this filter is to return all Programmes.	${format}	"hd" "sd"	OR
highlights.groupby	Specifies that results should be grouped by some common parameter; the parent brand or series, or the top level editorial object. The default is to apply no grouping.	${groupby}	"brand" "series" "topGroup"	
highlights.paginate	Index of the first and last results to be returned, in order to paginate results. If absent, endpoints default to returning items 1 to 10.	${start} ${end}	Any integer.	
highlights.location	This parameter allows the client to specify its location, for the purposes of accessing content only available to, or targeted at, certain regions. The client may provide one or more location terms*, to the finest granularity which it is able to supply. The CCO service then matches based on these base terms, but also matches on prefixes further up the hierarchy. (e.g. a client supplying the term GBR-ENG-london is also be provided with metadata about content targeted at GBR-ENG and GBR). * The current business rule is for the client to supply only a single location term, but the Highlights Service supports multiple terms.	${location}	Any term from YouViewTargetRegionCS, supplied with the B2B interface specification.	OR
highlights.include	This filter enables the Closed User Groups feature, which allows certain users to see content not available to the whole user base. The filter allows the client to specify a list of terms. Additional content may then be included in results, based the matching term being applied to that content. For example, terms may include the name of the ISP to which the client is connected, causing results to include content available only to a specific ISP.	${terms}	Terms from YouViewInternetServiceProviderCS, supplied with the B2B interface specification.	OR
highlights.inwindow	Return or exclude Programmes based on availability of descendent On-demand Publications Options are to return items within availability window, items which	${window}	One of the following terms: "now" (have a past or absent start of availability and a future or absent	OR

	are coming soon or all items regardless of availability. The default is "now".		end of availability) "soon" (have a future start of availability and a future or absent end of availability) "all"	
highlights. available	Return or exclude Programmes based on actual asset availability of descendent On-demand Publications. The default is to return all Programmes (1 OR 0)	${available}	"1" (return only actually available items) "0" (return only items which are not available)	OR

Returned entities are sorted according to the algorithms of the Highlights Service. No sorting options are provided to the client.

B2C Highlights Service: Response specification

Responses from the Highlights Service are according to the XML response format detailed in above. The endpoint returns an XML instance document containing zero or more <entry> elements, each one representing a Programme, Series or Brand entity.

B2C: Linear Event Resolution Service

This service returns a Programme entity, which provides additional information about a programme being shown on a linear channel. It does this by accepting the broadcast identifiers (DVB event locator and Programme CRID) of a linear Event and returning the Programme whose list of Publications contains those broadcast identifiers.

The Linear Event Resolution Service provides one endpoint, for making event resolution requests.

B2C Linear Event Resolution Service: Request specification

Requests are made to the Linear Event Resolution Service using the HTTP interface detailed in above. The Linear Event Resolution Service endpoint template is as follows:

Endpoint Template Name	**Description**	**Placeholders in Template**	**Type(s) Returned**
eventresolve	This endpoint returns a Programme entity when provided a broadcast CRID and DVB event locator. It is used to resolve a broadcast linear schedule event into the enhanced metadata for the associated Programme.	${programme-crid} ${event-locator} ${view}	programme

The template includes placeholders for both the linear programme CRID and an event locator of the event to be resolved into a Programme. The event locator is required, and the programme CRID is optional, and is supplied where available.

The accepted values for ${programme-crid} are linear programme CRIDs only. Linear series CRIDs and linear Recommendation CRIDs are not resolved.

Filters & Sorting:

The following table lists the filters which apply to the Linear Event Resolution Service.

Filter Template Name	Description	Placeholder(s) in Template	Valid Values
eventresolve. language	Allows the client to request metadata in a particular language (where available). See above.	${lang}	"eng" (English) "cym" (Welsh) "gla" (Scots Gaelic)

Usually, only one result will be returned. If multiple Programmes match, they are returned in decreasing order of the proximity of their scheduleSlot (broadcast date and time) to the present. In other words, the Programme whose schedule slot is closest to "now" is returned first, and the one furthest in the past/future appears last.

Where resolution is successful, the Linear Event Resolution Service returns the appropriate Programme entity, regardless of whether it currently has any available child On-demand Publications.

B2C Linear Event Resolution Service: Response specification

Responses from the Linear Event Resolution Service are according to the XML response format detailed in above. The endpoint returns an XML instance document containing zero or more <entry> elements, each one representing a Programme entity. Each Programme entity appears only once in the response.

B2C: Linear Service Resolution Service

This service returns a Service record when presented with a linear service locator. This allows the client receiver device to discover enhanced metadata about that service.

The Linear Service Resolution Service provides one endpoint, for making service resolution requests.

B2C Linear Service Resolution Service: Request specification

Requests are made to the Linear Service Resolution Service using the HTTP interface detailed in above. The Linear Service Resolution Service endpoint template is as follows:

Endpoint Template Name	Description	Placeholders in Template	Type(s) Returned
serviceresolve	This endpoint returns a Service entity when provided a DVB service locator, and is used to obtain enhanced metadata for a linear service.	${service-locator} ${view}	service

The template includes a ${service-locator} placeholder, which the client is required to replace with the service locator of the service to be resolved.

Filters & Sorting:

The following table lists the filters which apply to the Linear Service Resolution

Service.

Filter Template Name	Description	Placeholder(s) in Template	Valid Values
serviceresolve. language	Allows the client to request metadata in a particular language (where available). See above.	${lang}	"eng" (English) "cym" (Welsh) "gla" (Scots Gaelic)

Only one result may ever be returned by this service, as two CCO service entities may not share a service identifier. Therefore, no sorting is applied.

As the Linear Service Resolution Service deals only with Service entities, availability windows are not applicable at all. Any resolved service is returned, irrespective of the date and time of the request.

B2C Linear Service Resolution Service: Response specification

Responses from the Linear Service Resolution Service are according to the XML response format detailed in above. The endpoint returns an XML instance document containing zero or one <entry> elements, representing a Service entity.

B2C: Schedule service

- The client may request a schedule of events from the Schedule Service.
- The request shall bound the data using three parameters:
- The start time of the schedule block (accepted to a granularity of full hours only)
- The end time of the schedule block (accepted to a granularity of full hours only)
- The Service(s) (channels) for which the schedule is requested
- The Schedule Service provides one endpoint, for requesting a schedule.

B2C Schedule service: Request specification

Requests are made to the Schedule Service using the HTTP interface detailed above.

The Schedule Service endpoint template is as follows:

Endpoint Template Name	Description	Placeholders in Template	Type(s) Returned
schedule	This endpoint returns a Schedule for a particular time block, for a particular linear Service or Services. Start and end times to be a valid W3C datetime, bounding the start or end time of the events (in other words, includes all events which fall at least partly within the specified time block).	${sched-start} ${sched-end} ${sched-service} ${view} A schedule for multiple services may be requested by using the OR operator in the same manner as with filters on other services (multiple IDs separated by a | character).	schedule event (summary)

The template includes placeholders for the client to replace with the start time, end time and the CCO record identifier(s) of the Service(s) for which the schedule is requested.

In order to aid caching, the B2C client only ever requests schedule blocks of 3 hours, beginning at one of the following UTC times:
00:00, 03:00, 06:00, 09:00, 12:00, 15:00, 18:00, 21:00

Filters & Sorting:

The following table lists the filters which apply to the Linear Service Resolution Service.

Template Name	Description	Placeholder(s) in Template	Valid Values
schedule.language	Allows the client to request metadata in a particular language (where available).	${lang}	"eng" (English) "cym" (Welsh) "gla" (Scots Gaelic)

The events in the schedule returned are sorted according to service first, and then chronologically, beginning with the event with the earliest scheduled start time.

The Schedule Service deals only with Schedule Event entities, so On-demand availability windows are not applicable. All items in the requested schedule are returned, irrespective of the availability of sibling On-Demand Publications.

B2C Schedule service: Response specification

Responses from the Schedule Service is according to the XML response format detailed above. The endpoint returns an XML instance document containing zero or more <entry> elements, each representing a scheduleevent entity in summary form.

This list of Schedule Event Summaries describes a schedule in that each entry corresponds to one Event in the linear schedule. Each Schedule Event Summary includes some simple descriptive metadata (such as title) sufficient to populate an EPG grid. This data may be supplied directly over the B2B interface or else denormalised from the parent Programme, if one exists.

B2C: Roll-up of Programme groups

The following description provides implementation information on how metadata is exposed by the CCO. It is not part of the interface, but has a direct effect on the information which is supplied across the B2C interface.

In order to ease the process of navigating a very large amount of content, the content guide may wish to employ Roll-up to simplify the presentation of large sets of content to the user. Roll-up is a process of grouping content from the same parent group (Brand or Series) into a single result in a browse or search list. Here a means is defined by which a client may request that a response be grouped (rolled-up) in this manner.

For example, if grouping by Brand is requested, the following rules apply:

- If a Brand contains multiple programmes, then a browse or search result includes the Brand itself, and not the individual Programmes. However, this only applies where multiple Programmes belong to the same Brand.
- If the result set contains a single Programme belonging to a Brand, then the Programme entity itself is included in the results.

Result sets may contain a mixture of different results types. For example, if a particular result set contains both a rolled-up Brand and a single Programme, it would appear as shown below:

```
<entry>
<yv:entityType>brand</yv:entityType>
<id>123456</id>
<title>Doctor Who</title>
{additional brand information would appear here}
</entry>
<entry>
```

<yv:entityType>programme</yv:entityType>
<id>654320</id>
<title>Doctor Dolittle</title>
{additional programme information would appear here}
</entry>

If roll-up by Top Level Editorial Object is requested, then roll-up may also occur on Series for Programmes which have a parent Series but no parent Brand.

If rolling up a result set would cause only one entity to be returned then roll-up should not occur. The most likely use-case is that the children of a Brand have been requested from the Browse service, but all the resulting Programmes belong to the same Series. In this case, the Series entity is not returned, rather the Programmes are returned instead.

In order to be able to signal to the user how many results will be revealed when a rolled-up Brand or Series is selected, the B2C interface includes a <yv:programmeCount> element. This contains a number indicating how many Programme descendents the entity has.

B2C: Examples of URL templates

Here information is provided regarding the URL templating system the client developer uses. This is not part of the interface specification, but is relevant for possible implementations. The URL templates presented here are designed such that they provide a high level of flexibility for the B2C client to request data in a variety of ways. However, for a given client user interface, it may well be the case that only a small number of templates are required from the total possible set of combinations of endpoints, filters and sorting options. It may therefore be advantageous to provide to the client software a smaller set of templates, which may be based around the implementation of the client. The following worked examples show how some simple use-cases could be translated into URL templates based on the client Metadata Broker's methods, rather than the CCO endpoints.

B2C Example URL template: Browse Use Case

Step 1: List Categories

Once the user selects a category root in the content guide (e.g. "TV & Film"), retrieve its contents.

B2C URL Templates	categories browse.category browse.language	http://browse.youview.com/Categories?${view} byCategoryId=${category} preferredLanguage=${lang}
Client URL Templates	getmembers.category categoryroot.1.id preferences.language	http://browse.youview.com/Categories?byCategoryId=${category}&preferredLanguage=${lang} 123123 eng
Resulting URL	http://browse.youview.com/Categories?byCategoryId=123123&preferredLanguage=eng	

The configuration parameter categoryroot.1.id contains the CCO record identifier of the "TV & Film" root Category and its value is substituted into the ${category} template.

Step 2: List Sub-Categories

The user selects a category with the CCO record ID 456456. Retrieve the list of subcategories.

B2C URL Templates	categories browse.category	http://browse.youview.com/Categories?${view}

	browse.language	byCategoryId=${category} preferredLanguage=${lang}
Client URL Templates	getmembers.category [ID of selected Category] preferences.language	http://browse.youview.com/Categories?byCategoryId=${category}&preferredLanguage=${lang} 456456 eng
Resulting URL	http://browse.youview.com/Categories?byCategoryId=456456&preferredLanguage=eng	

Step 3: List Programmes

The user selects a sub-category with the CCO record ID 789789. Retrieve the list of summaries for the programmes in this category.

B2C URL Templates	summaries browse.category browse.language	http://browse.youview.com/Summaries?${view} byCategoryId=${category} preferredLanguage=${lang}
Client URL Templates	getdeepmembers.category [ID of selected Category] preferences.language	http://browse.youview.com/Summaries?byCategoryId=${category}&preferredLanguage=${lang} 789789 eng
Resulting URL	http://browse.youview.com/Summaries?byCategoryId=789789&preferredLanguage=eng	

Step 4: Request a programme

The user selects a programme with the CCO record ID 001001. Retrieve the full information for this Programme.

B2C URL Templates	programmes browse.id browse.language	http://browse.youview.com/Programmes?${view} byId=${id} preferredLanguage=${lang}
Client URL Templates	getprogramme [ID of selected Programme] preferences.language	http://browse.youview.com/Programmes?byId=${id}&preferredLanguage=${lang} 001001 eng
Resulting URL	http://browse.youview.com/Programmes?byId=001001&preferredLanguage=eng	

B2C Example URL template: Schedule Use Case

Step 1: Request a schedule

Request information to render an EPG grid.

B2C URL Templates	schedule	http://schedule.youview.com/Schedule?start=${sched-start}&end=${sched-end}&services=${sched-service}
Client URL Templates	getschedule	http://schedule.youview.com/Schedule?start=${sched-start}&end=${sched-end}&services=${sched-service}
Resulting URL	http://schedule.youview.com/Schedule?start=2010-01-01T09:00Z&end=2010-01-	

	01T12:00&services=1001|1002|1003

Step 2a: Request full metadata for a schedule event

If the user requests more information for an event for which enhanced metadata is not available, the client may request more information about the schedule event.

B2C URL Templates	scheduleevents browse.id browse.language	http://browse.youview.com/ScheduleEvents?${view} byId=${id} preferredLanguage=${lang}
Client URL Templates	getpublication [ID of selected Schedule Event] preferences.language	http://browse.youview.com/ScheduleEvents?byId=${id}&preferredLanguage=${lang} 555888 eng
Resulting URL	http://browse.youview.com/ScheduleEvents?byId=555888&preferredLanguage	

Step 2b: Request full metadata for a Programme

If the user requests more information about an event for which enhanced metadata is available, the parent Programme may be requested, which will provide a greater level of information.

B2C URL Templates	programmes browse.id browse.language	http://browse.youview.com/Programmes?${view} byId=${id} preferredLanguage=${lang}
Client URL Templates	getprogramme [ID of selected Programme] preferences.language	http://browse.youview.com/Programmes?byId=${id}&preferredLanguage=${lang} 555222 eng
Resulting URL	http://browse.youview.com/Programmes?byId=555222&preferredLanguage=eng	

B2C: Media asset availability

The CCO does not manage media assets directly: it aggregates and presents metadata about the content available, but the Content Providers themselves serve the media files to users and may not publish fully resolved media URLs in the metadata. Therefore, where content is marked as available for on-demand consumption, CCO may never be able to know for certain whether the corresponding media asset is actually available. Even in cases where automatic checking is possible, a Content Provider's server or a Content Distribution Network could suffer a temporary outage. It is therefore assumed that all best attempts have already been made to avoid situations where a user is presented with metadata about an asset which is claimed to be available but in fact is not. The CCO metadata services only make metadata available in the B2C feeds once the Content Provider has indicated to (via the B2B interface) that the assets are actually available.

Business-to Business (B2B) metadata contribution technical interface

The description below describes a technical interface for the contribution of descriptive and technical metadata to a centralised Metadata Aggregation Service by multiple Metadata Publishing Parties ("Publishers") / content providers. The centrally aggregated metadata is then offered to a population of receiver devices via a business-to-consumer (B2C) technical interface described elsewhere in this document. Typically, each Metadata Publishing Party will itself be a Content Provider, but it may also be the nominated third-party representative of one (or more) Content Providers.

Conceptually, the Metadata Aggregation Service maintains a TV-Anytime (TVA) Metadata Description [ETSI TS 102 822-3-1, TS 102 822-3-3] which is the logical union of all metadata submitted by the various Metadata Publishing Parties. This, in turn, is a

specialisation of an MPEG-7 Multimedia Content Description [ISO/IEC 15938-5]. The metadata is organised into a hierarchy of tables and records referred to here as the Description Tree, and summarised in Figure 80. The TVAMain 4400 comprises all program descriptions 4402. This is split into several categories, the 'ProgrammeInformation Table 4404, the GroupInformation Table 4406, the ProgrammeLocation Table 4408 and the ServiceInformation Table 4410. The ProgrammeLocation Table 4408 comprising a Schedule Fragment 4412 for broadcast content and an OnDemandProgramme Fragment 4414 for On Demand content.

B2B Metadata Description fragmentation

It would be impractical for a Metadata Publishing Party to resubmit its entire Description Tree every time there was an addition or update. Instead, the MPEG-7 System specification [ISO/IEC 15938-1 Clause 5] specifies a means to break down the overall Description Tree into a set of Fragment Update Units which can be transmitted individually from a publisher to a recipient. Using these controlled fragments avoids the need to update larger portions of the Description Tree when changes have taken place in just a few nodes. The TV-Anytime system specification for unidirectional environments [ETSI TS 102 822-3-2 Clause 4.3] further refines this by specifying that the granularity of updates to a Description Tree occurs at whole record level rather than at individual field level.

The profile of TV-Anytime described in the present specification defines a particular subset of TV-Anytime fragment types that are to be supported by compliant Metadata Publishing Parties and compliant Metadata Aggregation Services.

The TV-Anytime metadata schema defines a specific, unique identifier for each fragment that allows the Metadata Publishing Party and receiving system to explicitly track the creation, update and deletion of individual fragments in an unambiguous manner. For reasons of simplicity, this specification adopts a simpler approach to identifying fragments that combines the fragment's primary identifier (e.g. CRID) with the identity of the metadata source (the so-called Metadata Originating Party) to synthesise an implicit "proxy" fragment identifier. This is further described below.

B2B Distributed Allocation of Unique Identifiers

The B2B metadata contribution technical interface makes extensive use of strings to identify various different resources unambiguously. In an environment where metadata is being aggregated from a number of disparate organisations, it is important that these identifiers remain unique across organisational boundaries. In general, the principle applied is to allow the Metadata Publishing Party to assign values of these identifiers itself wherever possible.

To guarantee that identifier values never clash, a number of different techniques are employed:

- The use of the Uniform Resource Identifier (URI) format [IETF STD 66, RFC 3986]. A number of different URI schemes are used, including crid: [IETF RFC 4078] for uniquely referring to media content, and options of http: [IETF RFC 2616] or tag: [IETF RFC 4151] schemes for all other identifier types.
- The scoping part of these URIs must include the Internet Domain Name of the authority responsible for assigning the unique identifier.
- The data part of these URIs must then be managed uniquely by a competent authority within the organisation that owns the Internet Domain Name.

A number of the examples presented here suggest the use of Globally Unique Identifiers (GUIDs) in the data part, but alternative ways of allocating unique values within an organisation are equally valid. In cases where GUID values are used, it is still useful to include an Internet Domain Name in the identifier string to indicate the authority responsible. This, in turn, is helpful in tracing faults in a practical implementation.

B2B Referential Integrity

Fragments in the inbound metadata stream correspond to records in the logical metadata model. These are linked by references between records of various kinds, such as the link between an editorial version and its parent episode, or between a broadcast event and its containing service.

As a general principle, referential integrity must be maintained in the aggregated metadata description, i.e. any new record must link only to records already declared and present. However, to allow for the realities of metadata workflow management, a short-term Referential Integrity Quarantine (RIQ) is specified for holding records that do not yet have the necessary referential integrity. The Referential Integrity Quarantine is a conceptual state that may be implemented in a number of different ways, provided always that a record in quarantine is barred from any type of onward publication, and cannot remain in quarantine beyond a configurable maximum time. The expectation is that in many cases the missing referents will arrive before the end of this period. More detail on Referential Integrity Quarantine is given below.

B2B Metadata Origination attribution

Every fragment in the Metadata Description is attributed by the receiving system to a single Metadata Originating Party ("Originator") for management and copyright ownership purposes. This is a logical relationship which is not exposed to downstream systems, but enables the tracking of metadata ownership within the Metadata Aggregation Service. It could be used, for example, to prevent one Originator from accidentally updating fragments published by another. Note that it is permissible for different Originators to update the same content item at different periods over its life-time, but not at the same time. See above for the distinction between fragment and content identifiers.

The concept of Metadata Originating Party is subtly different from that of Metadata Publication Party. To illustrate the distinction, consider a third-party Metadata Publishing Party acting on behalf of several Content Providers (4510, 4512, 4514, and 4516 in Figure 81). The Metadata Publishing Party 4512 is responsible for publishing metadata fragments relating to each of the Content Providers 4510, 4512, 4514, 4516, but the copyright relating to the information resides with the original Content Provider 4510. As a consequence, each combination of Content Provider 4510, 4512, 4514, 4516 and Metadata Publication Party 4518, 4520, 4522 amounts to a unique Metadata Originating Party.

In simple cases, the Content Provider 4510 and the Metadata Publication Party 4518 are one and the same organisation, in which case a single Metadata Originating Party is sufficient 4524. A single content provider 4512may chose to supply metadata via more than one metadata publisher 4520, 4522 (as shown by lines B-X 5426 and B-Y 5428). This is acceptable provided that transaction ordering rules are observed, for example, to respect referential integrity.

B2B Security model

Access to the Metadata Aggregation Service is strictly controlled so that only authorised Metadata Publishing Parties 4518, 4520, 4522 can interact with the system and submit transactions. The primary goal is to prevent identity "spoofing" and "man-in-the-middle" attacks.

An important additional objective is to prevent one Metadata Originating Party 4524, 4526, 4528 (combination of Content Provider and Metadata Publishing Party) from interfering with the metadata of another (creating, updating or deleting fragments).

Any logical partitioning of metadata does not prevent one Metadata Originating Party from referencing metadata submitted by another Metadata Originating Party since this is a valid Use Case (e.g. descriptive metadata supplied by one party; technical metadata by another). Normal rules of Referential Integrity apply in such cases.

Each different Metadata Originating Party is issued with a different set of credentials so that transactions can be traced and policed at this level of granularity. This means that a

Metadata Publishing Party 4522 acting for multiple Content Providers 4512, 4514 4516 has a different set of credentials 4528 4530 4532 for each Content Provider.

B2B Transaction handling

The Metadata Aggregation Service maintains a separate notional queue of inbound transactions for each Metadata Originating Party. Transactions submitted by a given Metadata Origination Party are guaranteed to be processed in the order of submission.

The Metadata Aggregation Service is also resilient in the sense that the actions of one Metadata Originating Party will not interfere with the processing of transactions for other Metadata Originating Parties.

B2B Republishing scenarios

Republishing of metadata occurs in two main cases:

- Routine: republishing of metadata items that have been amended in the normal course of daily workflow. In this case, the priority is minimising the work required to update the necessary metadata nodes. This is achieved by selecting for update the smallest possible set of metadata Fragments.
- Emergency: wholesale republishing by a publisher of all its current metadata, coordinated with the operator of the Metadata Aggregation Service (in fact most likely at the request of the Metadata Aggregation Service operator, after a major, data-corrupting system failure). In this case, a full set of metadata Fragments is required. The Metadata Publishing Party may need to sequence carefully the transactions to maximise the Referential Integrity and return the Metadata Description to a useful state as quickly as possible.

B2B Transport and Packaging specification

This section specifies an example of a mechanism by which a Metadata Publishing Party publishes metadata to a Metadata Aggregation Service.

Metadata transactions are pushed by the Metadata Publishing Party to the Metadata Aggregation Service rather than being polled by the Metadata Aggregation Service. The Metadata Publishing Party is best placed to know when significant events are occurring in upstream media workflows that require the publication of some metadata. A pushed approach also ensures a low update latency in the end-to-end metadata chain.

Fragments of the Metadata Description are published to the Metadata Aggregation Service in well-defined transactions. The transport protocol used to convey transactions is secure HTTP [IETF RFC 2616, RFC 2818] over TCP/IP.

A well-defined HTTP service endpoint is specified to which transactions are to be submitted using the HTTP POST method. Depending on implementation there may be a single endpoint for all Metadata Originating Parties or a different endpoint for each one.

Each transaction is conveyed in a single HTTP server interaction. The same endpoint is used for submitting both new and updated metadata fragments.

An HTTP response is returned by the Metadata Aggregation Service indicating whether the transaction has been processed fully or accepted for later processing. Each transaction is assigned a unique transaction identifier by the Metadata Aggregation Service, which is returned to assist with transaction tracking and logging by the Metadata Publishing Party.

Additionally, the ongoing status of transactions can be monitored asynchronously by the Metadata Publishing Party via a second HTTP service endpoint.

B2B Transaction handling specification

A Metadata Publishing Party submits metadata updates, of various types such as Service reference data, Descriptive metadata or Publication metadata, to the aggregation service via messages referred to as Transactions. Two types of Transaction are given below:

- Fragment update Transaction. This is the means by which a Metadata Publishing

Party adds or updates a fragment of the Metadata Description.

- Fragment delete Transaction. This is the means by which a Metadata Publishing Party explicitly removes a fragment from the Metadata Description.

Each Transaction is formatted as an HTTP request message and the Metadata Aggregation Service supplies an HTTP response message in reply.

In the case of Fragment update Transactions, two different modes of operation are specified:

- A simple fully synchronous mode in which the Fragment updates in the Transaction are processed immediately and the HTTP response message contains a Status Report indicating the success (or otherwise) of the Transaction.
- An asynchronous mode in which the HTTP response message indicates acceptance, but may not confirm the full, formal correctness of the entire transaction.

These two operational modes are fully specified below. Support for either or both modes of operation is a decision for individual implementations.

Transaction identifier:

Every transaction is assigned a globally unique transaction identifier by the recipient system. This is returned in the synchronous response as a location header, containing a URL that can be queried subsequently to determine the status of the transaction.

Transaction identifier values shall take the form of Uniform Resource Locators using the http: URI scheme. For example:
http://<hostname>/transaction/<transaction_id>

Transaction identifiers are returned to the Metadata Publishing Party using the Location header in the HTTP response header. The URL can then be re-presented to the Metadata Aggregation Service to query the status of the Transaction identified.

Asynchronous Fragment update Transaction:

Figure 82 illustrates an asynchronous fragment update transaction. After initial stages of validation, an early synchronous response declares that the transaction has been accepted onto a queue for further processing/validation 4550. Only when all stages of validation have been passed later is the Transaction deemed to have completed successfully. The current status of a Transaction can be monitored by means of a status poll 4552. Equally, a failure in these later stages causes an error notification in the form of a Status Report to be sent asynchronously to the Metadata Originating Party 4554. This mode is useful if later stages of validation are demanding enough resources so that the transactions queue becomes too long for synchronous Success messages to be possible. In the validation sequence, the step "accepted for further processing" 4550 would be an example of the point where the early synchronous response might be sent.

Synchronous Fragment update Transaction:

Figure 83 illustrates a synchronous fragment update transaction. In this simpler model, all validation of an update transaction occurs before a single, late synchronous response, which must be either an Error or a Success message 4560. The whole HTTP POST method is therefore blocking, and the synchronous response contains the Status Report. There is no asynchronous response. This mode of operation may be found acceptable if the overall processing speed of the metadata ingest system is high enough.

Transaction life-cycle:

Every transaction submitted to the Metadata Aggregation Service via the Fragment update operation passes through the states outlined in the Figure 84.

1. If the ingest service is too busy to deal with the Transaction, or if the server is in a maintenance mode, the Transaction is rejected outright 4570.

2. If the Metadata Publishing Party fails to provide a valid set of security credentials, the Transaction is also rejected 4570.
3. Otherwise, the basic structure of the HTTP request is examined and the HTTP request headers verified. If any mandatory header is absent, or if any header has been given a syntactically incorrect value, then the Transaction is rejected as Malformed 4570.
4. Otherwise, the Transaction is accepted for further processing 4572 and it enters the Accepted Pending state, joining the tail of the transaction queue.
5. At some later point in time, the Transaction will be picked off the head of the queue and considered by the Metadata Aggregation Service for incorporation into the Metadata Description 4574. At this point the Transaction enters the In progress state.
6. Any XML instance document in the Transaction is first verified to ensure it is well-formed. If not, the Transaction is rejected and goes into the Error state 4576.
7. The XML instance document and its constituent fragments are next subjected to a more rigorous XML schema validation process. This determines whether the fragments are syntactically valid with respect to the TV-Anytime schema profile. If any discrepancies are discovered, the Transaction is rejected and goes into the Error state 4576.
8. The Transaction is next checked to ensure that it contains at least one create, delete or update request (trap for duplicates).
9. The individual fragments in the Fragment update transaction are tested for semantic validity. For example, it is a semantic error to declare an episode number of 7 within a series that has been declared to have only 6 episodes. Again, any problems detected result in the transaction being rejected and entering the Error state 4576.
10. The transaction is checked for correctness of reference data values, such as programme classifiers.
11. The importer then enforces a configurable basic set of editorial constraints (e.g. "must have a medium length title", "must not exceed maximum character count limit").
12. Lastly, the body undergoes a referential integrity check to ensure that all cross-references already exist in the aggregated Metadata Description, or else are included in the transaction under consideration. If this is not true, the transaction is marked as being in a Referential Integrity Quarantine (RIQ) state. The quarantined transaction can proceed to the next Committing state 4578, but its fragments must remain unpublishable until the quarantine is lifted. The transaction is rejected if the Referential Integrity is still not satisfied. Processes must be in place to:
    - Clear a transaction from Referential Integrity Quarantine when all missing referents have appeared
    - Ensure that a transaction may not remain quarantined indefinitely, being rejected if necessary after a configurable maximum time.
13. If all verification checks are passed successfully, the Metadata Aggregation Service attempts to commit the metadata contained in the various fragments, including to the Metadata Description. This is handled as a composite database commit so that any problems occurring at this stage can be rolled back to revert the database to its previous state before this transaction was accepted for committal. Such problems result in the transaction leaving the Committing state 4578 and entering the Error state 4576.
14. Only once the transaction has been successfully committed to the Metadata Description does the transaction enter the Success state 4572.

The behaviour of the metadata ingest service depends on which operational mode it supports:

- In the fully synchronous mode of operation, the HTTP operation is blocked between

the START 4571 and STOP 4584 states. The publisher is informed whether the transaction was successful or not by means of a Status Report in the HTTP response message.

- In the asynchronous mode of operation, the HTTP operation is blocked between the START state 4571 and the Accepted state 4572. The HTTP response message contains a status code indicating that the Transaction has been queued for later processing. The processing of the Transaction continues in the background and the Metadata Publishing Party has the option to poll the ongoing status of the Transaction using the mechanism described below.

Asynchronous Transaction monitoring:

The Metadata Aggregation Service maintains a chronological record of all transactions separately for each Metadata Originator. Each transaction must remain on record for a configurable period. The Service provides a means of monitoring the progress of transactions through their life-cycle, via the Transaction state query operation, described in more detail below.

Error reporting:

If a transaction enters the Error state at any point in the sequence of validation steps above, the receiving system sends a notifying electronic mail message automatically to the Metadata Publishing Party.

Transaction Status Report digest:

The Service also supplies each Metadata Originating Party with a (configurable) periodic report of the status of all transactions, whether successful or unsuccessful (Figure 82 4556, Figure 83 4562). All transactions that were unresolved in the last report and all that appeared subsequently are eligible for inclusion.

Initialisation and re-initialisation:

Initialisation occurs when a publisher first begins to send Transactions to the Metadata Aggregation Service. It requires an establishing Service transaction to occur before all others: see below for more information on this transaction.

Certain occasional scenarios may require a Re-initialisation, a repeat of the initialisation event with the same leading transaction being repeated (its content updated as appropriate).

A re-initialisation may be requested of one or more publishers by the Metadata Aggregation Service, most probably offline by its operators, because of some problem with database state. Under certain circumstances a Metadata Publishing Party may be required to re-submit all its current data, but this is not mandatory for all re-initialisations.

A Metadata Publishing Party may choose to re-initialise for its own reason, in which case the same establishing transaction must come first. As with a re-initialisation at the request of the Metadata Aggregation Service, full data updates may follow but are not mandatory in the general case.

B2B Transport: Application transport protocol specification

Hypertext Transport Protocol version 1.1 [IETF RFC 2616] shall be used by the Metadata Publishing Party to transmit transactions to the Metadata Aggregation Service. Requests [RFC 2616 Section 5] shall be initiated by the Metadata Publishing Party and responses [RFC 2616 Section 6] returned by the Metadata Aggregation Service.

Application transport security layer:

Secure HTTP [IETF RFC 2818] shall be used by all Metadata Publishing Parties as the application transport protocol. All traffic between the Metadata Publishing Party and the

Metadata Aggregation Service shall be encrypted using SSL/TLS.

All parties shall support HTTP "Basic" authentication scheme [IETF RFC 2617 Section 2]. When challenged, the Metadata Publishing Party shall present its Base64 encoded username and password credentials to the Metadata Aggregation Service using the Authorization: HTTP request header.

Certificate-based authentication may additionally be supported by the implementation.

Application transport service endpoints:

The Metadata Aggregation Service responds to the following requests:

Operation	**HTTP request method**	**Request path**	**Request headers**	**Request message body**	**Response headers**	**Response message body**
Fragment update Transaction *(asynchronous)*	POST	/transaction	Content-Type: Content-Length:	<TVAMain> XML instance document	Location:	-
Fragment update Transaction *(synchronous)*			Content-Type: Content-Length: Accepts: text/xml		Location: Content-Type: text/xml Content-Length:	<StatusReport> XML instance document
Fragment delete Transaction *(asynchronous)*	DELETE	/fragment/<*identifier*>	-	-	Location:	-
Fragment delete Transaction *(synchronous)*			Accepts: text/xml		Location: Content-Type: text/xml Content-Length:	<StatusReport> XML instance document
Query status of an individual Transaction	GET	/transaction?id=<*identifier*>	Accepts: text/xml	-	Content-Type: text/xml Content-Length:	<StatusReport> XML instance document
Query state of a specific fragment	GET	/fragment?id=<*identifier*>	Accepts: text/xml	-	Content-Type: text/xml Content-Length	TV-Anytime single-Fragment XML instance document

Individual operations are fully specified below.

B2B Application transport operation:

The individual operations are described in detail in the following subsections.

Fragment update Transaction:

The Fragment update Transaction is used both for adding new fragments to the aggregated Metadata Description, and for submitting updates to existing fragments.

- Using HTTP POST method request to a well-defined request URI endpoint.
- HTTP request message body contains a <TVAMain> XML instance document containing one or more fragments to be updated.
- Transaction may contain an arbitrary mix of new fragments and updates to fragments already in the Metadata Description.

- Various possible status codes in HTTP response.
- Synchronous HTTP response tells Metadata Publishing Party whether or not the Transaction has been processed (synchronous mode) or accepted for later processing (asynchronous mode).
- In both operational modes a Transaction identifier is returned in the Location header of the HTTP response message telling the publisher where the transaction status can be queried later.
- In asynchronous mode, no processing of the XML request message body is done at this stage.

Example: Fragment update operation (request):

```
POST /transaction HTTP/1.1
Content-Type: text/xml
Content-Length: 1456

<?xml version="1.0" encoding="UTF-8"?>
<TVAMain xml:lang="en-GB" xmlns="urn:tva:metadata:2010"
xmlns:mpeg7="urn:tva:mpeg7:2008"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
      <!-- etc. -->
</TVAMain>
```

Example: Fragment update Transaction (asynchronous mode)

```
HTTP/1.1 202 Accepted
Location: http://<servername>/transaction/123456789
```

Example: Fragment update operation (synchronous mode)

```
HTTP/1.1 201 Created
Location: http://<servername>/transaction/123456789
Content-Type: text/xml
Content-Length: 1121

<?xml version="1.0" encoding="UTF-8"?>
<StatusReport>
      <!-- etc. -->
</StatusReport>
```

Specific HTTP status codes relating to this operation:

Status code	Reason phrase	Meaning for this operation
201	Created	The Fragment update Transaction has been processed (synchronous mode) and a new Transaction resource created in the process. The enclosed Status Report indicates whether the processing was successful or not.
202	Accepted	The Fragment update Transaction has been queued for later processing (asynchronous mode).
400	Bad request	The request was malformed in some way, *e.g.* missing or syntactically invalid request headers.
401	Unauthorized	The client credentials presented by the Metadata Publishing Party were either invalid or missing altogether.
411	Length required	The `Content-Length` header was not supplied in the request.
413	Request entity too large	The request entity body exceeds the (configurable) maximum size supported by the Metadata Aggregation Service.
415	Unsupported media type	The only valid value of the `Content-Type` header for this operation is `text/xml`.

Status code	Reason phrase	Meaning for this operation
503	Service unavailable	The Metadata Aggregation Service is down or experiencing high load, and is unable to accept the transaction at this time.

Query status of an individual transaction:

This operation is used by the Metadata Publishing Party to determine asynchronously the current status of a submitted transaction. The Metadata Publishing Party may periodically poll the status of each transaction until it reaches one of the terminating states in its life-cycle.

- Using HTTP GET method request to a well-defined request URI endpoint.
- An existing transaction identifier must be quoted in the HTTP request URI.
- Synchronous HTTP response includes a Status Report about the transaction in question.
- Response Content-Type: text/xml
- Various possible status codes in HTTP response.

Example: transaction status query operation (request)

```
GET /transaction/123456789 HTTP/1.1
```

Example: transaction status query operation (response)

```
HTTP/1.1 200 OK
Content-Type: text/xml
Content-Length: 1121

<?xml version="1.0" encoding="UTF-8"?>
<StatusReport>
      <!-- etc. -->
</StatusReport>
```

Specific HTTP status codes relating to this operation:

Status code	Reason phrase	Meaning for this operation
200	OK	A Status Report document for the specified transaction is included in the response message body.
400	Bad request	The request was malformed in some way, *e.g.* missing or syntactically invalid request headers.
401	Unauthorized	The client credentials presented by the Metadata Publishing Party were either invalid or missing altogether.
404	Not Found	The resource requested was unknown to the recipient system.
503	Service unavailable	The Metadata Aggregation Service is down or experiencing high load, and is unable to accept the query at this time.

Query state of a specific fragment:

This operation enables a Metadata Publishing Party to inspect the most up-to-date version of a particular fragment as processed by the Metadata Aggregation Service. This represents the current state of the fragment in the aggregated Metadata Description resulting from earlier successfully committed fragment updates. It does not reflect any updates to the fragment included in pending transactions.

- Using HTTP GET method request to a well-defined request URI endpoint.
- The fragment is identified by passing the identifying Record identifier, such as a CRID or, for a publication, CRID+IMI. The aggregation service combines this with the

credentials of the publisher to form the full fragment identifier (see table below)

- Because passing these Record identifiers requires embedding one URI within another, HTTP requires escaping of the characters ":", "/" and "#" (see IETF RFCs 1738 and 2396).
- Synchronous HTTP response includes the parsed TV-Anytime fragment as an XML instance document. This is presented bare (i.e. without any enclosing <TVAMain> wrapper element).
- Response Content-Type: text/xml
- Various possible status codes in HTTP response.

Example: (content) Fragment state query operation (request)

```
GET
/fragment?id=crid%3A%2F%2Fsyndication.content.co.uk%2Fepisode%2F
234154
```

Example: Fragment state query operation (response)

```
HTTP/1.1 200 OK
Content-Type: text/xml
Content-Length: 1948

<?xml version="1.0" encoding="UTF-8"?>
<ProgramInformation xml:lang="en-GB" programId="
crid://syndication.co.uk/episode/234154">
      <!-- etc. -->
</ProgramInformation>
```

Example: (publication) Fragment state query operation (request)

In the case of querying the status of a Publication fragment, the requestor must pass both the fragment's Instance Metadata Identifier (IMI) and the CRID of the published content, as the IMI is only required to be unique within the scope of that CRID. This example illustrates the querying of imi:syndication.co.uk/23734 within the scope of crid://syndication.co.uk/episode/234154. The IMI is appended, hash-separated, to the CRID in the specified URL, viz:

crid://syndication.co.uk/episode/234154#imi:syndication.co.uk/23734 and the resulting Record identifier string is finally encoded to escape characters not permitted in URL strings.

```
GET /fragment?id=crid%3A%2F%2Fsyndication.content.co.uk%2Episod
e%2F234154%23imi%3Asyndication.co.uk%2F23734 HTTP/1.1
```

Specific HTTP status codes relating to this operation:

Status code	Reason phrase	Meaning for this operation
200	OK	The specified TV-Anytime fragment is included in the response message body.
400	Bad request	The request was malformed in some way, *e.g.* missing or syntactically invalid request headers.
401	Unauthorized	The client credentials presented by the Metadata Publishing Party were either invalid or missing altogether.
404	Not Found	The requested fragment is not currently part of the Metadata Description.
503	Service unavailable	The Metadata Aggregation Service is down or experiencing high load, and is unable to accept the query at this time.

Fragment delete Transaction:

An explicit fragment delete operation is supported by the application transport protocol. See also below, where this operation is linked to the use case of revocation.

- Removes a single fragment from the aggregated Metadata Description.

- Using HTTP DELETE method request to a well-defined URI endpoint.
- The fragment is identified by passing the identifying Record identifier, such as a CRID or, for a publication, CRID+IMI. The aggregation service combines this with the credentials of the publisher to form the full fragment identifier (see table below)
- Because passing these recordIDs requires embedding one URI within another, HTTP requires escaping of the characters ":", "/" and "#" (IETF RFCs 1738 & 2396).
- Transaction may be handled asynchronously or synchronously, depending on implementation decision.
- Various possible status codes in HTTP response.
- It is the Metadata Aggregation Service's responsibility to ensure that referential integrity is maintained in the aggregated Metadata Description. Any attempt to delete a fragment that is still referenced by other fragments will result in an error status in the HTTP response.

Example: Content Fragment delete operation (request)

```
DELETE
/fragment?id=crid%3A%2F%2Fsyndication.content.co.uk%2Fepisode%
2F234154 HTTP/1.1
```

Example: Publication Fragment delete operation (request)

In the case where a Publication fragment is to be deleted, both the fragment's Instance Metadata Identifier (IMI) and the CRID of the published content need to be passed since the IMI is only required by TV-Anytime to be unique within the scope of that CRID. The example below illustrates the deletion of Publication fragment imi:syndication.co.uk/23734 within the scope of Content fragment crid://syndication.co.uk/episode/234154. Prior to character escaping, the two identifiers are combined with the hash symbol thus: crid://syndication.co.uk/episode/234154#imi:syndication.co.uk/23734 to produce the required Record identifier.

```
DELETE /fragment?id=crid%3A%2F%2Fsyndication.content.co.uk%2Fepi
sode%2F234154%23imi%3Asyndication.co.uk%2F23734 HTTP/1.1
```

Example: Fragment delete operation (asynchronous response)

```
HTTP/1.1 202 Accepted
Location: http://<servername>/transaction/987654321
```

The above example illustrates a Transaction to delete a fragment whose Record identifier is crid://syndication.co.uk/episode/234154. The colon and forward slash characters in the identifier are escaped so that they can be passed as part of the HTTP request URL.

Example: Fragment delete operation (synchronous response)

```
HTTP/1.1 201 Created
Location: http://<servername>/transaction/987654321
Content-Type: text/xml
Content-Length: 1121

<?xml version="1.0" encoding="UTF-8"?>
<StatusReport>
      <!-- etc. -->
</StatusReport>
```

Specific HTTP status codes relating to this operation:

Status code	Reason phrase	Meaning for this operation
201	Created	The specified fragment was successfully removed from the aggregated Metadata Description (synchronous mode). A new Transaction resource has been created in the process.
202	Accepted	The Fragment delete Transaction has been queued for later processing (asynchronous mode).

Status code	Reason phrase	Meaning for this operation
400	Bad request	The request was malformed in some way, *e.g.* missing or syntactically invalid request headers.
401	Unauthorized	The client credentials presented by the Metadata Publishing Party were either invalid or missing altogether.
403	Forbidden	The fragment could not be deleted because it is still referred to by another fragment in the Metadata Description, or because the specified fragment is not owned by the Metadata Originating Party indicated in the client credentials.
404	Not Found	The requested fragment is not currently part of the Metadata Description.
503	Service unavailable	The Metadata Aggregation Service is down or experiencing high load, and is unable to accept the delete request at this time.

Dealing with error conditions:

The Metadata Publishing Party must, in general, be able to deal with any of the HTTP status codes defined in [RFC 2616 Section 6.1.1]. The following specific guidance is included in this specification to help implementers to deal with certain application-specific error conditions.

Status code	Reason phrase	Suggested action for publisher
400	Bad request	Inspect request for malformation
401	Unauthorized	Check that client credentials were offered and are valid
403	Forbidden	Send one or more other enabling transactions before this one
404	Not found	Check the formation of the request URI
405	Method not allowed	The method requested cannot be used with the request URL.
411	Length required	Check `Content-Length` header was supplied
413	Request entity too large	Check the maximum size permitted and resubmit a smaller transaction
415	Unsupported media type	Check value of `Content-Type` header was valid for the operation
501	Not implemented	Check that the method requested was one of `POST`, `GET` and `DELETE`, the only methods the Metadata Aggregation Service is required to support
503	Service unavailable	Retry the transaction later, employing exponentially increasing back-off period before each successive attempt. Maintain an appropriately ordered queue of pending transactions, including the current one, to be submitted once the Metadata Aggregation Service becomes available again.
505	HTTP Version not supported	Check that the HTTP protocol stated was version 1.1, the only version the Metadata Aggregation Service is required to support

B2B Transaction Status Report transport specification

A means is required for the Metadata Aggregation Service to notify the Metadata Publishing Party of the status of one or more Transactions. Transaction Status Reports are generated by the Metadata Aggregation Service in the following scenarios:

Scenario	Context	Transport specification
Error detected during the processing of a Fragment update Transaction	Synchronous mode	Status Report returned in HTTP response message.
	Asynchronous mode	Status Report sent via e-mail.
Error detected during the processing of a Fragment Delete Transaction	Synchronous mode	Status Report returned in HTTP response message.
	Asynchronous mode	Status Report sent via e-mail.
Digest of the status of several Transactions	Asynchronous mode Synchronous mode	Status Report sent via e-mail.

An XML schema for Transaction Status Reports is described in later.

Status Report e-mail specification:

Every Metadata Originating Party supplies a recipient address for the delivery of Transaction Status Reports. Every Metadata Originating Party specifies the frequency with which Transaction Status Report digests messages are to be sent.

The Transaction Status Report XML instance document is packaged as the message body of an [IETF RFC 5322] message. The message content type is text/xml. The message is transported to its recipient using SMTP [IETF RFC 5321].

B2B Transport: Exceptional scenarios

The following sections outline how the specification provides support for some exceptional occurrences, i.e. less common and/or unplanned events outside "business as usual".

Metadata resynchronisation:

A metadata resynchronisation may be required in exceptional circumstances when the aggregation service's repository becomes corrupted unrecoverably. In this case, a metadata publisher may be asked to resubmit some or all metadata. The three main cases are (in order of increasing severity):

1. Reinitialisation only.
2. Reinitialisation followed by a repeat of all transactions since a specified date–time.
3. Reinitialisation followed by transactions incorporating all metadata for content items (that should be) available on the service.

Revocation:

Revocation occurs when there is a need, typically urgent, to revoke the publishing of a particular piece of content.

Content providers or metadata publishers can revoke content in a number of ways (listed here in order of increasing severity):

1. Using a Fragment update Transaction to remove the media availability indicator, described in more detail below. This will have the effect of removing the content from some parts of the platform content guide (e.g. the on-demand catalogue) but may still allow the content to be advertised as “coming soon” in other views (e.g. the linear programme guide) depending on the dates provided for the availability window.
2. This is the softest form of revocation and is only really suitable in cases where there is a temporary problem with the media distribution chain. The revocation can be reversed simply by republishing the affected Fragment with the media availability indicator restored.
3. Using a Fragment update Transaction to amend one or more availability windows for the problem content, for example moving the start and end dates into the past.

4. Using a Delete fragment Transaction to delete one or more current Publications (such as On-demand Publications) of the content.
5. Using a Delete fragment Transaction to delete the Content Description metadata altogether, whether a single Editorial Version or even an Episode.
6. Manual revocation, i.e. direct deletion of metadata by an operator using the Configuration & Management interface onto the Metadata Aggregation System.

B2B: Fragment update Transaction specification

This section specifies a set of acceptable transactions that are supported by the Metadata Aggregation Service in a Fragment update operation. These *pro forma* transactions define exactly which TV-Anytime fragments are allowed to appear in a transaction. The purpose of being prescriptive here is to simplify implementation for both the Metadata Publishing Party and the Metadata Aggregation Service. Transactions not conforming to one of the *pro forma* transaction specifications may be rejected by the Metadata Aggregation Service as malformed. Figure 85 gives a graphical overview of transaction shapes; with the subsequent sections giving more detailed definitions.

Service metadata Transaction:

- One or more ServiceInformation Fragments wrapped in the Service Information Table.
- The first transaction in an Initialisation.
- In each new initialisation, every Service must be declared afresh before it can be referenced from a Descriptive metadata transaction.
- It is valid to publish a Service transaction at any point, subject to the aforementioned rules around declaration before use. This could, for example, be used to declare a new Service without a full re-initialisation.

The Service metadata Transaction provides basic information about the logical Services provided by the Metadata Originating Party. These fall into one of three different categories:

1. Content-owning Service. These are the Services to which the descriptive metadata for content items is attributed in the User Experience. (The Content-owning Service corresponds roughly to the concept of "masterbrand" in other ecosystems.) The exact service names and brand groupings exposed to end users may include brands borrowed from the linear world (e.g. "Channel Four", "Five") or brands more familiar from the on-demand world (e.g. "4oD", "Demand Five"). In practice, the Fragments in Descriptive metadata Transactions are attributed to one of these Owning Services and this is the branding that appears against the corresponding content item in the on-demand catalogue.
2. On-demand Portal Service. These Services are relevant only to originators intending to deliver an on-demand catalogue. These Services are an indication of the on-demand service provider (e.g. "BBC iPlayer", "Kangaroo"). This explicit attribution enables filtering of metadata by on-demand provider. In practice, every Fragment representing an On-demand Publication is attributed to one (or more) such On-demand Portal Service. This implies that each Metadata Originating Party must provide at least one such Service.
3. Linear Service. These Services are relevant only to originators intending to deliver Schedule or Schedule linkage metadata Transactions. Each Linear Service represents a single linear channel variant. For example, a linear channel such as "BBC One" with 18 regional variants may be represented by a single Content-owning Service for the purposes of the User Experience, but at this level will need to be modelled as 18 separate Linear Services with names such as "BBC One North West" and "BBC One Scotland".

Descriptive metadata Transaction:

The Descriptive Metadata transaction is the main vehicle for publishing information

about programme content itself (as opposed to publication information such as broadcasts or on-demand availabilities), such as titles, synopses and cast list.

- Zero or more ProgramInformation Fragments in the Program Information Table, each representing an Editorial Version in the logical metadata model.
- Zero or more GroupInformation Fragments of type programConcept in the Group Information Table, each representing an Episode Group in the logical metadata model.
- Zero or more GroupInformation Fragments of type series in the Group Information Table, each representing a Series Group in the logical metadata model.
- Zero or more GroupInformation Fragments of type show in the Group Information Table, representing a Brand Group in the logical metadata model.
- Zero or more normalised person credits as PersonName Fragments in the Credits Information Table, representing an Agent in the logical metadata model.
- Zero or more normalised company credits as OrganizationName Fragments in the Credits Information Table, representing an Agent in the logical metadata model.

The above transaction shape specification allows a wide variety of different implementations by Metadata Publishing Parties. In one extreme case, an entire on-demand metadata catalogue could be published as a single Transaction containing a very large number of Fragments. At the opposite end of the spectrum, a Metadata Publisher could publish an update to a single Fragment. In practice, a particular deployment would likely impose a maximum allowed Transaction size to protect itself against Denial of Service attacks. This could be defined in terms of the number of individual Fragment updates, or as a raw size in bytes.

Publication metadata Transactions:

Publication transactions carry information about the *availability* of content, as opposed to the content itself.

Schedule Transaction

The Schedule transaction is only relevant to Metadata Publishing Parties supplying full schedules for linear channels. This includes

- Broadcast linear channels.
- IP channels.
- Virtual/placeholder channels.

The primary purpose of the transaction is to convey a master schedule of linear events. This includes provision of full schedule metadata for non-broadcast linear channels and provision of historical schedule metadata for broadcast linear channels.

- One Schedule Fragment in the Program Location Table, containing a set of <ScheduleEvent> objects, which correspond to a set of Broadcast Publications in the logical metadata model from a particular linear time period.
- All <ScheduleEvent> elements in the Schedule Fragment must be related to the same linear Service.

One typical approach to supplying linear schedules is to publish one Schedule Transaction per channel variant per programme schedule day.

The business rules surrounding the completeness of linear schedule metadata are not specified in the B2B interface. It merely specifies the mechanism for conveying this information. It may be a requirement that a Metadata Publishing Party supplies complete schedules with no gaps, for example.

Schedule linkage Transaction

The purpose of the Schedule linkage transaction is to enable a Metadata Publishing Party to cross-reference linear schedule metadata provided by a different Metadata Publishing Party in a Schedule transaction. The Schedule linkage transaction carries minimal details of a linear schedule slot and links it to enhanced Content Description

metadata, including on-demand content,

- One or more BroadcastEvent Fragments in the Program Location Table, each one representing one linear schedule slot.
- All Fragments in the transaction must refer to the same Editorial Version CRID (the programId value of a ProgramInformation Fragment), i.e. all describe linear publications of the same programme (version).

On-demand publication Transaction

The On-demand Publication transaction carries details of a window of availability for content that can be consumed on-demand. While the on-demand catalogue is populated with descriptive metadata from the Descriptive metadata Transaction, it is the availability metadata present in the On-demand publication Transaction that controls the appearance of content items in the catalogue as seen by the end user.

- One or more OnDemandProgram Fragments in the Program Location Table, representing an On-demand Publication in the logical metadata model.
- All Fragments in the transaction must refer to the same Editorial Version CRID (the programId value of a ProgramInformation Fragment), i.e. all describe on-demand availabilities of the same programme (version).

Typically, there is expected to be one OnDemandProgram Fragment per Media Set of an Editorial Version. A Media Set comprises one or more media files transcoded at different bit rates, but all encoding identical source pictures and/or sound. Media Sets for High Definition and Standard Definition video are represented by separate logical On-demand Publications and therefore separate OnDemandProgram Fragments. However, both Fragments reference the same Editorial Version CRID. This pair of Fragments may be published in the same On-demand Publication transaction.

B2B Transaction Status Report specification

The following uses Figure 86 as a reference. Provided they are well formed and not rejected outright, the Fragment Update operation and the Fragment Delete operation both yield a Transaction Status Report.

- In the synchronous mode of operation, the Transaction Status Report is returned in the body of the HTTP response message.
- In asynchronous mode a URL is returned in the Location: response header, and the Metadata Publishing Party may poll this subsequently to monitor the ongoing status of that particular Transaction.

The additional transport specified above provides for the delivery of Transaction Status Reports by electronic mail in two scenarios:

1. If a Transaction fails a Transaction Status Report is automatically sent.
2. A periodic digest of Transaction Status Reports detailing both successful and failed Transactions accepted by the Metadata Ingest Service within a specific window of time.

Transaction Status Report schema specification:

In one example, Transaction Status Reports is formatted as an XML instance document complying with the schema with the following name space:
http://refdata.youview.com/schemas/YouViewStatusReport/2010-06-03

Root element specification:

In one example, the root element of the instance document is `<StatusReport>` and contains one or more `<TransactionReport>` elements.

The Root element may also provide human-readable remarks using the `<Remark>` element (one per language). The language of the remark is optionally indicated by the `xml:lang` attribute.

Transaction Report specification:

In one example, the `<TransactionReport>` element carries a system-unique Transaction Identifier in the `transactionId` attribute. This is the URL by which the ongoing status of the Transaction can be monitored by the Metadata Publishing Party. The current state of the Transaction is encoded in the `state` attribute. The set of possible states is the same as those outlined in Figure 84 (with the exception of the Rejected state since outright rejection is reported via the HTTP response status code). The Transaction Report may also provide human-readable remarks using the `<Remark>` element (one per language). The language of the remark is optionally indicated by the `xml:lang` attribute.

Transactions in pre-validate states have no further elements. Otherwise, each `<TransactionReport>` contains:

- Zero or more `<FragmentUpdateReport>` elements (it is possible to update several Fragments in a single Transaction).
- Zero or one `<FragmentDeleteReport>` elements (it is only possible to delete a single Fragment per Transaction).

Fragment Update Report specification:

In one example, the `<FragmentUpdateReport>` element carries in its `fragmentId` attribute the Fragment Identifier of the TV-Anytime Fragment whose update was requested in the Transaction. This is a proxy Fragment identifier of the form supplied to the Fragment State operation, as described above. The overall acceptability of the new metadata Fragment is conveyed in the Boolean `success` attribute. This indicates whether (or not) the new Fragment successfully passed all the ingest validation tests.

The Fragment Update Report may provide human-readable remarks using the `<Remark>` element (one per language). The language of the remark is optionally indicated by the `xml:lang` attribute. A number of `<Message>` entities may then follow, detailing individual aspects of the validation tests conducted on the new Fragment.

Fragment Delete Report specification:

In one example, the `<FragmentDeleteReport>` element carries in its `fragmentId` attribute the Fragment Identifier of the TV-Anytime Fragment whose deletion was requested in the Transaction. This is a proxy Fragment identifier of the form supplied to the Fragment Delete operation, as described above. The overall success of the Fragment deletion is indicated in the Boolean `success` attribute.

The Fragment Delete Report may provide human-readable remarks using the `<Remark>` element (one per language). The language of the remark is optionally indicated by the `xml:lang` attribute. A number of `<Message>` entities may then follow, detailing individual aspects of the Fragment deletion.

Message specification:

In one example, each `<Message>` entity provides a machine-readable reason code (in the `reasonCode` attribute) taken from the following Classification Scheme name space:

http://refdata.youview.com/mpeg7cs/YouViewMetadataIngestReasonCS/2010-09-23

This Classification Scheme defines a controlled vocabulary of reason codes.

The location in the Fragment to which this message relates is indicated in the `location` attribute in the form of an XPath.

The severity of the message is indicated in the `severity` attribute. The permitted values are detailed in the table below, along with their meaning:

Severity	Meaning
error	A fatal error that has caused the Transaction to enter the "Fail" state.
warning	A non-fatal problem that has not prevented the Transaction from passing

Severity	Meaning
	to the next state in its life-cycle, but which **should** be noted by the Metadata Publishing Party and corrected.
information	A message provided for information only. No action on the part of the Metadata Publishing Party is required.

B2C Profile of TV-Anytime Metadata Description

This section specifies a domain-specific profile of the TV-Anytime Metadata Description [ETSI TS 102 822-3-1], and Extended Metadata Description [ETSI TS 102 822-3-3].

Fundamental TV-Anytime concepts: Fragmentation of Metadata Description

The TV-Anytime Metadata Description is a logical tree of metadata tables containing individual records called Fragments. The Metadata Description is conceptually maintained by the Metadata Aggregation Service as the union set of metadata Fragments received from all Metadata Originating Parties. The smallest granularity of update to the Metadata Description by a Metadata Publishing Party is a single metadata Fragment. It is not possible to update individual fields within a Fragment without republishing the entire Fragment. The mechanism for adding Fragments to the Metadata Description, and updating existing Fragments already in it, is the Fragment update Transaction specified above.

For reasons of efficient batch processing, any number of Fragments may be conveyed in a single Fragment update Transaction, subject to business rules imposed by a particular deployment.

The set of TV-Anytime Metadata Description Fragments that may appear in a TV-Anytime XML instance document is specified in [ETSI TS 102 822-3-2]. The present specification further profiles this set down to the following Fragment types and their enclosing tables:

1. Group Information Table
   - *GroupInformation* Fragment (schema type: `GroupInformationType`).
2. Program Information Table
   - *ProgramInformation* Fragment (schema type: `ProgramInformationType`).
3. Program Location Table
   - *Schedule* Fragment (schema type: `ScheduleType`).
   - *BroadcastEvent* Fragment (schema type: `BroadcastEventType`).
   - *OnDemandProgram* Fragment (schema type: `OnDemandProgramType`).
4. Service Information Table
   - *ServiceInformation* Fragment (schema type: `ServiceInformationType`).
5. Credits Information Table
   - *PersonName* Fragment (schema type: `PersonNameType`).
   - *OrganizationName* Fragment (schema type: `OrganizationNameType`).

In one example, no other tables or Fragment types are permitted by this TV-Anytime profile.

The order of the various tables in the `<TVAMain>` instance document is fixed by the XML schema. This is the order shown in the list above and in Figure 87.

The remainder of this specification describes the various TV-Anytime Metadata Description Fragments in a more logical order, but they must appear in the correct schema order in the XML instance document.

Fundamental TV-Anytime concepts: <TVAMain> document specification

In one example, the payload of the Fragment update Transaction is an XML instance document complying with the TV-Anytime metadata schema (and Extended Metadata schema, as appropriate). That is, an XML instance document whose root element is

<TVAMain> (see Figure 87).

- The XML instance document shall be encoded using the UTF-8 character set.
- The XML instance document is introduced by a valid XML processing instruction. The value of the `encoding` attribute shall be `"UTF-8"`.
- The `<TVAMain>` root element shall declare the following name spaces:
  http://www.w3.org/2001/XMLSchema-instance
  urn:tva:mpeg7:2008
  urn:tva:metadata:2010
  urn:tva:metadata:extended:2010
  http://refdata.youview.com/schemas/2010-09-23
- The `xsi:schemaLocation` attribute is omitted.

The `xsi:schemaLocation` attribute is useful for validating instance documents locally against copies of the XML schemas, but must not be transmitted to the Metadata Aggregation Service.

Fundamental TV-Anytime concepts: Mapping from the Logical Metadata Model

The table below specifies the mapping from the various Record types in the Logical Metadata Model to the corresponding Fragments of the TV-Anytime Content Description and their respective XML schema types.

Logical Record type	TV-Anytime Fragment	XML schema type
Service Record	*ServiceInformation*	`ServiceInformationType`
Agent Record	*OrganizationName*	`OrganizationNameType`
	PersonName	`PersonNameType`
Group Record (Brand)	*GroupInformation*	`GroupInformationType`
Group Record (Series)		
Group Record (Episode)		
(Group Record (Clip))		
(possibly: Group Record (Collection))		
Editorial Version Record	*ProgramInformation*	`ProgramInformationType`
Broadcast Publication Record	*Schedule*	`ScheduleEventType`
(Not applicable)	*BroadcastEvent*	`BroadcastEventType`
On-demand Publication Record	*OnDemendProgram*	`OnDemerdProgramType`

The Schedule Fragment aggregates a number of <ScheduleEvent> elements, each of which models a single Broadcast Publication Record.

The BroadcastEvent is purely a linking device, and does not correspond to any Record in the Logical Metadata Model.

Fundamental TV-Anytime concepts: Fragment identification specification

The use of the TV-Anytime `fragmentId` attribute is not permitted in this profile. Instead, the ingest stage of the Metadata Aggregation Service will synthesise a "proxy" unique fragment identifier based on the supplied identifier (CRID and, if present IMI or TVAID) and the identity of the Metadata Originating Party. This identifier will then be used to track subsequent updates to the same Fragment. The specification for constructing a "proxy" unique fragment identifier is provided in Appendix 4 of this specification.

The use of the TV-Anytime `fragmentVersion` attribute is not permitted in this profile. Fragment revision control is handled automatically by the Metadata Aggregation Service.

The use of the TV-Anytime `fragmentExpirationDate` attribute is permitted in this profile. The Metadata Aggregation Service may use the date–time information included in this attribute to automatically delete the metadata Fragment so labelled.

Fundamental TV-Anytime concepts: Content Referencing Identifier (CRID) specification

In one example, every piece of descriptive metadata in the TV-Anytime Metadata Description is identified by a globally unique Content Referencing Identifier or CRID. This is a Uniform Resource Identifier of the form crid://*<authority>*/*<data>*.

- The *<authority>* part indicates the CRID Issuing Authority and is a registered Internet Domain Name. Typically, this is the domain name of the Metadata Originating Party or that of its nominated Metadata Publishing Party.
- The *<data>* part is an identifier assigned by the CRID Issuing Authority and unique within its scope.

In this way, management of the CRID name space is delegated and a CRID value issued by one Issuing Authority is guaranteed not to clash with values issued by other authorities by virtue of the scoping *<authority>* part.

- For *GroupInformation* Fragments the CRID is specified in the `groupId` attribute.
- For *ProgramInformation* Fragments the CRID is specified in the `programId` attribute.
- For `<ScheduleEvent>` elements in a *Schedule* Fragment the CRID of the parent *ProgramInformation* Fragment is quoted in the `<Program>` element.
- For `<BroadcastEvent>` Fragments the CRID of the parent *ProgramInformation* Fragment is quoted in the `<Program>` element.
- For *OnDemandProgram* Fragments the CRID of the parent *ProgramInformation* Fragment is quoted in the `<Program>` element.

While the CRID is sufficiently unique to identify a piece of content, it is *not* sufficiently unique to use the CRID as a primary key to a database of Fragments describing content. Several different Metadata Originating Parties may wish to publish metadata Fragments describing *the same piece of content*, in which case they would each submit a Fragment with the same CRID. One possible implementation strategy that solves this problem is outlined in Appendix 4.

Fundamental TV-Anytime concepts: Instance Metadata Identifier (IMI) specification

Every Publication Record describes an instance of a *ProgramInformation* Fragment. As well as quoting the `programId` CRID of the parent *ProgramInformation* Fragment, a disambiguating Instance Metadata Identifier (IMI) must additionally be provided for every `<ScheduleEvent>` in a *Schedule* Fragment, for every *BroadcastEvent* Fragment, and for every *OnDemandProgram* Fragment. The IMI need only be unique within the scope of the parent CRID, so the combination of the two identifiers uniquely pinpoints both the instance and the content.

Again, the IMI takes the form of a Uniform Resource Identifier: imi:*[<authority>/]<data>*.

- The optional *<authority>* part indicates the IMI Issuing Authority and shall be a registered Internet Domain Name. Typically, this is the domain name of the Metadata Originating Party or of its nominated Metadata Publishing Party. If omitted, the authority is assumed to be the same as that of the parent CRID.
- The *<data>* part is an identifier assigned by the IMI Issuing Authority and unique within the scope of the *ProgramInformation* CRID.

In this way, management of the IMI name space is delegated and an IMI value issued by one Issuing Authority is guaranteed not to clash with values issued by other authorities by virtue of the scoping *<authority>* part.

The use of an explicit *<authority>* part in the IMI allows for architectures in which the publication instance metadata is provided by a different Metadata Publishing Party.

Fundamental TV-Anytime concepts: Linear Service Locator specification

Linear Service Locators are used to identify the location of a linear Service within a broadcast network or within an internetwork. A Linear Service Locator is declared in every *Service* Fragment.

The Linear Service Locator shall be a Uniform Resource Identifier (URI) complying with [IETF STD 66, RFC 3986].

This profile of TV-Anytime permits two alternative URI formats for a Linear Service Locator:

1. For broadcast linear Services, the DVB Event Locator format [ETSI TS 102 727] is used.
   - All numeric values is expressed as hexadecimal strings.
   - The optional `transport_stream_id` field is omitted.
   - The optional `service_id` field is present.
   - The optional `component_tag` fields are omitted.
   - The optional `event_id` field is omitted.
   - The optional `path_segments` field is omitted.

   For example:

   dvb://233a..1044
2. For virtual/placeholder channels the Linear Service Locator is omitted.

Fundamental TV-Anytime concepts: Linear Event Locator specification

Linear Event Locators are used to identity slots in the linear schedule. A Linear Event Locator is declared in every *BroadcastEvent* Fragment and in every `<ScheduleEvent>` element of a *Schedule* Fragment.

The Linear Event Locator is a Uniform Resource Identifier (URI) complying with [IETF STD 66, RFC 3986].

This profile of TV-Anytime permits two alternative URI formats for a Linear Event Locator:

1. For events on broadcast linear Services, the DVB Event Locator format [ETSI TS 102 727] is used.
   - All numeric values are expressed as hexadecimal strings.
   - The optional `transport_stream_id` field is omitted.
   - The optional `service_id` field is present.
   - The optional `component_tag` fields are omitted.
   - The optional `event_id` field is present.
   - The optional `path_segments` field is omitted.

   For example:

   dvb://233a..1044;c3bf
2. For events on all other types of linear Service, the Linear Event Locator shall comply with the specification below.

Fundamental TV-Anytime concepts: Other TV-Anytime identifier specification

All other formal identifiers in the Metadata Description are defined to use the schema type `TVAIDType`. To eliminate the risk of name space clashes between different Metadata Publishing Parties this profile restricts this schema type to use only valid Uniform Resource Identifiers (URIs). This restriction ensures that identifiers are appropriately scoped and their values do not clash.

This profile recommends that Metadata Publishing Parties use either the `http:` [IETF RFC 2616] or `tag:` [IETF RFC 4151] URI scheme. However, alternative URI schemes may also be acceptable in particular deployment scenarios.

For example:

```
http://syndication.channel3.co.uk/service/channel3/scotland
tag:syndication.channel3.co.uk,2010-
05:service:channel3:Scotland
```

Fundamental TV-Anytime concepts: Date and time formats

Date–time format

Unless otherwise specified, all date–time values in the TV-Anytime Metadata Description complies with [ISO 8601 Clause 5.4.1a], a complete representation including the additional separators of the extended format.

All times are expressed in Coordinated Universal Time (UTC) and carry the Zulu time-zone designator [ISO 8601 Clause 5.3.3].

For example:

2010-06-25T20:42:40Z

Time period format

Unless otherwise specified, all time period and duration values in the TV-Anytime Metadata Description comply with [ISO 8601 Clause 5.5.3.2]. Incomplete representations are permitted.

For example:

PT2H30M5S

PT1H20M

Fundamental TV-Anytime concepts: Language signalling specification

The signalling of language is useful in at least two distinct contexts:

1. Indicating the languages available in the content. This includes spoken languages and the languages used for accessibility services such as subtitles, audio description and sign language. The TV-Anytime schema elements and attributes used for this signalling vary depending on context.
2. Indicating the written language of the metadata itself. The standard `xml:lang` attribute is used for metadata language signalling.

These two cases are described in more detail below. In both cases, the same set of language codes is used, so these are described first.

Language codes

Both content and metadata languages shall be signalled using either ISO two- [ISO 639-1] or three-letter [ISO 639-2, ISO 639-3] codes as specified in the table below:

Language	ISO 639-1	ISO 639-2	ISO 639-3	Additional codes
English	en	eng		
Welsh	cy	cym		
Scottish Gaelic	gd	gla		
British Sign Language			bfi	sgn-GB

The system of regional suffixes used in ISO 639-1, giving such English variants as en-GB (*British*) and en-US (*American*), is adopted to support the proper specification of deaf sign languages by extending the generic `sgn` *Sign Language* of ISO 639-2. So British Sign Language (BSL) is indicated by `sgn-GB`.

Content languages

Content languages relating to particular productions are indicated using sub-elements of `<BasicDescription>` at the Editorial Version or Episode levels of the metadata hierarchy, *i.e.* in the *ProgramInformation* Fragment or a *GroupInformation* Fragment of type `programConcept`. This is described in more detail below.

Content languages relating to accessibility (subtitles, audio description and sign language) are indicated using sub-elements of `<InstanceDescription>` at the Publication level of the metadata hierarchy, i.e. in the *OnDemandProgram* Fragment or in the `<ScheduleEvent>`

element of the *Schedule* fragment. This is described in more detail below.
See also the Transactions examples below.

Metadata language

Metadata language (*i.e.* the written language of the descriptive metadata) is signalled using the standard `xml:lang` attribute, which may be applied optionally at many points in the Metadata Description tree. The most minimal method is to apply the `xml:lang` attribute to the root document element `<TVAMain>`:

```
<TVAMain xml:lang="en-GB">
   ...
</TVAMain>
```

and for a completely monolingual metadata set this is sufficient, since any Fragment lacking an `xml:lang` attribute implicitly inherits the value of its containing element in the XML document tree.

Another simple approach, only slightly less economical, is to apply the element to each of the main tables, for example:

```
<TVAMain>
   <ProgramDescription>
         ...
         <ProgramInformationTable                    xml:lang="en-
GB">...</ProgramInformationTable>
         ...
         <GroupInformationTable                      xml:lang="en-
GB">...</GroupInformationTable>
         ...
   </ProgramDescription>
</TVAMain>
```

In this case a Fragment will automatically inherit the default metadata language signalled in its parent table.

Similarly, it is valid to apply the `xml:lang` attribute to individual Fragment elements:

```
<TVAMain>
   <ProgramDescription>
         ...
         <GroupInformationTable>
               ...

   <GroupInformation xml:lang="en-GB" groupId="crid://...">...
</GroupInformation>

   <GroupInformation xml:lang="cym" groupId="crid://...">...
</GroupInformation>
               ...
         </GroupInformationTable>
         ...
   </ProgramDescription>
</TVAMain>
```

Most importantly, individual descriptive metadata fields *within* a Fragment can carry the `xml:lang` attribute and so override the default, inherited value. Furthermore, most free-text descriptive fields (such as titles or synopses) can occur many times within a single Fragment. This provides a mechanism for supplying multilingual metadata descriptions for the same piece of content within a single Fragment.

A simple example would be the parallel provision of Welsh and English synopses for a programme:

```
<GroupInformation xml:lang="en-GB" groupId="crid://...">
   ...
   <BasicDescription>
         ...
```

```
            <Synopsis   length="medium"   xml:lang="cym">Beth   fydd
penderfyniad Gwyneth ynglyn â'r babi? Cyfaddefa Colin i Izzy ei
fod yn gwybod am yr hyn ddigwyddodd rhyngddi hi a Macs. Pam nad
yw Dani'n yn hapus efo Dai a Diane?</Synopsis>
            <Synopsis   length="medium"   xml:lang="eng">What   will
Gwyneth decide to do about the baby? Colin admits to Izzy that
he knows the truth about her and Macs. Why isn't Dani happy with
Dai and Diane?</Synopsis>
            ...
      </BasicDescription>
      ...
</GroupInformation>
```

Fundamental TV-Anytime concepts: Classification Schemes

The TV-Anytime Metadata Description borrows the concept of Classification Schemes from the MPEG-7 Content Description. Classification Schemes are simply vocabularies of controlled terms whose identifiers are collected into a particular name space. Term identifiers tend to be numeric or alphanumeric. (The MPEG-7 specification also allows other punctuation characters to appear.) Each Classification Scheme defines terms in a particular conceptual domain and these are presented in a reference XML instance document whose name space is defined by the `uri` attribute of the root element, `<ClassificationScheme>`.

Terms are applied to the TV-Anytime Metadata Description using elements such as `<Genre>` the fully-qualified term identifier being the concatenation of the Classification Scheme name space identifier with the locally unique term identifier from that Classification Scheme.

- If the name space has a `urn:` scheme then a colon character (":") is used to append the local term identifier to the name space identifier.
- If the name space has an `http://` scheme then a hash character ("#") is used to append the local term identifier to the name space identifier.

For example:

Name space identifier	Local term identifier	Fully-qualified term identifier
urn:mpeg:mpeg7:cs:RoleCS:2001	ACTOR	urn:mpeg:mpeg7:cs:RoleCS:2001:ACTOR
http://refdata.youview.com/mpeg7cs/YouViewIntendedAudienceCS/2010-09-20	4.2.3	http://refdata.youview.com/mpeg7cs/YouViewIntendedAudienceCS/2010-09-20#4.2.3

These fully-qualified terms might then appear in the Metadata Description as:

```
<BasicDescription>
   ...
   <Genre
href="http://refdata.youview.com/mpeg7cs/YouViewIntendedAudience
CS/2010-09-20#4.2.3"/>
   <CreditsList>
         ...
         <Credit
role="urn:mpeg:mpeg7:cs:RoleCS:2001:ACTOR">...</Credit>
         ...
   </CreditsList>
   ...
</BasicDescription>
```

B2B Reference Metadata Fragments: ServiceInformation Fragment profile

Reference Metadata Fragments provide metadata that is referenced by subsequent Fragments of Content Description metadata and Fragments of publication Instance Description metadata, which are both described in more detail below.

The ServiceInformation Fragment is used to represent the Service Record in the Logical Metadata Model. Its Record identifier for the purposes of manipulation is the value of the `serviceId` attribute. This identifier shall comply with the profile of `TVAIDType` above.

Three different types of service are modelled:

1. Linear Services (*e.g.* "BBC One North West", "ITV1 Granada"). There is one Service for every regional variant of a linear channel. All linear schedules reference one or more of these Linear Services.
2. On-demand Portal Services (*e.g.* "BBC iPlayer", "ITV Player", "STV Player", "Demand Five", "SeeSaw"). These Services advertise the on-demand portals of individual Content Providers. Subject to business rules, a particular Content Provider may operate several such branded portals at the same time (e.g. "CBBC iPlayer" and "BBC iPlayer"). All on-demand Publications reference one or more On-demand Portal Services. A media player Application can optionally be associated with an On-demand Portal Service.
3. Content-owning Services. These are user-facing brands (*e.g.* "BBC Four", "ITV3", "CITV", "FilmFour", "Milkshake") to which content is attributed so that the correct branding can be applied in content listings. The user-facing brands described by the set of Content-owing Services may be a mixture of linear channel brands, branded "blocks" and on-demand "channel" brands. The topmost Fragment in every Content Description metadata chain (whether Brand or Series or Episode) references exactly one Content-owning Service for attribution purposes in the end user experience. Fragments below the topmost in the chain may override this value by specifying a different Content-owing Service.

- The `serviceId` attribute is a scoped unique identifier to avoid name space clashes.
- Models both linear services and on-demand Services (*e.g.* BBC iPlayer, BT Vision).
- May optionally be arranged into a Service hierarchy.
- Must be (re)published at each reinitialisation.
- May be updated at any time by the Metadata Publishing Party to signal changes in the service line-up.
- Descriptive metadata is provided in `<ServiceDescription>` child element.
- Image references (*e.g.* service logos) may be provided using `<RelatedMaterial>` child element. (The use of the TV-Anytime `<Logo>` child element is prohibited by this profile.)

Service name

This is the name of the Service as it appears in the content guide.

- Up to two service names may be supplied: a full service name and an abbreviated one.

```
<ServiceInformation
serviceId="http://syndication.channel3.co.uk/service/midlands">
   ...
   <Name>Channel Three (Midlands)</Name>
   <Name length="short">Ch3 Midl</Name>
   ...
</ServiceInformation>
```

Service ownership

The name of a Service's owner as it is to appear in the content guide.

For example:

```
<ServiceInformation
serviceId="http://syndication.channel3.co.uk/service/midlands">
   ...
   <Owner>Channel Three Broadcasting</Owner>
```

...
</ServiceInformation>

This is a user-facing string. A separate machine-readable tag must also be provided for all Services to assist with the compilation of usage reports. See below for further details.

Service locator

A Uniform Resource Locator for the Service may be specified using the <ServiceURL> element.

1. Linear Services specify a service locator URL.
   For broadcast Linear Services this is the so-called DVB triplet of the form:
   dvb://<original_network_id>.[<transport_stream_id>].<service_id>
   The optional <transport_stream_id> element is always omitted since this varies between Service Insertion Points. This leaves two adjacent dots in the middle of the triplet, e.g. "dvb://233a..2045".
   For IP-delivered Linear Services the URL of the Service Description resource is supplied as the Service locator.
2. On-demand Portal Services may optionally provide the CRID of a media player Application. This media player will then be invoked to present all Publications associated with the Service. If no Service locator is specified in the Service fragment a default media player will be used for playback.
3. Content-owning Services do not specify a Service locator.

Service description

This is a user-facing description of the Service for display in the content guide.

- Up to three different lengths of description may be specified in the Service fragment using the optional length attribute to the <ServiceDescription> element:

Service description length	Optionality	Maximum character count
short	Mandatory	90 characters
medium	Recommended	210 characters
long	Optional	1200 characters

- If a <ServiceDescription> is provided without the optional length attribute, the text is automatically used as a default value for any of the three missing Service descriptions.

Primary service language

The primary language of the Service is conveyed in the <ServiceLanguage> element. This information supports the filtering of Services by language in the content guide.

Logical channel number

The logical channel number for Linear Services is *not* conveyed in the *Service* Fragment. Other mechanisms may be used for this purpose.

Service classifiers

In one example, services need to be further classified for a number of different reasons. Terms from Controlled Vocabularies are applied using the <ServiceGenre> element as follows:

1. Service category. The placement of Services into user-facing categories is achieved by labelling the Service fragment with one or more terms from the Classification Schemes IntendedAudienceCS, FormatCS, ContentCS, OriginationCS and IntentionCS.
   Terms intended for the purpose of classification (later mapped into user-facing categories) are signalled using the type="main" attribute of the

<ServiceGenre> element.

2. Service type. A single term from MediaTypeCS or YouViewServiceTypeCS is provided to indicate whether the *Service* Fragment represents a Linear Service (television and radio have separate terms), an On-demand Portal Service (video-on-demand and audio-on-demand are similarly discriminated) or a Content-owning Service. This influences the placement of the Service in the content guide.
   This term is signalled using the type="other" attribute value.
3. Content provider. A single term from YouViewContentProviderCS is provided to assist with the compilation and routing of usage reports to the correct content provider.
   This term is signalled using the type="other" attribute value.

Parent service linkage

A hierarchy of Services can be created using the <ParentService> linkage element. The serviceId of the parent service is quoted in the serviceIDRef attribute of this element. The exact Service hierarchies expressed are at the discretion of individual Metadata Originating Parties.

- Linear Services typically point to a Content-owning Service parent (e.g. the parent of the "Granada" Linear Service is the "ITV1" Content-owning Service).
- On-demand Portal Services may form natural hierarchies as a result of brand extension (e.g. "CBBC iPlayer" as a child of "BBC iPlayer").
- Content-owning Services may fall into similar hierarchies (e.g. "T4" branded block as a child of "Channel Four" or "BBC7" as a child of "BBC Radio 4").

Services automatically inherit the Service classifiers of all their ancestors. These are additive.

Services automatically inherit the Branding identity logos of all their ancestors. However, where the same <IntendedUse> content attribute value is specified, the image specified in the child overrides that of any ancestor.

Branding identity logos

In one example, each Service specifies one or more still images corresponding to Service logos for display in the content guide.

- Realising the Image entity in the Logical Metadata Model.
- Using <RelatedMaterial> element of type ExtendedRelatedMaterialType.
- The href attribute of the <HowRelated> element carries the fixed value urn:tva:metadata:cs:HowRelatedCS:2010:19 to indicate that this is a promotional still image.
- The file format of the image may be supplied using the appropriate term from MPEG-7 FileFormatCS in the href attribute of the <Format> element.
- A textual description of the image content is supplied in the <PromotionalText> element to support accessibility aids such as screen readers.
- The source URL of the image is supplied in the MediaLocator/MediaUri element.
- The width and height of the image are indicated in the elements ContentProperties/ContentAttributes/Width and ContentProperties/ContentAttributes/Height.
- A controlled term from YouViewImageUsageCS is provided in the <IntendedUse> element indicating the logical purpose of the image in the content guide.
- A controlled term from YouViewImageUsageCS may be provided in an additional <IntendedUse> element to indicate the source type of the image.
  The main display logo for the Service is indicated using the term source-ident.
  For Content-owning Services, a digital on-screen graphic logo may be indicated using the term source-dog.

- The controlled term `do_not_resize` from YouViewImagePropertyCS may be provided in a further `<IntendedUse>` element to indicate that the image is not a high-resolution master image, i.e. it is not suitable for resizing to fit varying requirements in the user experience.

Omission of this term implies that the image may be resized by the recipient system.

The protocol for updating a branding identity logo is to republish the affected Service Fragment with a different value of `<MediaUri>`.

B2B Reference Metadata Fragments: Credit Fragments

The intention of this class of Fragments is to allow Metadata Publishing Parties to build up a normalised database of credits in the Metadata Aggregation Service that can be referenced by many different descriptive metadata Fragments. Support for these two Fragment types is optional; an alternative denormalised approach to listing credits is also supported inside the `BasicDescription/CreditsList` element of *ProgramInformation* and *GroupInformation* Fragments.

The two Fragments described below correspond to the Agent Record in the Logical Metadata Model.

OrganizationName Fragment profile

The Record identifier for the purposes of Fragment manipulation is the value of the `organizationNameId` attribute. This identifier complies with the profile of `TVAIDType` specified above.

- Normalised organisation representing broadcasters, production companies, copyright holders.
- The `organizationNameId` attribute is a scoped unique identifier to avoid name space clashes.

Example:

```
<OrganizationName organizationNameId="http://syndication.channel3.co.uk/agent/724233">Associated Rediffusion</OrganizationName>
```

PersonName Fragment profile

The Record identifier for the purposes of Fragment manipulation is the value of the `personNameId` attribute. This identifier complies with the profile of `TVAIDType` specified above.

- Normalised person represents individual cast/crew member.
- The `personNameId` attribute is a scoped unique identifier to avoid name space clashes.
- An individual may have several different names over time (*e.g.* actor credited with different names).
- No plans to have a single, managed credits database, but individual Metadata Publishing Parties may choose to co-operate on the use of common `personNameId` values in order to allow cross-referencing of cast/crew members between content from different content partners, or else agree to label *PersonName* Fragments with common third-party identifiers as described below.

Third-party person reference identifier

Unique identifiers from external data sets may optionally be provided to assist with cross-referencing credits from different Metadata Originating Parties. This is achieved using one or more `<OtherIdentifier>` elements. The authority attribute shall be a registered Internet domain name that uniquely identifies the owner of the external data set.

Example:

```
<PersonName
personNameId="http://syndication.channel3.co.uk/agent/6284">
   <mpeg7:GivenName>Stephen</mpeg7:GivenName>
   <mpeg7:FamilyName>Fry</mpeg7:FamilyName>
   <OtherIdentifier authority="imdb.com">http://uk.imdb.com/name/
nm0000410/</OtherIdentifier>
   <OtherIdentifier authority="dbpedia.org">http://dbpedia.org/pa
ge/Stephen_Fry</OtherIdentifier>
</PersonName>
```

B2B Reference Metadata Fragments: Content Description metadata Fragments

These Fragments are used to represent the programme hierarchy in the Logical Metadata Model: Brand, Series, Episode and Editorial Version. Figure 88 illustrates how the TV-Anytime Fragment types are arranged to represent four common programme archetypes. Each archetype forms a distinct Content Description metadata chain; although in practice Fragments are expected to share common ancestors thereby forming inverted tree structures.

The object of the exercise is to avoid repeating the same descriptive metadata for all the Episodes in a given Series or all the Series in a particular Brand by normalising out the common fields into separate Fragments. The benefit of this normalised approach is that any change to a metadata field in (say) a Series requires only one metadata Fragment to be republished.

The simplest archetype, the One-off commission illustrates the minimum set of metadata Fragments required: a single Episode Record (*GroupInformation* Fragment of type `programConcept`) plus a single Editorial Version Record (*ProgramInformation* Fragment). This archetype is sufficient for modelling the Content Description metadata for flat film catalogues and unstructured music videos. The more complex archetypes are only necessary where grouping structures such as programme Brands and Series are brought into play.

Distinction between Episodes and Editorial Versions

Each Editorial Version Record corresponds to a *concrete* entry in the content guide.

The Episode Record, by contrast, represents an *abstract* commissioned editorial concept such as a programme, film or music video. From the outset, a number of different Editorial Versions of this abstract commission may be ordered by the original commissioner (linear channel controller, studio producer). Sometimes requirements for additional Editorial Versions emerge over time.

Valid reasons for modelling different Editorial Versions of an Episode include:

- Different run length. For a film, the duration of a director's cut may differ from that of the original studio cut.
- Different parental guidance. A post-watershed cut may have deleted scenes restored compared with a pre-watershed edit. This may result in different guidance flagging to prevent children from consuming the content unrestricted.

  (Of course, different edits may result in a different duration as well.)

The inclusion of accessibility services does not constitute a different Editorial Version in the Logical Metadata Model. Such differences are represented by multiple Publications of the same basic Editorial Version since the underlying editorial content is identical at scene level.

For example, in-vision Sign Language interpretation is modelled as a separate Publication of the same Editorial Version despite the fact that the source media may be different.

Typically, the majority of the Content Description metadata is common to all Editorial Versions of the Episode, in which case the common metadata is published once at Episode level rather than repeating it in each Editorial Version. Where the metadata differs, it is expressed at Editorial Version level. This general principle applies for reasons of economy

and efficiency so that the smallest amount of metadata needs to be republished when there is a change (*e.g.* changing a synopsis, adding a new Editorial Version) and the impact on downstream systems (execution of business logic, denormalisation of metadata, consequent cache invalidation) is minimised.

In this profile of TV-Anytime, run length and parental guidance flagging is specified *only* at Editorial Version level. Other Content Description metadata fields, such as title and synopsis, are generally supplied at Episode level, but may optionally be re-specified at Editorial Version level, in which case the field at Editorial Version level overrides the corresponding field in the Episode Record.

Other Content Description metadata fields are additive. For example, the set of classifiers, the additional keywords and the list of cast and crew are all inherited from Brand to Series to Episode to Editorial Version.

This profile does not provide any metadata field for explicitly signalling the difference between different Editorial Versions so that it can be displayed in the content guide: any difference is implied by the different run length or guidance supplied in the Content Description metadata. However, some Metadata Originating Parties may wish to provide additional discrimination at Editorial Version level, *e.g.* by specifying an overriding title at Editorial Version level.

B2B Reference Metadata Fragments: GroupInformation Fragment profile

This Fragment is used to realise all the different types of Group Record in the Logical Metadata Model. The Record identifier for the purposes of Fragment manipulation is the value of the `groupId` attribute. This identifier complies with the profile of CRIDs specified above.

- Used to represent Brand Group, Series Group and Episode Group Records in the Logical Metadata Model, describing the main grouping structures of conventional programming.
- Also used to represent Collection Group, Clip and Application Records.
- The `groupId` attribute is required by the schema to be a valid Content Referencing Identifier (CRID).
- Most of the descriptive metadata resides at Episode level, and provision of this is mandatory, but Content Description metadata is also useful at optional Series and Brand levels.
- Classifiers can be applied at any level in a Content Description metadata chain.
- Credits can be provided optionally at any level, whether inlined or as normalised credit pointers.
- Pointer to Content-owning Service for attribution purposes in the content guide. Preferably provided at the topmost level of each Brand–Series–Episode hierarchy, but can be overridden lower down also.
- Optional pointers to editorial Images can be provided at any or all levels of the hierarchy using `<RelatedMaterial>` tagged with term 19 (Promotional Still Image) from HowRelatedCS.
- Optional pointers to promotional Clips (*e.g.* series trailer, episode trailer) may be provided at any or all levels of the hierarchy.

Content-owning Service linkage

In any chain of Brand Group, Series Group or Episode Group Records the topmost Record in the chain declares a linkage to one Content-owning Service by means of the `serviceIDRef` attribute on the `<GroupInformation>` element. The value of this attribute is the `serviceId` of a *Service* Fragment.

Conventional inheritance rules apply to the Content-owning Service linkage. A Series Group may override the value specified in the parent Brand if this needs to be different. Similarly, an Episode Group may override the value specified in its parent Series

or Brand.

Depending on metadata ingest business rules, failure to provide a Content-owning Service linkage anywhere in a chain of Content Description metadata may cause the metadata to be rejected. Alternatively, the metadata may be accepted and displayed in the content guide without any attribution.

Ordered flag

If the order of the items in a Group is significant (*i.e.* its members are displayed in a particular sequence in the content guide) then the `ordered="true"` attribute is declared in the `<GroupInformation>` element.

If a Group is declared to be ordered then every member of that Group includes an `index` attribute in the linkage to its parent Group, further detail below.

In the absence of the `ordered` attribute a Group is assumed to be unordered and members of that Group do not include an `index` attribute in the linkages to their parent Group. Likewise if the `ordered` attribute is present but set to the value `"false"`.

Group type

The type of Group Record is specified via the `<GroupType>` element. The following table details how the `xsi:type` and `value` attributes of this element are to be specified for the different types of Group Record.

Record type	xsi:type	value
Brand Group	ProgramGroupTypeType	show
Series Group	ProgramGroupTypeType	series
Episode Group	ProgramGroupTypeType	programConcept
Clip Group	ProgramGroupTypeType	clip
Application Group	ProgramGroupTypeType	application
Collection Group	ProgramGroupTypeType	otherCollection

Basic Content Description

The `<BasicDescription>` element is specified 0 below since it is common to both types of Content Description metadata Fragment.

Linkage to parent Group

- The optional `<MemberOf>` linkage element may be used to refer to a parent *GroupInformation* Fragment of this Group when assembling a Brand–Series–Episode chain (as illustrated in Figure 88).
- The `groupId` attribute of the parent *GroupInformation* Fragment is quoted in the mandatory `crid` attribute of the `<MemberOf>` element.
- If the parent Group has been declared as ordered, the optional `index` attribute indicates the position of this Group within its parent Group.
- If the parent Group is unordered, the optional `index` attribute is not present.

```
<GroupInformation groupId="crid://provider.co.uk/series3"
ordered="true">
   <GroupType xsi:type="ProgramGroupTypeType" value="series"/>
   ...
</GroupInformation>

<GroupInformation groupId="crid://provider.co.uk/series3-
episode1">
```

```
   <GroupType xsi:type="ProgramGroupTypeType"
value="programConcept"/>
   ...
   <MemberOf crid="crid://provider.co.uk/series3" index="21"/>
</GroupInformation>

<GroupInformation groupId="crid://provider.co.uk/series3-
episode2">
   <GroupType xsi:type="ProgramGroupTypeType"
value="programConcept"/>
   ...
   <MemberOf crid="crid://provider.co.uk/series3" index="36"/>
</GroupInformation>
```

Positional indices do not have to form a contiguous sequence. For example, a Series Group may have a set of child Episodes with `index` attribute values 21, 36 and 54.

Private Group identifiers

This profile makes provision for Content Providers to supply private identifiers against Group Records. These are intended to be passed through metadata systems unaltered to the content guide.

- Any number (subject to external business rules) of private identifiers may optionally be supplied using the `<OtherIdentifier>` element.
- The mandatory attribute `authority` is supplied in the form of an Internet-style domain name that uniquely identifies the type of identifier in a meaningful way to the Content Provider.
- Each `authority` value is used only once in any given Brand–Series–Episode–Editorial Version–Publication metadata chain.

```
<GroupInformation groupId="crid://provider.co.uk/654321">
   <GroupType xsi:type="ProgramGroupTypeType"
value="programConcept"/>
   ...
   <OtherIdentifier authority="episode.provider.co.uk">3411/G</Ot
herIdentifier>     ...
</GroupInformation>
```

B2B Reference Metadata Fragments: ProgramInformation Fragment profile

This Fragment type realises the Editorial Version Record in the Logical Metadata Model. Each such Fragment represents the embodiment of an Episode, Clip or Application. The Record identifier for the purposes of Fragment manipulation is the value of the `programId` attribute. This identifier shall comply with the profile of CRIDs as described above.

Basic Content Description

The `<BasicDescription>` element is specified below since it is common to both types of Content Description metadata Fragment.

Private Editorial Version identifiers

This profile makes provision for Content Providers to supply private identifiers against Editorial Version Records. These are intended to be passed through metadata systems unaltered to the content guide.

- One or more Content Provider private identifiers may optionally be supplied using the <OtherIdentifier> element.
- The mandatory attribute `authority` is supplied in the form of an Internet-style domain name that uniquely identifies the type of identifier in a meaningful way to the Content Provider.

- Each `authority` value is used only once in any given Brand–Series–Episode–Editorial Version–Publication metadata chain.

For example:

```
<ProgramInformation programId="crid://provider.co.uk/123456">
   ...
   <OtherIdentifier
authority="version.provider.co.uk">3411/G/1</OtherIdentifier>
   ...
</ProgramInformation>
```

Production audio-visual attributes

The `<AVAttributes>` element is no longer supported by this profile in the *ProgramInformation* Fragment. Audio-visual attributes are instead conveyed in Instance Description metadata Fragments.

Membership of Collection Group

An Editorial Version **may** optionally be declared to be part of a Collection Group. This linkage shall be represented by the `<MemberOf>` element which carries the `groupId` value of the Collection's *GroupInformation* Fragment in its `crid` attribute.

- The target Collection Group is of type `"otherCollection"`.
- If the target Collection Group is ordered, an `index` attribute is provided in the `<MemberOf>` linkage element.

Linkage to parent Episode

- The mandatory `<DerivedFrom>` linkage element **shall** be used to refer to the Episode (*GroupInformation* Fragment of type `programConcept`).
- The `groupId` attribute of the target *GroupInformation* Fragment is quoted in the `crid` attribute of the `<DerivedFrom>` element.

<BasicDescription> element

The `<BasicDescription>` element is common to the two Content Description metadata Fragment types. However, different elements of descriptive metadata are permitted depending on the Fragment type and the type of Group:

Logical Metadata Model Record type	**Brand Group**	**Series Group**	**Episode Group**	**Editorial Version**	**Inheritance rule**
TV-Anytime Fragment Element	**<GroupInformation> brand**	**<GroupInformation> series**	**<GroupInformation> programConcept**	**<ProgramInformation>**	
`<Title>`	✓	✓	✓	✓	Independent in Brand and Series. Editorial Version overrides Episode.
`<Synopsis>`	✓	✓	✓	✓	
`<Keyword>`	✓	✓	✓	✓	Cumulative from Brand to Series to Episode to Editorial Version. Duplicates removed.
`<Genre>`	✓	✓	✓	✓	
`<ParentalGuidance>`	×	×	×	✓	None.
`<Language>`	×	×	✓	✓	Editorial Version overrides Episode.

Logical Metadata Model Record type	Brand Group	Series Group	Episode Group	Editorial Version	Inheritance rule
<CaptionLanguage>	×	×	×	✓	Conveyed in Instance Description.
<SignLanguage>	×	×	×	✓	Conveyed in Instance Description.
<CreditsList>	✓	✓	✓	✓	Cumulative from Brand to Series to Episode to Editorial Version. Duplicates removed.
<RelatedMaterial>	✓	✓	✓	✓	
<ProductionDate>	×	×	×	✓	None.
<ProductionLocation>	×	×	×	✓	
<Duration>	×	×	×	✓	
<PurchaseList>	×	×	×	✓	Conveyed in Instance Description.
<TargetingInformation>	✓	✓	✓	✓	Inherited from Brand to Series to Episode to Editorial Version. Re-specifying overrides all parent values.

No other elements are permitted to appear in the <BasicDescription>.

Titling

At least one title shall be provided for every Brand, Series and Episode Record (*i.e.* all *GroupInformation* Fragments). In the absence of a `type` attribute on the `<Title>` element, this is assumed to be the main title (`type="main"`). This profile also ascribes meaning to some of the other MPEG-7 title types to signal specific special cases:

- `"secondary"`: is used to signal an additional explicit sorting title, for example when leading articles such as "A" or "The" must be treated as first-order words in title sorting, rather than ignored. For example:

```
<BasicDescription>
   ...
   <!-- Display title (Note: "main" is the default value if the
type attribute is omitted altogether) -->
   <Title type="main">The Archers</Title>

   <!-- Sort title -->
   <Title type="secondary">Archers, The</Title>
   ...
</BasicDescription>
```

The secondary title element is omitted when it is the same as the primary title.

The secondary title is intended to be presented by the content guide in alphabetically sorted views. It is also intended to be used by the search engine as an additional means of indexing the content item.

If no secondary title is supplied, alphabetically sorted catalogue views are presented in strict lexicographic order based on the primary title submitted. It should be assumed that no automatic reordering of leading articles is performed by the metadata recipient system.

- `"episodeTitle"`: is used to indicate an editorially significant Episode title that is considered by the search engine indexer. Unless this type is used, Episode-level titles are assumed to be "synthetic" (*e.g.* "Wednesday, 3rd February", "Episode 5") and so are not indexed.

- "seriesTitle": for Series, shall be used to indicate an editorially significant title as with episodeTitle above.

The titles of Series without a parent Brand are always considered editorially significant, as are Brand titles.

- "songTitle", "albumTitle": may be used when describing content objects oriented primarily around single pieces of music.

Synopsis

- At least one synopsis is provided for every Brand, Series or Episode Record (*i.e.* for all *GroupInformation* Fragments).
- Three different synopsis lengths are supported by this profile, as detailed in the table below:

Synopsis length	Optionality	Maximum character count
short	Mandatory	90 characters
medium	Recommended	210 characters
long	Optional	1200 characters

- External business rules determine which synopsis lengths must be populated by Metadata Publishing Parties.

Additional keywords

This profile allows Metadata Publishing Parties to supply additional keywords in the supplied Content Description metadata to assist with the indexing of content by the Search Service.

- Present in Brand, Series or Episode Records only (*GroupInformation* Fragments).
- Each additional keyword is supplied in a separate <Keyword> element. The contents of the element **may** contain composite keywords containing spaces, *e.g.* "social deprivation", "royal wedding".
- Keywords are inherited in an additive fashion from Brand to Series to Episode.

Content placement classifiers

Classifiers drive the placement of content items into user-facing categories in the content guide. Because the set of user-facing categories is volatile, the placement is achieved through a mapping such that the classifiers applied to content by Metadata Publishing Parties can remain relatively static even if the user-facing categories are reorganised.

- Present in Brand, Series or Episode Records only (*GroupInformation* Fragments).
- A Fragment implicitly inherits content placement classifiers from its closest ancestor in the hierarchy. However, if a particular Fragment declares its own content placement classifiers, these completely replace any classifiers that would otherwise have been inherited.

The placement of content into user-facing categories is driven by content classifiers either directly specified at Episode level, or implicitly inherited by the Episode Record.

- Computer-readable terms selected from IntentionCS, FormatCS, ContentCS, IntendedAudienceCS or OriginationCS.
- The palette of available terms is a profiled subset of those defined by TV-Anytime and can be found in an accompanying specification.
- Any number of terms may be applied to a Fragment, subject to implementation business rules.
- Each term is included as the content of a <Genre type="main"> element.
- By default, content is assumed to be aimed at a general audience unless one of the terms described in the subsections below is applied.

Adult content classifiers

All content of a pornographic nature suitable for adults only is tagged either with the following classifier:

urn:tva:metadata:cs:ContentCS:2010:3.9 *(ADULT)*

or else with one of the more specific adult content classifier terms `3.9.*` from the controlled vocabulary YouViewContentCS.

Content of general interest to an audience of adults may be tagged with the following classifier:

urn:tva:metadata:cs:IntendedAudienceCS:2010:4.2.2 *(Adults)*

The classifier terms are included in the element `<Genre type="main">`.

Children's content classifier

All content suitable for viewing by children is tagged with the following classifier:

urn:tva:metadata:cs:IntendedAudienceCS:2010:4.2.1 *(Children)*

The classifier term is included in the element `<Genre type="main">`.

Educational content classifier

All content intended primarily for educational purposes is tagged with the following classifier:

urn:tva:metadata:cs:IntentionCS:2005:1.3 *(EDUCATE)*

More specific classifiers may additionally be specified.

The classifier terms is included in the element `<Genre type="main">`.

Content type classifiers

At least one Fragment in any Brand–Series–Episode–Editorial Version chain specifies the type of content to assist in the placement of the content item in the content guide. The terms specified in the following table shall be supplied with the element `<Genre type="main">`.

Controlled term	Meaning
urn:tva:metadata:cs:**MediaTypeCS**:2005:**7.1.1** *(Linear | Audio only)*	Radio
urn:tva:metadata:cs:**MediaTypeCS**:2005:**7.1.3** *(Linear | Audio and video)*	Television
urn:tva:metadata:cs:**MediaTypeCS**:2005:**7.1.3** *(Linear | Audio and video)* urn:tva:metadata:cs:**OriginationCS**:2005:**5.7** *(Cinema)*	Film
urn:tva:metadata:cs:**MediaTypeCS**:2005:**7.1.3** *(Linear | Audio and video)* http://refdata.youview.com/mpeg7cs/YouView**FormatCS**/2010-05-20#**2.5.5** *(Music video)*	Music video

Parental guidance

Provision of parental guidance metadata on every Editorial Version record is mandatory.

Depending on the configured parental control settings, the presence of a parental guidance flag on an Editorial Version Record may restrict the consumption of the corresponding content item in the content guide.

- Present in Editorial Version Records only (*ProgramInformation* Fragment).
- Expressed using MPEG-7 `<ParentalGuidance>` element, extended by TV-Anytime schema.

- A single computer-readable term from one of DentonContentWarningCS, BBFCRatingCS or YouViewContentRatingCS carried in `<ParentalRating>` element.
- If, after editorial content compliance, it is decided that no other content rating is applicable, the term `unrated` from YouViewContentRatingCS is applied.

External business rules may mandate the provision of Parental guidance metadata.

- A human-readable editorial guidance message may be provided in the `<ExplanatoryText>` child element. As with all textual elements, this editorial text can be supplied in several different languages by repeating the `<ExplanatoryText>` element with different values of the `xml:lang` attribute.

Production language

- The main language of the content is indicated either in the Episode Group Record or in the Editorial Version Record (*GroupInformation* Fragment of type `programCcncept` or *ProgramInformation* Fragment).
- Used to place non-English content into an appropriate category in the content guide.
- Encoded using the `<Language>` element.

```
<BasicDescription>
   ...
   <Language>cym</Language>
   ...
</BasicDescription>
```

A production language specified at Editorial Version level overrides a value specified at Episode level. Otherwise, the Editorial Version inherits the production language of its parent Episode.

Credits

- Present in Brand Group, Series Group, Episode Group or Editorial Version Records (*GroupInformation* Fragments or *ProgramInformation* Fragment).
- Expressed using the `<CreditsList>` element.
- The receiving system is responsible for collating the lists from the different levels of the metadata chain.
- The `index` attribute on the `<CreditsItem>` element may be used to explicitly control the order of interleaving. The presentation order is from low indices to high indices.
- Optional use of `<PresentationRole>` to control the presentation of crew roles.

Credits follow a simple additive pattern of inheritance from Brand to Series to Episode to Editorial Version. An Editorial Version inherits credits from all its direct ancestors.

In the absence of explicit ordering (`index` attribute of `<CreditsItem>` element), the order of the Credits shall be the natural lexical order as presented in the Fragment with Brand-level Credits first, then Series, then Episode then Editorial Version. If there is a mixture of ordered and unordered Credits, all the ordered Credits shall appear first followed by all the unordered Credits presented in the natural lexical order specified immediately above.

This profile of TV-Anytime supports two different approaches for expressing credits:

1. Referenced credit using `<PersonNameIDRef>` (or `<OrganizationNameIDRef>`) element in `<CreditsList>` to reference a *PersonName* (or *OrganizationName*) Fragment separately published, see previous sections for more detail.
2. This approach is more appropriate if the Metadata Publishing Party manages credits internally as a normalised database.
3. Inlined credit using `<PersonName>` element in `<CreditsList>`.
4. This approach is more appropriate if the Metadata Publishing Party handles credits as a simple list alongside the content metadata.

The two approaches may be mixed and matched arbitrarily so that a particular content billing has some referenced credits and some inlined credits.

In both cases, the machine-readable role of each credited individual/organisation is provided in the `role` attribute of the enclosing `<CreditsItem>` element using a term from one of the approved Classification Schemes (MPEG-7 RoleCS, TV-Anytime TVARoleCS).

- Where the role is `"ACTOR"` the name of the character played **may** be supplied in the optional `<Character>` child element of `<CreditsItem>`.
- For all other role terms, the crew member's role displayed in the content guide may be specified explicitly using the `<PresentationRole>` element.
- Otherwise, the role displayed against the name in the content guide is decoded from the controlled term specified in the `role` attribute.

Editorial images

- Realising the Image entity in the Logical Metadata Model.
- Editorial images may be present in Brand Group, Series Group, Episode Group or Editorial Version Records (*GroupInformation* Fragments or *ProgramInformation* Fragment).
- Using `<RelatedMaterial>` element of type `ExtendedRelatedMaterialType`.
- The `href` attribute of the `<HowRelated>` element carries the fixed value `urn:tva:metadata:cs:HowRelatedCS:2010:19` to indicate that this is a promotional still image.
- The file format of the image may be supplied using the appropriate term from MPEG-7 FileFormatCS in the `href` attribute of the `<Format>` element.
- A textual description of the image content is supplied in the `<PromotionalText>` element to support accessibility aids such as screen readers.
- The source URL of the image is supplied in the `MediaLocator/MediaUri` element.
- The width and height of the image is indicated in the elements `ContentProperties/ContentAttributes/Width` and `ContentProperties/ContentAttributes/Height`.
- A controlled term from YouViewImageUsageCS is provided in the `<IntendedUse>` element indicating the role of the image in the content guide. The term `role-primary` shall be used to label standard images for display in the content guide. The term `role-secondary` shall be used to indicate non-standard images.
- A controlled term from YouViewImageUsageCS may be provided in an additional `<IntendedUse>` element to indicate the source type of the image.
- The controlled term `do_not_resize` from YouViewImagePropertyCS may be provided in a further `<IntendedUse>` element to indicate that the image is not a high-resolution master image, i.e. it is not suitable for resizing to fit varying requirements in the user experience.
  Omission of this term implies that the image may be resized by the recipient system.
- The controlled term `has_DOG` from YouViewImagePropertyCS may be provided in a further `<IntendedUse>` element to indicate that the image carries a digital on-screen graphic (DOG). Omission of this term implies the contrary.

Editorial images follow an additive–override pattern of inheritance from Brand to Series to Episode to Editorial Version. They are additive in the sense that an Editorial Version inherits images from all its direct ancestors. Where there is a duplication of the same combination of intended use controlled terms, the image specified in the nearest ancestor overrides that of a more distant ancestor.

The protocol for updating an editorial image is to republish the affected metadata fragment with a different value of `<MediaUri>`.

Editorially-driven cross-promotions

This mechanism is intended to enable a Metadata Originating Party to explicitly cross-promote content (*e.g.* "if you liked this piece of content you may also like these other content items").

- Realising the Internal Reference entity in the Logical Metadata Model.
- Cross-promotions may be present in Brand Group, Series Group, Episode Group or Editorial Version Records (*GroupInformation* Fragments or *ProgramInformation* Fragment).
- Using `<RelatedMaterial>` element of type `ExtendedRelatedMaterialType`.
- Any Brand Group, Series Group, Episode Group or Editorial Version may be recommended.
- CRID of the recommended Fragment (from its `groupId` or `programId` attribute) **shall** be supplied in `MediaLocator/MediaUri` element.
- The `href` attribute of the `<HowRelated>` element carries the fixed value `urn:tva:metadata:cs:HowRelatedCS:2010:7` (Group Recommendation) if the target CRID is a Brand, Series or Episode Group; the value `urn:tva:metadata:cs:HowRelatedCS:2010:6` (Recommendation) is used if the target CRID is an Editorial Version.

Cross-promotions follow a simple additive pattern of inheritance from Brand to Series to Episode to Editorial Version. An Editorial Version inherits cross-promotions from all its direct ancestors.

Editorially-driven cross-promotions are not intended to be dynamic: the set of recommended CRIDs is fixed when the metadata Fragment is published. To change the set of cross-promotions, the metadata Fragment must be republished.

Supporting material

- Realising the External Reference entity in the Logical Metadata Model.
- Supporting material may be present in Brand Group, Series Group, Episode Group or Editorial Version Records (*GroupInformation* Fragments or *ProgramInformation* Fragment).
- Using `<RelatedMaterial>` element of type `ExtendedRelatedMaterialType`.
- Target URL is supplied in the `MediaLocator/MediaUri` element.
- The `href` attribute of the `<HowRelated>` element shall carry one of the following values from `urn:tva:metadata:cs:HowRelatedCS:2010:...`

Term identifier	Meaning	Protocol prefix of target URL
`10.1`	Programme e-mail address	mailto:
`14.1`	Support e-mail address	
`10.2`	Programme website	http://
`14.2`	Support website	
`10.3`	Programme telephone number	tel:
`14.3`	Telephone helpline	

Production date

A production date may be provided for an Editorial Version (*ProgramInformation* Fragment) only. Although optional, this metadata field is essential for the chronological ordering of non-broadcast content (such as films and music videos) in the content guide.

- The original year of production is expressed as an ISO 8601 date and conveyed in the `ProductionDate/TimePoint` element.
- The year is specified; month and day number may optionally be provided additionally.
- A time point is not specified.

Production country

The original country (or countries) of production may be specified for an Editorial Version (*ProgramInformation* Fragment) only..

- Each country is specified using a separate `<ProductionLocation>` element with a single ISO 3166 country code apiece.

Content duration

The running time of the content is specified against Editorial Version Records only (*i.e.* *ProgramInformation* Fragment).

- The duration shall be conveyed in a `<Duration>` element.
- The duration indicates the running time of the underlying content item only, excluding interstitials, accurate to the nearest minute (or better).

Indicative pricing

The indicative price of content may be expressed in Instance Description metadata (see description below).

B2B: Instance Description metadata Fragments

These Fragments correspond to the Publication Records in the Logical Metadata Model.

Schedule Fragment profile

This Fragment type does not correspond to any particular Record in the Logical Metadata Model. It describes a set of event slots in a linear channel schedule and therefore realises a set of Broadcast Publication Records. Each Broadcast Publication Record is encoded as a single `<ScheduleEvent>` element in the *Schedule* Fragment. The identifier for the purposes of Fragment manipulation is the value of the `serviceIdRef` plus the `start` and `end` date–time values.

- Contains a set of `<ScheduleEvent>` elements, each one corresponding to a Broadcast Publication record in the Logical Metadata Model.
- Mandatory pointer to linear *Service* Fragment using `serviceIDRef` attribute.
- A separate *Schedule* Fragment needs to be published for every regional variant of a linear channel with a different schedule.
- Temporal scope of the schedule in each Fragment is at the discretion of the Metadata Publisher. One programme day per Fragment is conventional. The time block is indicated using the `start` and `end` attributes on the `<Schedule>` element.
- A particular `<ScheduleEvent>` falls within the scope of a particular *Schedule* Fragment if its `<PublishedStartTime>` is earlier than the `end` date–time indicated by the enclosing *Schedule* Fragment.
- A *Schedule* Fragment may be updated at any time, but the time block indicated by the `start` and `end` attributes must remain invariant across its life-cycle since these attribute value are used to synthesise the proxy Fragment identifier.
- Business rules will determine whether it is acceptable for delivered schedules to be sparse (*i.e.* containing a non-contiguous set of `<ScheduleEvent>` elements.)

To summarise, the Metadata Publishing Party is given the freedom to define whatever schedule block size is convenient (one day, six hours, *etc.*) and the duration of one schedule block may be different from other schedule blocks. However, for the life-cycle of a particular schedule block, the start and end date–time must remain the same.

Timing of publication

Schedule Fragments may be published at any time before, during (or even after!) the set of events contained in the indicated schedule. Typically, a full linear schedule needs to

be delivered well in advance of the scheduled start time and is updated as and when required by changes in the planned schedule.

Edge cases

There is an edge case where a particular linear slot is shifted along the linear timeline such that its start time moves from the scope of one schedule block to that of the next schedule block. In this case, both affected *Schedule* Fragments are republished. In so doing, the `<ScheduleEvent>` in question is implicitly deleted from one *Schedule* Fragment and added to a different *Schedule* Fragment.

Importantly, the *migration* of a `<ScheduleEvent>` out of a *Schedule* Fragment (with the intention of adding it subsequently to another schedule block) is indistinguishable from the *implicit deletion* of a linear slot by the republication of that Fragment with the unwanted `<ScheduleEvent>` deleted.

This implies the need for the metadata ingest system to keep track of which `<ScheduleEvent>`s currently exist in which *Schedule* Fragments so that it can correctly handle the implicit deletion and moving of individual linear slots.
One way of achieving this would be to index the CRID and IMI values of the individual `<ScheduleEvent>`s present in each *Schedule* Fragment.

<ScheduleEvent> element

- The `programId` CRID of the parent Editorial Version Record (*ProgramInformation* Fragment) is indicated using `crid` attribute of `<Program>` element.
- A Linear Event Locator is provided in the `<ProgramURL>` element.
- Every `<ScheduleEvent>` is assigned an Instance Metadata Identifier compliant with the profile discussed above and this is conveyed in the `<InstanceMetadataId>` child element.

TV-Anytime requires only that the value of the Instance Metadata Identifier is unique within the scope of the parent ProgramInformation Fragment. However, it is recommended that Metadata Publishing Parties assign globally unique values to simplify system debugging. This is relevant to the below description also.

- Title, synopsis and airing attributes are supplied in the `<InstanceDescription>` to support Use Cases such as historical schedule. Where relevant, the metadata provided corresponds exactly to the schedule sent to linear metadata collator systems (*e.g.* Freeview Central Collator, Freesat Central Collator).
- If this is the canonical scheduled linear outing of the content identified by the `programId` CRID, the controlled term `broadcast-canonical` from YouViewPublicationTypeCS may be applied in `InstanceDescription/Genre`. The `type` attribute is given the value `"other"`.
  It is recommended that the Metadata Publishing Party does not label more than one `<ScheduleEvent>` with the same `programId` CRID as canonical.

  The purpose of this feature is to present a definitive date, time and channel of broadcast against on-demand items in the platform content guide.

  If no <ScheduleEvent> is marked as canonical, or if more than one is marked as canonical, the platform is at liberty to select one at its discretion.
- The scheduled start time of the linear slot is conveyed in the `<PublishedStartTime>` element and is formatted according to the time–date profile described above.
  This is the time advertised to end users in the linear billing and may be rounded (e.g. to the nearest five minutes) for optimal display in the content guide.
- The scheduled duration of the slot is conveyed in the `<PublishedDuration>` element and is formatted according to the time period profile described above.
  This is the duration advertised to end users in the linear billing and may be rounded (e.g. to the nearest five minutes) for optimal display in the content guide.

- The `<Repeat>` element may be present to indicate whether this is a repeat screening of the content. If absent, it is assumed not to be a repeat.
- The `<Free>` element is present to indicate whether or not the content in the linear slot may be consumed free of charge.

BroadcastEvent Fragment profile

The purpose of the *BraodcastEvent* Fragment is to explicitly link Content Description metadata to a `<ScheduleEvent>` provided by a different Metadata Publishing Party. Support for this Fragment type is optional.

By allowing a Metadata Publishing Party to link its enhanced metadata to a schedule published by a third party, three Use Cases are supported:

1. Decorate an Electronic Programme Guide slot with enhanced metadata.
2. Decorate an Electronic Programme Guide slot with on-demand availability and allow the user to initiate content playback from historical/future EPG slots.
3. Capture a definitive broadcast date–time for an on-demand catalogue item. This may be displayed in the on-demand catalogue and/or used to sort "Catch-up" items by date.

If *BroadcastEvent* Fragments are not published for a given Linear Service, these Use Cases cannot be supported and the Electronic Programme Guide will instead present basic metadata.

The *BroadcastEvent* Fragment does not correspond to any particular Record type in the Logical Metadata Model. (Formally, it models the relationship between a set of On-demand Publication Records and a Broadcast Record.)

- Mandatory pointer to linear *Service* Fragment using the `serviceIDRef` attribute.
- The `programId` CRID of the parent Editorial Version Record (*ProgramInformation* Fragment) is conveyed in the `crid` attribute of the `<Program>` element.
- Every *BroadcastEvent* Fragment is assigned an Instance Metadata Identifier and this is conveyed in the `<InstanceMetadataId>` child element.
- The element `InstanceDescription/Genre` may be used to indicate that this Fragment points to the "canonical" schedule slot for the enhanced metadata. The controlled term `broadcast-canonical` from YouViewPublicationTypeCS is used for this purpose. The `type` attribute is given the value `"other"`.
- No more than one *BroadcastEvent* Fragment with the same parent Editorial Version Record is labelled as "canonical" because of the ambiguity this creates.
- If the metadata recipient system finds more than one "canonical" *BroadcastEvent* Fragment for a given Editorial Version Record, it is at liberty to select one schedule slot over the others as "canonical" using whatever algorithm is deemed appropriate by the business.
- Similarly, if no single *BroadcastEvent* Fragment for a given Editorial Version Record is marked as "canonical" the metadata recipient system is permitted to make its own choice according to a business rule not specified here.
- No other elements may be present in Fragments of this type, with the exception of those specified in the subsections below.

Two alternative signalling methods are supported to enable the *BroadcastEvent* Fragment to identify its target schedule event. These are described in the following subsections.

It is recommended that a separate *BroadcastEvent* linkage Fragment be published for every repeat airing of an Editorial Version on every linear service, including all regional variants.

This ensures that every repeat on every channel is decorated.

In the case where linear identifiers identify the target schedule event, the metadata recipient system may be able to infer repeats automatically. This is described in more detail below.

Match on linear identifiers

In this method, the target schedule event is identified by identifiers present in the master linear schedule.

- A Linear Event Locator is conveyed in the `<ProgramURL>` element.
- A Linear Programme CRID is provided where possible to disambiguate the Linear Event Locator.
  The value of a Linear Programme CRID is conveyed in the element `InstanceDescription/OtherIdentifier`. There may be zero or one of these elements per Fragment.
  The `authority` attribute has the value "`pcrid.dmol.co.uk`" for a Freeview Programme CRID or "`pcrid.freesat.co.uk`" for a Freesat Programme CRID.
  Supplying the Linear Programme CRID allows the metadata recipient system to identify repeat events of the same programme in the linear schedule.
  It is recognised that not all linear channels label their schedules with Linear Programme CRIDs.

Match on billed date–time

In this method, the target event in the master schedule is identified by its start time and duration.

- The scheduled start time of the linear slot is conveyed in the `<PublishedStartTime>` element and is formatted according to the time–date profile described above.
- The scheduled duration of the slot is conveyed in the `<PublishedDuration>` element and is formatted according to the time period profile described above.

The metadata recipient system is at liberty to use "fuzzy logic" where there is not an exact match between the information conveyed in the BroadcastEvent Fragment and the start time and duration of an event in the master linear schedule.

Timing of publication

The *BroadcastEvent* Fragment may be published at any time before, during or after the time of the target schedule event. Referential integrity is achieved if the CRID of the referenced *ProgramInformation* Fragment has previously been accepted into the Metadata Description.

If the *BroadcastEvent* Fragment targets a schedule event that is currently unknown to the recipient metadata system, a business rule determines whether and for how long a match is sought.

OnDemandProgram Fragment profile

This Fragment type represents the On-demand Publication Record in the Logical Metadata Model. The identifier for the purposes of Fragment manipulation is the CRID of the referenced *ProgamInformation* Fragment concatenated with the Instance Metadata Identifier with an additional hash character (`#`) between the two identifiers.

- Mandatory pointer to one or more on-demand *ServiceInformation* Fragments using the `serviceIDRef` attribute.
- The `programId` CRID of parent Editorial Version Record (*ProgramInformation* Fragment) is indicated using `crid` attribute of `<Program>` element.
- Every *OnDemandProgram* Fragment is assigned an Instance Metadata Identifier compliant with the profile described above and this is conveyed in the `<InstanceMetadataId>` child element.
- Any discontinuous availability windows are modelled as multiple *OnDemandProgram* Fragments.

Timing of publication

In one example, *OnDemandProgram* Fragments can be published at any time before, during (or even after) the indicated availability window.

- In the case where a Metadata Publishing Party is confident of the window start and end point (for example, if the content rights have been purchased with fixed start and end points and the media content has already been distributed), publishing the Fragment in advance results in the corresponding content item appearing in the user-facing content guide at the start of the availability window.
- In cases where the availability window is driven by external real-time factors (e.g. "Catch-up" rights dependent on the end of linear broadcast), it is equally acceptable for the Metadata Publishing Party to publish an *OnDemandProgram* Fragment in real time. Ingest of the Fragment by the Metadata Aggregation Service is subject to prevailing processing latencies. This may result in the start of the availability window falling in the past by the time the Fragment is processed, but the content item will appear in the user-facing content guide as expected provided the end of the availability window has not passed.
- If the Metadata Publishing Party wishes to advertise forthcoming availability of content, it is permissible to publish an *OnDemandProgram* Fragment with start and end of availability both in the future. Depending on business rules, a corresponding content item may appear in the user-facing content guide, advertised as "coming soon". It may be possible for an end user to book a future acquisition of the on-demand Publication, but it is not possible to consume the content.
  If the "coming soon" feature is not supported then the content item will simply not appear in the content guide.
- Alternatively, a Metadata Publishing Party may pre-publish Content Description Metadata only and simply refrain from publishing any Instance Description metadata until later.
- To remove a content item from the user-facing content guide all on-demand Publication instance Fragments are explicitly deleted by the Metadata Publication Party using a mechanism specified for this purpose described above.

Availability "black-out" periods

Under certain circumstances, a Metadata Originator needs to specify a discontinuous on-demand availability window for an item of content, for example to represent a "black-out" period during which the content is hidden from the user-facing content guide. Since each *OnDemandProgram* Fragment can only model a single availability window, the recommended solution is for multiple Fragments to be published, each one representing a continuous availability window before or after a "black-out" period.

Simple media locator

A fully-resolved playback URL for the on-demand publication may be provided as the content of the element `<ProgramURL>`. This facility maybe preferably used by smaller content providers with no need for a separate media resolution service. In one example, this feature may not be used in conjunction with the signalling of Content Distribution Network availability specified below.

Content Distribution Network availability

A Metadata Publishing Party **may** indicate the set of Content Distribution Networks from which the media corresponding to this On-demand Publication is available. The set of Content Distribution Networks is used to indicate to the end user whether the media corresponding to the On-demand Publication can be played back immediately with assured quality.

- The set of available Content Distribution Networks is not inherited from the On-demand Portal Service indicated by the `serviceIDRef` attribute of the *OnDemandProgram* Fragment.
- Availability of media from a Content Distribution Network is indicated in the *OnDemandProgram* Fragment by using controlled terms from YouViewContentDistributionNetworkCS in the `<Genre>` child element of `<InstanceDescription>`. The `type` attribute are `"other"`.
- Where a default media player is to be used for playback, the Metadata Publishing Party additionally publishes at least one corresponding Media locator for each Content Distribution Network, as specified below.
- Where a custom media player is to be used for playback, the Metadata Publishing Party may publish corresponding media locators for each Content Distribution Network, or it may alternatively publish Private On-demand Publication Identifiers, as specified below.
- Where Content Distribution Network availability is signalled in an On-demand Publication Record, the use of the Simple media locator specified above is prohibited.

Publication duration

In one example, the running time of the overall on-demand presentation is signalled in the `<PublishedDuration>` element.

- The calculation of the duration (where possible) includes any interstitials such as pre-roll promotional trailers and commercial breaks.
- The value is accurate to the nearest minute (or better).

Advertised availability window

Each *OnDemandProgram* Fragment may specify an availability window using the `<StartOfAvailability>` and `<EndOfAvailability>` elements. Both of these elements are optional in the schema, but business rules enforce the presence of at least one of them. The table below summarises the semantics of the different permutations:

<StartOfAvailability>	**<EndOfAvailability>**	**Semantics**
Element absent	*Element absent*	Not permitted
Element absent	Past date–time	Not permitted
Element absent	Future date–time	Available until end of window
Past date–time	*Element absent*	Available indefinitely
Past date–time	Past date–time	Temporarily revoked
Past date–time	Future date–time	Available during window
Future date–time	*Element absent*	Future indefinite availability
Future date–time	Past date–time	Not permitted
Future date–time	Future date–time	Future availability

The signalled availability window is only a general indication of the intended availability period. In addition, an explicit indication of actual media availability is separately specified below.

The separation of these two concepts allows the Metadata Publishing Party to advertise future intended availability prior to actual media availability.

Pay/Free flag

- The `<Free>` element is used to indicate whether (or not) an On-demand Publication instance is offered free-of-charge to all end users.
- If set to `false` the end user may be charged for consuming the content.
- This element is mandatory in this profile of TV-Anytime.

See also the sections below which describe how an indicative price can be signalled.

<InstanceDescription> element

The `<InstanceDescription>` element is common to the two Instance Description metadata Fragment types. (Where BroadcastEvent Fragments are supplied, the Instance Description is not required, as in that case the schedule data supplied separately is the definitive source for billings metadata.) However, different child elements are allowed in the three cases. The table below summarises the position (✓: permitted, ×: not permitted):

	Broadcast Publication	**Schedule Event Linkage**	**On-Demand Publication**
TV-Anytime Fragment	*Schedule*	*BroadcastEvent*	*OnDemandProgram*
Element	`<ScheduleEvent>`		
`<Title>`	✓	×	×
`<Synopsis>`	✓	×	×
`<Genre>`	✓	×	✓
`<PurchaseList>`	×	×	✓
`<Language>`	×	×	×
`<CaptionLanguage>`	✓	✓	✓
`<SignLanguage>`	✓	✓	✓
`<AVAttributes>`	✓	×	✓
`<OtherIdentifier>`	×	✓	✓
`<RelatedMaterial>`	✓	×	✓

Instance title

A particular Instance Description Fragment may provide an event-specific title using the `<Title>` element. This is particularly relevant for schedule metadata where the linear broadcast title may differ from the title in the Content Description metadata.

The `<Title>` element is not provided in the Instance Description of an *OnDemandProgram* Fragment.

Instance synopsis

A particular Instance Description Fragment may provide a single event-specific synopsis using the `<Synopsis>` element. This is particularly relevant for schedule metadata where the linear broadcast synopsis may differ from the synopsis in the Content Description metadata.

A synopsis provided in this context indicates `length="medium"` only. No other synopsis lengths are permitted.

The `<Synopsis>` element is not provided in the Instance Description of an *OnDemandProgram* Fragment.

Linear event classifiers

Linear broadcast event classifiers may be provided for Broadcast Publication Records (`<ScheduleEvent>` elements of a *Schedule* Fragment) only using the `<Genre>` element. The `type` attribute carries the value `"secondary"`.

- Freeview event genre (exactly one) encoded using a term from DTGContentCS.
- Freesat event genres (one or two) encoded using a term from FreesatContentCS.

On-demand Content Distribution Network availability

Using `<Genre>` element in an On-demand Publication instance. See above for details.

Indication of actual media availability

In one example, by default an *OnDemandProgram* Fragment is assumed to be a placeholder On-demand Publication advertising future on-demand availability, even if the current date–time lies within the specified availability window. A separate indicator is specified here to indicate that the associated media is actually available for consumption/acquisition.

The setting of this indicator enables additional playback/acquisition user journeys in the user-facing content guide.

- Actual media availability is indicated using a single `<Genre>` element.
  The `type` attribute carries the value `"other"`.
  The content of the element shall be the fully-qualified term identifier `media_available` from the controlled vocabulary YouViewMediaAvailabilityCS.
- The absence of this term is interpreted as meaning that the media is not yet available.

Indicative pricing

The indicative cost of a publication instance may optionally be encoded using the `PurchaseList/PurchaseItem/Price` element.

- The value of the `currency` attribute on the `<Price>` element is one of those listed in the following table:

Currency	Value of currency attribute
Pounds Sterling	GBP

- A number of different `<PurchaseItem>` elements may be supplied in the same Publication Record, each with a separate pricing window indicated by the date–time values of the `start` and `end` attributes.
- Where a number of pricing windows are supplied they are contiguous and non-overlapping.

Profiling indicative price in the Instance Description metadata allows for differential pricing of different publications (*e.g.* high definition and standard definition publications). This is intended purely as an indication of the maximum amount that an end user may be charged in the absence of individual per-customer pricing information. If, for example, this piece of content is part of a particular end user's on-demand package subscription, content signalled with an indicative price may, in fact, be available free of charge to that end user until the subscription expires.

Subtitles

The availability of subtitles in a particular Publication is indicated via the `<CaptionLanguage>` element, along with the language of the subtitles.

```
<InstanceDescription>
   ...
   <CaptionLanguage closed="true">eng</CaptionLanguage>
   ...
</InstanceDescription>
```

Sign language

In one example, the availability of sign language in a particular Publication is indicated using the `<SignLanguage>` element, along with the language of the signing.

```
<InstanceDescription>
   ...
   <SignLanguage>sgn-GB</SignLanguage>
   ...
</InstanceDescription>
```

<AVAttributes> element

The audio–visual attributes of the Publication (sometimes referred to as technical metadata) are signalled in the `<AVAttributes>` element. The attributes permitted by this profile are summarised in the following table:

Element	Sub-element	Broadcast Publication Record	On-Demand Publication Record
`<AudioAttributes>`	`<MixType>`	mandatory	mandatory
	`<AudioLanguage>`	optional	optional
`<VideoAttributes>`	`<HorizontalSize>`	optional	mandatory
	`<VerticalSize>`	optional	mandatory
	`<AspectRatio>`	mandatory	mandatory
	`<Color>`	mandatory	mandatory
`<BitRate>`		optional	mandatory

- The `<AVAttributes>` element is present in all `<ScheduleEvent>` elements.
- The `<AVAttributes>` element is omitted altogether from *BroadcastEvent* Fragments.
- The `<AVAttributes>` element is present in all *OnDemandProgram* Fragments where the actual media availability indicator is present. The element may be omitted entirely if this indicator is absent.
- For Publications representing media with no audio (such as a silent film), the `<AudioAttributes>` element is omitted altogether.
- For Publications representing media with no video (such as linear radio or audio-on-demand), the `<VideoAttributes>` element is omitted altogether.

Audio mix type

The type of audio mix available in an audio–visual Publication is indicated by the `<MixType>` sub-element of `<AudioAttributes>`. The `href` attribute carries a term value from AudioPresentationCS.

For non-audio–visual Publications the `<MixType>` sub-element is omitted altogether.

Audio Description

The availability of Audio Description in a particular Publication is indicated using the `<AudioLanguage>` sub-element of `<AudioAttributes>`. The content of this element is an ISO 639 language code from a specified set.

- The `supplemental` flag shall be set to `"true"`.
- The `purpose` attribute shall have the value
  urn: mpeg:mpeg7:cs:AudioPurposeCS:2007:1 (Audio Description for the visually impaired).

Video resolution

- The horizontal resolution of the encoded video elementary stream is indicated in the `<HorizontalSize>` sub-element of `<VideoAttributes>`.
- The vertical resolution of the encoded video elementary stream is indicated in the `<VerticalSize>` sub-element of `<VideoAttributes>`.

In cases where the Publication represents a media set with different encoded resolutions the *maximum* resolution available in the media set is signalled in both elements.

Picture aspect ratio

The aspect ratio of the video raster in the encoded video elementary stream is indicated in the content of the `<AspectRatio>` element.

Only the following values are used in this profile:

Aspect ratio value
4:3
16:9

Colour flag

The `type` attribute of the `<Color>` element is used to indicate whether the encoded video elementary stream contains colour or black and white material.

Bit rate

The content of the `<BitRate>` element indicates the target bit rate required to consume the On-demand Publication with a minimum acceptable quality (as defined by external business rules). Where the On-demand Publication describes a set of encoded media files intended for the Adaptive Streaming service, the acceptable quality corresponds to the bit rate of one of these streams.

The optional `minimum` and `maximum` attributes respectively indicate the bit rates of the lowest and highest bit rate streams in an Adaptive Streaming media set.

For single constant bit rate streams, only the target bit rate is supplied.

Media locators

The location(s) of media on one or more Content Distribution Network may be indicated against an On-demand Publication Record.

- The URL of the media is specified in the content of an `<OtherIdentifier>` element.
- The only mandatory attribute is `authority` which shall convey an unqualified term identifier from YouViewContentDistributionNetworkCS corresponding to one of the fully-qualified Content Distribution Network terms signalled as described above.
- The same `authority` value may be used more than once in a particular On-demand Publication Record if the media is available from more than one location on a particular Content Distribution Network.

Private On-demand Publication identifiers

This profile makes provision for Content Providers to supply private identifiers against On-demand Publication Records. These are intended to be passed through metadata systems unaltered to the content guide.

- One or more Content Provider private identifiers may optionally be supplied using the `<OtherIdentifier>` element.
- The only mandatory attribute is `authority` which shall be in the form of an Internet-style domain name that uniquely identifies the type of identifier.
- Each `authority` value is used only once in any given metadata Brand–Series–Episode–Editorial Version–Publication chain.

Linear broadcast identifiers

In order to support the Use Case for looking up availability of on-demand content from a linear content guide, Metadata Publishing Parties decorate each `<ScheduleEvent>` with a linear broadcast Programme CRID and one or more DVB Event Locators.

- Supplied using the `<OtherIdentifier>` element.
- The only mandatory attribute is `authority` which shall be in the form of an Internet-style domain name that uniquely identifies the type of identifier.
- The `authority` values `"event.dmol.co.uk"` and `"event.freesat.co.uk"` are used to encode broadcast Event Locator values from (respectively) Freeview and Freesat. These values of `authority` are reserved for this purpose and do not appear elsewhere in any metadata chain.
- The `authority` values `"pcrid.dmol.co.uk"` and `"pcrid.freesat.co.uk"` are used to encode broadcast Programme CRID values from (respectively) Freeview and Freesat. These values of `authority` are reserved for this purpose and do not appear elsewhere in any metadata chain.

For example:

```
<InstanceDescription>
   ...
   <OtherIdentifier authority="pcrid.dmol.co.uk">crid://broadcast
er.co.uk/FXM9G</OtherIdentifier>
   <OtherIdentifier authority="event.dmol.co.uk">dvb://233a..1044
;24b2</OtherIdentifier>
   <OtherIdentifier authority="event.freesat.co.uk">dvb://2..23fb
;24b2</OtherIdentifier>
   ...
</InstanceDescription>
```

Receivers with access to linear broadcast metadata (e.g. DVB Event Information Table) are able to present the broadcast Programme CRID and/or DVB Event Locator to the Metadata Aggregation Service. By matching these against values stored in a `<ScheduleEvent>`, the Metadata Aggregation Service can locate the *ProgramInformation* of which it is an instance and then establish whether there are any *OnDemandProgram* instances of the same Editorial Version.

Examples of transactions: Full-stack Content Transaction

Figure 89 shows the "full-stack" pattern of content transaction, where all objects from Editorial Version up to Brand (if present) are contained in the same single transaction body. The transactions for Service and the two publication types (Broadcast and On-demand Publication) remain separate.

Examples of transactions: Atomised Content Transactions

Figure 90 shows the "atomic" pattern of content transactions, where TVA fragments representing content objects from Editorial Version up to Brand are each contained in individual transactions (except that the Editorial Version and Episode are together). The transactions for Service and the two publication types (Broadcast and On-demand Publication) remain separate.

Examples of transactions: Music video

Figure 91 shows a simple modelling of a single music video, one on-demand publication of it and the associated on-demand service.

Examples of transactions: Adult film

Figure 92 models a cinema film/movie, showing also how adult content is labelled, and how content can be grouped into editorial collections such as thematic seasons.

Examples of transactions: Minimal Metadata

Figure 93 illustrates the minimum set of metadata that needs to be contributed. It represents the metadata that might be contributed by (or on behalf of) a small content provider wishing to make some standalone content items available with no series or brand groupings.

This example includes only two Transaction files:

1. Service Transaction. Terse definition of a Content-owning Service and an On-demand Portal Service. The latter points at a default media player Application. This Transaction is submitted once to establish the set of reference Services.
2. Combined Content and Publication Transaction. Minimal interpretation of the TV-Anytime profile, including only the metadata absolutely essential for a workable user experience. One such Transaction is submitted per content item.

It will be understood that the present invention has been described above purely by way of example, and modifications of detail can be made within the scope of the invention.

Each feature disclosed in the description, and (where appropriate) the claims and drawings may be provided independently or in any appropriate combination.

Reference numerals and/or titles appearing in the claims are by way of illustration only and shall have no limiting effect on the scope of the claims.

Appendix 1

A.1 Playback Controls Guidelines

The system has an integrated playback experience which includes a playback bar and controls, for consistency of user experience these should be the same for On Demand content within Content Provider players:

Play

- N1.1.1 – If the viewer is playing content then pressing the Play button must always continue content playback.

- N1.1.2 – If the viewer has paused the content or is fast forwarding or rewinding, pressing the Play button must always resume playback of the content.

Pause

- N1.1.3 – If the viewer is playing content then pressing the Pause button must always pause the content.

- N1.1.4 – If the viewer has paused the content, pressing the Pause button must always resume playback of the content.

Stop

- N1.1.5 – If the viewer is playing content or the content is paused then pressing the Stop button must always pause the content and present an exit confirmation message ("Press Stop again to exit or press Play to resume playback") which if the viewer confirms they want to exit, causes the player to exit and the viewer to be returned to the point from which the content was launched. If the viewer will lose an entitlement by exiting this must be reflected in the confirmation message.

- N1.1.6 – If the viewer is rewinding or fast forwarding then pressing the Stop button must always cause the content to resume playback.

Rewind

- N1.1.7 – If the viewer is playing content or the content is paused then pressing the Rewind button must always cause the content to start rewinding at the standard first rewind speed (if available) EXCEPT when adverts are playing whereby fast forward and rewinding behaviour can be prevented by the content provider.

- N1.1.8 – If the viewer is rewinding then pressing the Rewind button must always cause the content to either:

    - Rewind at the higher rewind speed (if available)

    OR

    - Continue to rewind at the current rewind speed

- N1.1.9 – If the viewer is rewinding at the maximum speed then pressing the Rewind button must always cause the rewind speed to remain at the maximum speed.

- N1.1.10 – If the viewer is fast forwarding then pressing the rewind button must always cause the content to start rewinding at the standard rewind speed (e.g. the same rewind speed as when the viewer presses the rewind button during playback). If the viewer goes past the boundaries of the currently buffered portion of the video, it is acceptable for the screen to go black as long as there is some visual indication (progress bar/feedback iconography) to show that action is still being taken.

Fast Forward

- N1.1.11 – If the viewer is playing content or the content is paused then pressing the Fast Forward button must always cause the content to start fast forwarding at the standard first fast forward speed (if available). EXCEPT when adverts are playing whereby fast forward and rewinding behaviour can be prevented by the content provider.

- N1.1.12 – If the viewer is fast forwarding then pressing the Fast Forward button must always cause the content to either:

    - Fast forward at the higher fast forward speed (if available)

    OR

    - Continue to fast forward at the current fast forward speed

- N1.1.13 – If the viewer is fast forwarding at the maximum speed then pressing the Fast Forward button must always cause the fast forward speed to remain at the maximum speed.

- N1.1.14 – If the viewer is rewinding then pressing the fast forward button must always cause the content to start fast forwarding at the standard fast forward speed (e.g. the same rewind speed as when the viewer presses the fast forward button during playback). If the viewer goes past the boundaries of the currently buffered portion of the video, it is acceptable for the screen to go black as long as there is some visual indication (progress bar/feedback iconography) to show that action is still being taken.

Skip

- If the viewer is playing, rewinding or fast forwarding content or the content is paused then pressing the Skip button (if available) should always either:

    - Result in no playback action

    - Result in no playback action but display a "Not possible" feedback message"

    - Skip the viewer to the next item in the playlist (if available) and resume playback

    - Skip the viewer an amount of time forward in the content (the content provider can define the skipped time) and resume playback.

A.2 Content Provider Player Update Guidelines

- D2.1 – If the Player changes substantially or is materially different to the version that was approved and certified then Content Providers must re-submit the Player to the system governor for approval.

Appendix 2 – An example XML fragment

```
<settings>
  <group id="parentalcontrols" name="PARENTAL_CONTROLS_TITLE"
description="PARENTAL_CONTROLS_DESCRIPTION">
    <setting id="pin" name="PIN_ENABLED" description="PIN_ENABLED_DESCRIPTION"
libraryFile="youViewGenericSettingsControls" class="textInput">
      <parameter name="style" value="password"/>
      <parameter name="localServiceRepositoryKey" value="canvas.fictionary.pin"/>
    </setting>

  </group>

  <group id="viewingexperience" name="VIEWING_EXPERIENCE_CONTROLS_TITLE"
description="VIEWING_EXPERIENCE_CONTROLS_DESCRIPTION">

    <setting id="subtitle" name="SUBTITLES_ENABLED"
description="SUBTITLES_ENABLED_DESCRIPTION" libraryFile="youViewGenericSettingsControls"
class="canvas.controls.boolean">
      <parameter name="trueLabel" value="On"/>
      <parameter name="falseLabel" value="False"/>
      <parameter name="localServiceRepositoryKey" value="canvas.fictionary.subtitles"/>
    </setting>

    <setting id="audiodescription" name="AUDIO_ENABLED"
description="AUDIO_ENABLED_DESCRIPTION" libraryFile="youViewGenericSettingsControls"
class="canvas.controls.boolean">
      <parameter name="trueLabel" value="On"/>
      <parameter name="falseLabel" value="False"/>
      <parameter name="localServiceRepositoryKey" value="canvas.fictionary.audiodescription"/>
    </setting>


    <setting id="screenshape" name="SCREEN_SHAPES"
description="SCREEN_SHAPES_DESCRIPTION" libraryFile="youViewGenericSettingsControls"
class="canvas.controls.enumeration">
      <parameter name="members">
        <member name="auto" value="0"/>
        <member name="square" value="1"/>
        <member name="rectangle" value="2"/>
      </parameter>
      <parameter name="localServiceRepositoryKey" value="canvas.fictionary.screenshape"/>
    </setting>

  </group>

  <group id="networking" name="INTERNET_TITLE" description="INTERNET_DESCRIPTION">
    <setting id="ethernet" name="ETHERNET_TITLE" description="ETHERNET_DESCRIPTION"
libraryFile="youViewCustomSettingsControls" class="canvas.controls.ethernet">
      <!-- no parameters needed for this control, ethernet has complex APIs -->
    </setting>
    </group>
```

Appendix 3 - Implementation

```
class ExampleSettingLoader
{
// ...
// btw makes lots of sense to maintain a pool of libraryLoader,
// to avoid duplication in case where boolean and radio button
// provided by same library
private var _libraryLoader:Loader = null;
private var _className:String = "";
public function loadSettingAsset(librarySwf:String, className:String):void
{
// save className for once load has finished
_className = className;
// bring in library -- assumes we don't already have loaded
_libraryLoader = new Loader();
var securityContext:LoaderContext = new LoaderContext(false, ApplicationDomain.currentDomain);
loader.contentLoaderInfo.addEventListener(Event.COMPLETE, onLibraryLoaded);
loader.load(new URLRequest(librarySwf), securityContext);
}
private function onLibraryLoaded( e:Event ):void
{
var settingControlClass:Class = getDefinitionByName(_className) as Class;
// check we actually get an object back!
if( settingControlClass )
{
// we might want to police the class to see if it implements the interface we need!
// not sure if this will produce results of Class or what it points at (hopefully latter)
var classDetails:XML = describeType( settingsControlClass );
// if the length of specificInterfaceDefinitions > 0 then this class implements our interface
var specificInterfaceDefinitions:XMLList =
classDetails..implementsInterface[type=="ISettingsInterface"];
if( 0 < specificInterfaceDefinitions.length )
dispatchEvent( new ClassReadyForUseEvent( settingControlClass ) );
else
dispatchEvent( new ClassWithBrokenInterface( settingControlClass ) );
}
else
dispatchEvent( new ClassNotFound( _className ) );
}
}
```

Appendix 4 - Fragment identification (informative)

Note: This appendix describes one possible implementation strategy for solving the problem of unique Fragment identification. Other solutions may also exist.

It is possible for more than one Metadata Originating Party to provide descriptive metadata for the same piece of content. In such cases, the respective Metadata Publishing Parties may submit Fragment update Transactions containing Fragments with the same CRID value. It is therefore unsafe to use the CRID as a primary database key in the Metadata Aggregation Service. A unique Fragment identifier is required.

The TV-Anytime Metadata Schema provides such an identifier: the `fragmentId` attribute optionally present on every Fragment of the Metadata Description. However, after consultation with interested parties it was concluded that maintaining explicit unique Fragment identification would be too onerous in practice for Metadata Publishing Parties. In the absence of an explicit unique Fragment identifier, a suitable "proxy" identifier is therefore required for use as a primary database key by the Metadata

Aggregation Service.

The following table shows how variables in incoming metadata are used by the Metadata Aggregation Service to form "proxy" unique Fragment identifiers, obviating the need for explicit `fragmentIds` provided by Metadata Publishing Parties. Record identifiers of TVAID type from the inbound metadata description are combined with publishers' certificate identifiers, providing transactional context from the security layer.

Logical Metadata Model Record	**TV-Anytime Fragment**	**Proxy fragment identifier**	**Source XPath**
	ServiceInformation	Service identifier + MOP identifier	~/ServiceInformationTable /ServiceInformation[@serviceId]
Credit	*OrganizationName*	Organization identifier + MOP identifier	~/CreditsInformationTable /OrganizationName[@organizationNameId]
	PersonName	Person Identifier + MOP identifier	~/CreditsInformationTable /PersonName[@personNameId]
Brand Group	*GroupInformation*	CRID + MOP identifier	~/GroupInformationTable/ GroupInformation[@groupId]
Series Group	*GroupInformation*	CRID + MOP identifier	~/GroupInformationTable/ GroupInformation[@groupId]
Episode Group	*GroupInformation*	CRID + MOP identifier	~/GroupInformationTable/ GroupInformation[@groupId]
Editorial Version	*ProgramInformation*	CRID + MOP identifier	~/ProgramInformationTable/ ProgramInformation[@programId]
Schedule	*Schedule*	Service identifier reference + Start date–time + End date–time + MOP identifier	~/ProgramLocationTable/Schedule /ScheduleEvent/Program[@crid], ~/ProgramLocationTable/Schedule/ ScheduleEvent/InstanceMetadataId
	BroadcastEvent	CRID + IMI + MOP identifier	~/ProgramLocationTable/ BroadcastEvent/Program[@crid], ~/ProgramLocationTable/ BroadcastEvent/InstanceMetadataId
On-demand Publication	*OnDemandProgram*	CRID + IMI + MOP identifier	~/ProgramLocationTable /OnDemandProgram/Program[@crid] , ~/ProgramLocationTable/ OnDemandProgram/InstanceMetadataId

~=TVAMain/ProgramDescription

MOP = Metadata Originating Party

Claims

EPG

1. A user interface for a content provision system, which comprises:

means for generating graphical representations of a plurality of media content items available to a user, said media content items being provided by a plurality of media content providers; and

means for enabling a user to access particular content items by selecting said graphical representations, wherein the content items are in the form of both scheduled content items and unscheduled content items.

2. A user interface according to Claim 1 wherein a scheduled content item is in at least one of following forms: a scheduled broadcast content item; a scheduled multicast content item; and scheduled streamed content item.

3. A user interface according to Claim 1 or 2, wherein the unscheduled content item is in the form of an on-demand content item, for example, an on-demand video or audio content item.

4. A user interface according to any of Claims 1 to 3, wherein the graphical representations are of a uniform type regardless of the nature of the content items.

5. A user interface according to any of Claims 1 to 4, wherein the graphical representations are of a uniform type regardless of the delivery mechanism by which the content item is provided and/or the content provider associated with the content item.

6. A user interface according to any of Claims 1 to 5, wherein the graphical representations relating to the content items provided by a particular content provider are displayed adjacent to one another.

7. A user interface according to Claim 6, wherein scheduled broadcast content items are displayed adjacent to one another in accordance with their broadcast schedule.

8. A user interface according to Claim 6, wherein unscheduled content items are displayed adjacent to one another in accordance with a virtual schedule.

9. A user interface according to Claim 6 or 7, wherein the graphical representations relating to the content items provided by a particular content provider are displayed adjacent to one another thereby to form a horizontal content provider bar, and wherein horizontal bars representing each content provider are arranged in a vertical stack.

10. A user interface according to Claim 9, wherein the axis of the horizontal bars represents the time at which a content item is broadcast, and/or made available in accordance with a virtual schedule.

11. A user interface according to Claim 9 or 10, further comprising means for generating a vertical time marker for display over the horizontal content provider bars thereby to indicate the present time, and means for scrolling the horizontal bars beneath the time marker thereby to indicate the passage of time.

12. A user interface according to any of Claims 1 to 11, wherein the user interface is in the form of an Electronic Program Guide (EPG).

13. A user interface according to any of Claims 1 to 12, further comprising means for

displaying content items that have previously been broadcast together with content items that have yet to be broadcast.

14. A user interface according to Claim 13, further comprising means for indicating whether a previously broadcast content item has been stored and/or recorded on a local storage means.

15. A user interface according to Claim 13 or 14, further comprising means for indicating whether a content item that has yet to be broadcast has been booked to be recorded.

16. A user interface according to Claim 14 or 15, wherein the indication as to whether a content item has been previously recorded and/or has been booked to be recorded is displayed on the EPG.

17. A user interface according to any of Claims 1 to 16, further comprising means for indicating a user's entitlement to a particular content item.

18. A user interface according to any of Claims 1 to 17, further comprising means for indicating the availability of a particular content item.

19. A user interface according to any of Claims 1 to 18, further comprising means for enabling a user to access a particular content item by selecting the graphical representation relating to the particular content item.

Discovery and playback

20. A system for providing media content to users, which comprises:

means for aggregating data relating to a plurality of media content items provided by a plurality of media content providers;

means for providing the aggregated data to a user; and

means for enabling a user to access particular content items by means of said aggregated data, wherein the content items are in the form of both scheduled content items and unscheduled content items.

21. A system according to Claim 20, wherein a scheduled content item is in at least one of following forms: a scheduled broadcast content item; a scheduled multicast content item; and scheduled streamed content item.

22. A system according to Claim 20 or 21, wherein the unscheduled content item is in the form of an on-demand content item, for example, an on-demand video or audio content item.

23. A system according to any of Claims 20 to 22, further comprising means for delivering content items to a user for consumption by the user.

24. A system according to Claim 23, wherein the delivery means is adapted to deliver the content items via more than one delivery mechanism.

25. A system according to Claim 23 or 24, wherein the delivery means includes one or more communication networks.

26. A system according to Claim 25, wherein the communication network is in the form of at least one of the following types of network: a digital terrestrial television (DTT) network; an analogue terrestrial television network; an Internet Protocol (IP) network; a cable network; and a digital satellite network.

27. A system according to any of Claims 23 to 26, wherein the delivery means is adapted to deliver at least a portion of the aggregated data to a user.

28. A system according to Claim 27, wherein the delivery means is adapted to deliver content items to a user via one delivery mechanism and aggregated data to a user via a different delivery mechanism.

29. A system according to any of Claims 20 to 28, wherein the media content providers include one or more of the following: linear broadcast analogue and/or digital terrestrial channels; Video on Demand (VOD) content providers; linear IP unicast and/or multicast channels; linear IP broadcast channels; and non-linear IP channels.

30. A system according to Claim 29, wherein each content provider is adapted to deliver content items to a user via an appropriate communication network infrastructure.

31. A system according to any of Claims 20 to 30, further comprising means for receving data relating to a plurality of media content items provided by a plurality of media content providers.

32. A system according to any of Claims 20 to 31, further comprising means for storing the aggregated data.

33. A system according to Claim 32, wherein the content items are not stored together with the aggregated data.

34. A system according to any of Claims 20 to 33, wherein the content items are stored on storage means each associated with a respective content provider.

35. A system according to any of Claims 20 to 34, wherein the data includes metadata relating to the content items.

36. A system according to any of Claims 20 to 35, wherein the data includes one or more of the following types of information relating to the content items: the location of the content item, for example, a Uniform Resource Identifier (URI) for the content item; access rights and/or user entitlement to the content item; geographical or location specific information relating to the content item; the content provider associated with the content item; the broadcast time and/or date of the content item; graphical information relating to the content items, for example, an icon or screen shot representative of the content item; the delivery method associated with the content item; and the format or type of content item.

37. A system according to any of Claims 20 to 36, further comprising means for determining at least one characteristic associated with a user; and means for adapting access to the media content items in dependence on the at least one determined characteristic.

38. A system according to Claim 37, wherein the characteristic is at least one of the following: the geographical location of the user; the user's subscriptions to particular types of content items and/or content providers; an Internet Service Provider (ISP) to which the user is connected; the availability of particular content items; and the user's entitlement to particular content items.

39. A system according to Claim 37 or 38, wherein the access means is adapted to

provide a user with access to particular content items by filtering the aggregated data provided to that user.

40. A system according to Claim 39, wherein the access means is adapted to provide a user with access to particular content items by providing the user with a particular subset of the aggregated data.

41. A system according to any of Claims 20 to 40, further comprising at least one remote client device associated with a user.

42. A system according to Claim 41, wherein the client device includes means for playing content items, thereby to enable a user to consume content items.

43. A system according to Claim 42, wherein the client device is in the form of a Set Top Box (STB).

44. A system according to any of Claims 41 to 43, wherein the client device is connectable to a display means.

45. A system according to any of Claims 41 to 44, wherein the client device comprises means for connecting the client device to one or more communication networks.

46. A system according to Claim 45, wherein the communication network is in the form of at least one of the following types of network: a digital terrestrial television (DTT) network; a analogue terrestrial television network; an Internet Protocol (IP) network; a cable network; and a digital satellite network.

47. A system according to any of Claims 41 to 46, wherein the client device further comprises means for providing information relating to the client device and/or the associated user to the system.

48. A system according to Claim 47, wherein the information includes at least one of the following: the geographical location of the client device; user subscription information; an Internet Service Provider (ISP) to which the client is connected; and user content entitlement information.

49. A system according to any of Claims 20 to 48, further comprising a media player for enabling users to consume content items.

50. A system according to Claim 49, wherein the media player is adapted to play media content items provided by a plurality of media content providers.

51. A system according to Claim 50, wherein the player is adapted to provide further information to a user in dependence on the content provider associated with a particular content item being played by the player, for example, relating to other content items provided by that content provider.

52. A system according to any of Claims 20 to 51, further comprising a plurality of further media players each associated with a respective content provider, and each adapted to play content items provided by that respective content provider.

53. A system according to Claim 52, wherein each of the further media players are adapted to provide a generic set of basic player operations.

54. A system according to any of Claims 20 to 53, further comprising means for providing the aggregated data to a user via a user interface, thereby to enable a user to access particular content items.

55. A system according to Claim 54, wherein the user interface is in the form of an Electronic Programme Guide (EPG).

56. A server for providing media content to users, which comprises:
means for aggregating data relating to a plurality of media content items provided by a plurality of media content providers;
means for providing the aggregated data to a user; and
means for enabling a user to access particular content items by means of said aggregated data, wherein the content items are in the form of both scheduled content items and unscheduled content items.

57. A method of providing media content to users, which comprises:
aggregating data relating to a plurality of media content items provided by a plurality of media content providers;
providing the aggregated data to a user; and
enabling a user to access particular content items by means of said aggregated data, wherein the content items are in the form of both scheduled content items and unscheduled content items.

58. A user interface according to any of Claims 1 to 19, for providing aggregated data to a user in a system according to any of Claims 20 to 55.

Software stack

59. A Set Top Box (STB) for a content provision system, which comprises:
a lower level software layer; and
an upper level software layer, wherein the lower level software layer interacts directly with the hardware of the STB and provides an interface to the upper level software layer, and wherein the upper level software layer interacts with the lower level software layer and provides a user facing interface for user applications.

60. A STB according to Claim 59, wherein an application programming interface is provided between the software layers.

61. A STB according to Claim 59 or 60, wherein each of the software layers is adapted to be updated independently by different parties.

62. A STB according to any of Claims 59 to 61, wherein the lower level software layer is adapted to be updated by the STB manufacturer.

63. A STB according to any of Claims 59 to 62, wherein the upper level software layer is adapted to be updated by a service (platform) provider .

64. A STB according to any of Claims 59 to 63, wherein the upper level software layer is adapted to execute user applications.

65. A STB according to Claim 64, wherein the upper level software layer is adapted to receive updated user applications.

66. A STB according to any of Claims 59 to 65, wherein the lower level software layer includes at least some of the following modules: a kernel; a boot-loader; a root file system;

and middleware.

67. A STB according to any of Claims 59 to 66, wherein the upper level software layer includes at least a user interface application.

ISP Discovery

68. A system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising:

means for determining a data communications network that a remote client device is connected to, the remote client device being adapted to provide one of the plurality of users with access to the media content; and

means for providing configuration settings for the remote client device in dependence on said determined network.

69. A system according to Claim 68, wherein said determining means utilises the IP address of the remote client.

70. A system according to Claim 68 or 69, further comprising storage means adapted to store a data communications network look-up table, the look-up table including data relating said IP address to the data communications network.

71. A system according to Claim 68, 69 or 70, said means for providing configuration settings comprising storage means, adapted to store a configuration settings look-up table, the look-up table including data relating said data communications network to the configuration settings.

72. A system according to any of claims 68 to 71, wherein said configuration settings are specific to one of: all remote client devices, a plurality of remote client devices or a specific remote client device.

73. A system according to any of claims 68 to 71, wherein said configuration settings include at least one of: a remote client device user interface; a remote client device media content player; user identifiers; media content identifiers; and media content locations.

74. A system according to Claim 73, wherein at least one of the user interface, media content and media player is specific to the determined data communications network.

75. A system according to any of claims 68 to 74, wherein said configuration settings are provided to the remote client by directing the remote client, utilising a Uniform Resource Indicator, to a storage means.

76. A system according to Claim 75, wherein the Uniform Resource Indicator, comprises a plurality of components, including at least one address component and at least one remote client device identification component.

77. A system according to Claim 75 or 76, wherein the Uniform Resource Indicator, comprises at least one of: a base Uniform Resource Indicator; a remote client device manufacturer identifier; a remote client device identifier; a firmware identifier; a software identifier; and a configuration settings identifier.

78. A system according to Claim 75, 76 or 77, wherein said configuration settings are provided in XML format.

79. A system according to any of claims 68 to 78, further comprising means for receiving data from the remote client device indicating the current configuration settings.

80. A system according to Claim 79, wherein said current configuration settings data indicates whether updated configuration settings are required.

81. A system according to any of claims 68 to 80, further comprising means for determining whether updated configuration settings are required.

82. A system according to Claim 81, wherein said update determining means operates at predetermined intervals.

83. A system according to Claim 82, wherein said intervals are regular.

84. A system according to any of claims 68 to 83, further comprising means for determining the location of a remote client device, the configuration settings being dependent on said determined location.

85. A system according to any of claims 68 to 84, said data communications network being an Internet Service Provider.

86. A system according to any of claims 68 to 85, further comprising means for providing the remote client device with media content in dependence on the determined data communications network.

87. A system according to any of claims 68 to 86, further comprising a remote client device, the remote client device adapted to receive and apply said configuration settings.

88. A system according to Claim 87, said remote client device adapted to only accept configuration settings from an authorised data communications network.

89. A system according to any of claims 68 to 88, further comprising:

means for determining the location of a remote client device, the remote client device being adapted to provide one of the plurality of users with access to the media content; and

means for determining a set of media content accessible by the remote client in dependence on the determined location.

Geo-location

90. A system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising:

means for determining the location of a remote client device, the remote client device being adapted to provide one of the plurality of users with access to the media content; and

means for determining a set of media content accessible by the remote client in dependence on the determined location.

91. A system according to Claim 89 or 90, wherein the location determining means utilises the digital terrestrial television signal.

92. A system according to Claim 91, wherein the location determining means utilises the relative signal strength of the digital terrestrial signal.

93. A system according to Claim 91 or 92, wherein the location determining means utilises triangulation of the digital terrestrial signals.

94. A system according to any of Claims 89 to 93, wherein the location determining means utilises the IP address of the remote client.

95. A system according to any of Claims 89 to 94, further comprising storage means, adapted to store a location look-up table, the look-up table including data relating said determined location and a set of media content.

96. A system according to any of Claims 89 to 95, further comprising means for providing the remote client with data in relation to said set of media content.

97. A system according to Claim 96, wherein said data includes the source location of the media content.

98. A system according to any of Claims 89 to 97, further comprising

means for receiving a plurality of media content metadata relating to media content from a plurality of media content providers;

means for determining at least one media content access right of a user to media content in dependence on the media content metadata and on user information;

means for generating media content availability data in dependence on the determined at least one user access right.

CREDS

99. A system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising:

means for receiving a plurality of media content metadata relating to media content from a plurality of media content providers;

means for determining at least one media content access right of a user to media content in dependence on the media content metadata and on user information;

means for generating media content availability data in dependence on the determined at least one user access right.

100. A system according to Claim 98 or 99, wherein the user information comprises media content purchase information, and the means for determining is adapted to determine a media content access right in dependence on the media content purchase information.

101. A system according to Claim 100, wherein the media content purchase information comprises information regarding purchase of a single item of media content.

102. A system according to Claim 101, wherein the media content purchase information comprises information regarding purchase of a subscription to media content.

103. A system according to any of Claims 100 to 102, wherein the means for generating media content availability data is adapted to generate media access options data in dependence on the media content metadata, on the user information and on the user media content purchase information.

104. A system according to Claim 103, wherein the media access options data comprises an option for the purchase of media content.

105. A system according to Claim 103 or 104, wherein the media access options data comprises an option for the advertisement-sponsored consumption of media content.

106. A system according to Claim 103, 104 or 105, wherein the media access options data is dependent on the identity of the user.

107. A system according to any of Claims 98 to 106, further comprising means for receiving user information from a remote client device.

108. A system according to any of Claims 98 to 107, further comprising means for transmitting media content availability data to a client device.

109. A system according to any of Claims 98 to 108, further comprising:
means for determining at least one characteristic of a user; and
means for adapting access to the plurality of media content in dependence on the at least one determined characteristic.

Chameleon System

110. A system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising:
means for determining at least one characteristic of a user; and
means for adapting access to the plurality of media content in dependence on the at least one determined characteristic.

111. A system according to Claim 109 or 110, wherein said at least one user characteristic includes at least one of: the location of the user; the group in which the user is categorised; the user's media content subscriptions; the user's Internet Service Provider; the user's preferences; and the availability of the media content.

112. A system according to Claim 111, wherein said group in which the user is categorised is determined by a characteristic of the user.

113. A system according to Claim 112, said characteristic being at least one of: the user's location; the user's media content subscription; the user's Internet Service Provider; the user's preferences.

114. A system according to any of Claims 109 to 113, wherein said access is adapted by at least one of: selectively providing access to media content from the plurality of media content; configuring a remote client device associated with the user; selectively providing access to media content in dependence on available bandwidth.

115. A system according to any of Claims 109 to 114, further comprising a remote client device, adapted to provide the user access to the plurality of media content, the remote client device having a configurable media content access interface.

116. A system according to Claim 115, wherein said interface is configurable in dependence on the determined user characteristic.

117. A system according to any of Claims 109 to 116, further comprising:
means for determining a media content item selected by one of the plurality of users;
means for determining at least one delivery pathway for said media content in dependence on at least one characteristic of a plurality of available delivery pathways.

Assured delivery

118. A system for providing a plurality of users with access to a plurality of media content from a plurality of media content sources, comprising:

means for determining a media content item selected by one of the plurality of users;

means for determining at least one delivery pathway for said media content in dependence on at least one characteristic of a plurality of available delivery pathways.

119. A system according to Claim 117 or 118, further comprising means for initiating delivery of said media content, from said content provider to said user, via said determined delivery pathway.

120. A system according to Claim 117, 118 or 119, wherein each of the plurality of said delivery pathways originates at a respective content delivery network.

121. A system according to Claim 120, each said content delivery network having the selected media content item.

122. A system according to any of Claims 117 to 121, said at least one characteristic being at least one of: the bandwidth of the delivery method; the bitrate of the media content available; and previous usage statistics.

123. A system according to any of Claims 117 to 122, wherein said determining means is adapted to determine the or each pathway capable of delivering said media content with a bitrate greater than or equal to a minimum bitrate.

124. A system according to Claim 123, wherein said minimum bitrate is dependent on the type of media content.

125. A system according to Claim 124, the type of media content including at least one of: standard-definition; and high-definition.

126. A system according to any of Claims 117 to 125, further comprising means for providing metadata to a remote client, the metadata comprising information relating to the at least one determined delivery pathway.

127. A system according to any of Claims 117 to 126, further comprising a remote client device, adapted to provide a user with access to the media content in dependence on said at least one determined delivery pathway.

128. A system according to Claim 127, said remote client being further adapted to monitor the bitrate provided by a determined delivery pathway, the remote client comprising storage, adapted to store said monitored bitrate.

129. A system according to Claim 128, said monitored bitrate being utilised to determine the at least one delivery pathway.

130. A system according to any of Claims 127, 128 or 129, further comprising a server, the server being adapted to provide the remote client with metadata relating to the delivery pathway to utilise.

131. A remote client device adapted to communicate with a system according to any of claims 20 to 55 or 68 to 130.

132. A server adapted to communicate with a system according to any of claims 20 to 55 or 68 to 130.

133. A system substantially as herein described and/or as illustrated with reference to the accompanying drawings.

134. A server substantially as herein described and/or as illustrated with reference to the accompanying drawings.

135. A method substantially as herein described and/or as illustrated with reference to the accompanying drawings.

136. A user interface substantially as herein described and/or as illustrated with reference to the accompanying drawings.

137. A STB substantially as herein described and/or as illustrated with reference to the accompanying drawings.

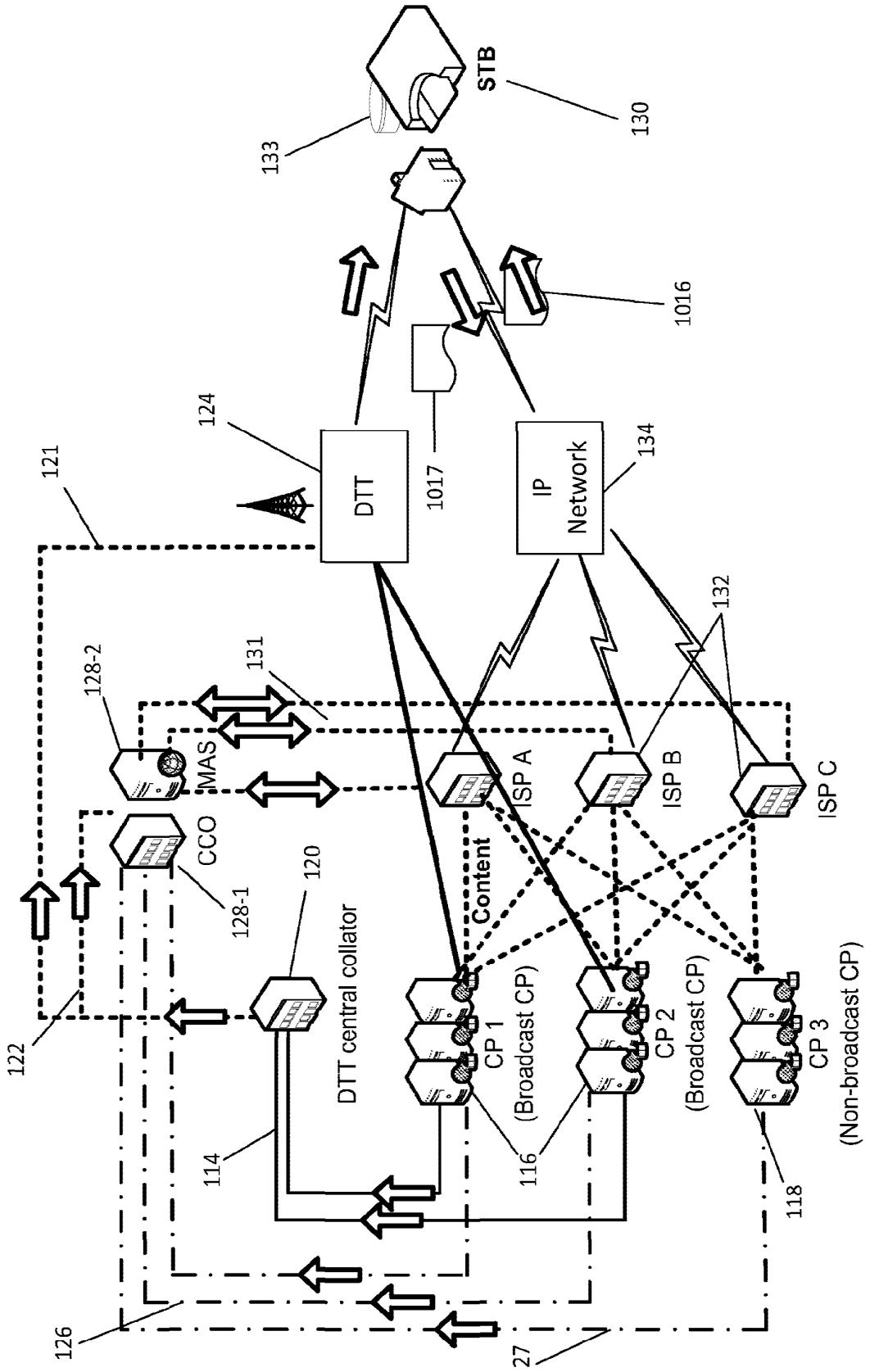


Figure 1

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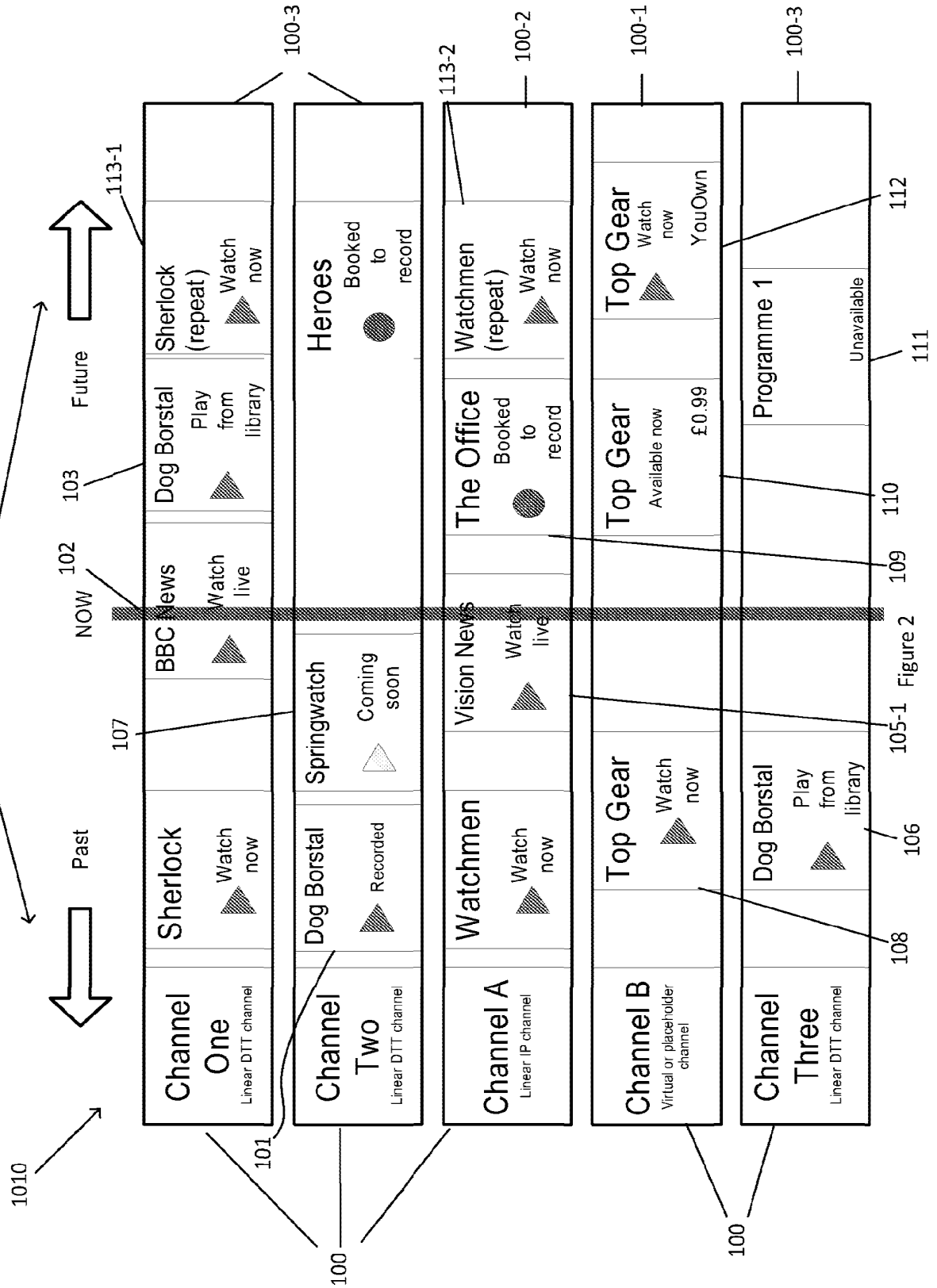


Figure 2

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VIZIO v. MMT, IPR2024-00722

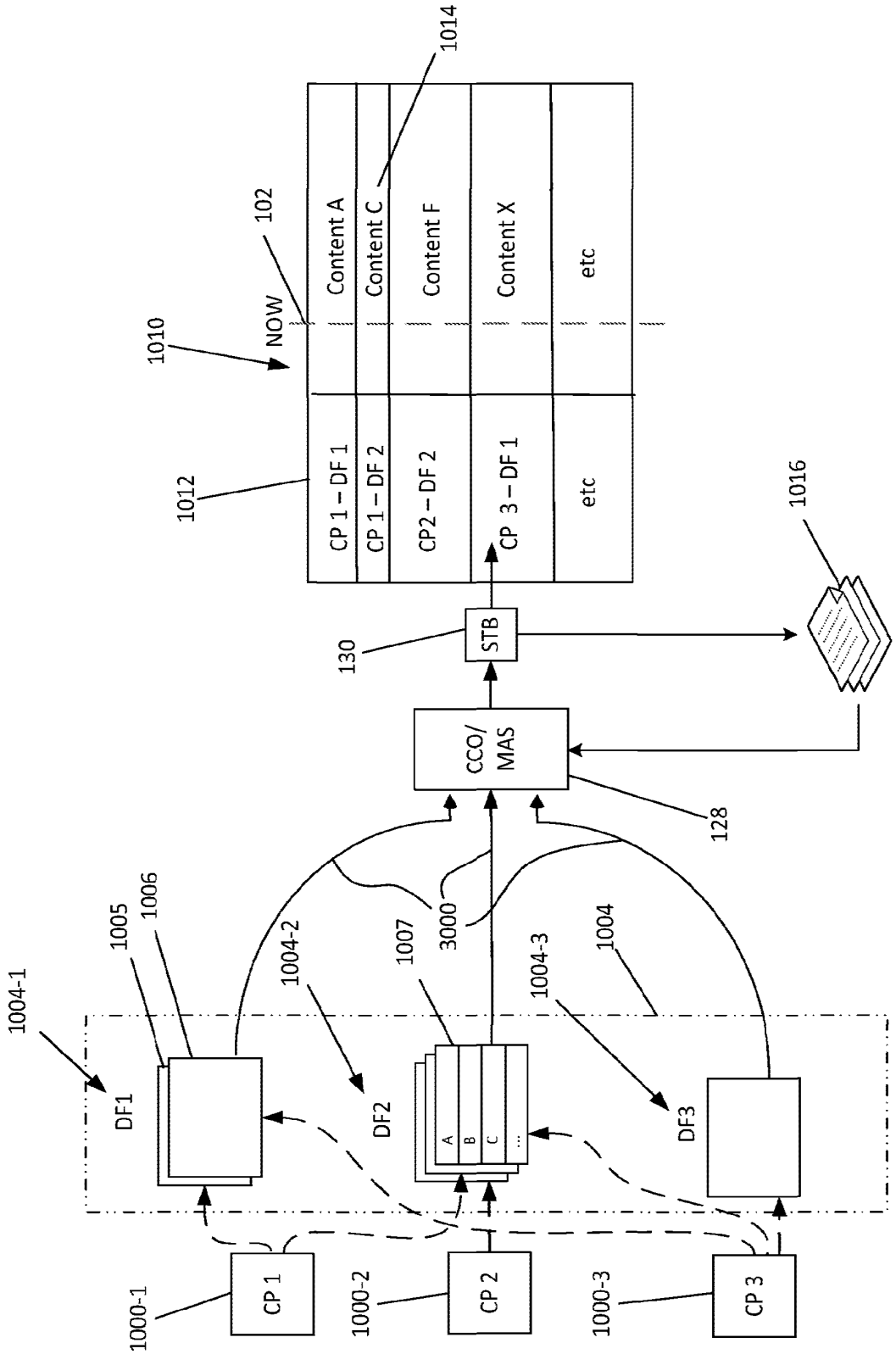


Figure 3

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VIZIO v. MMT, IPR2024-00722

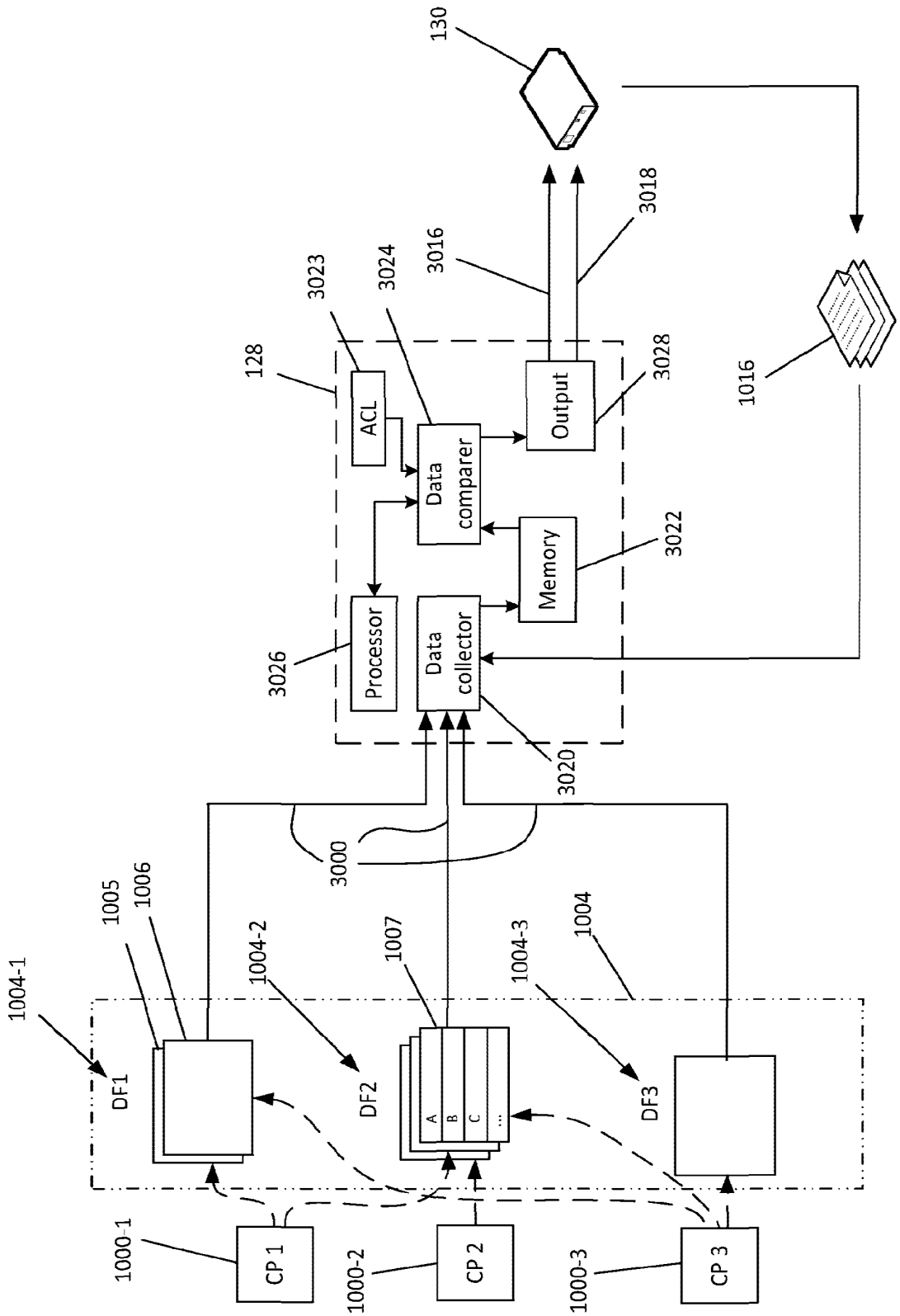


Figure 4

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VIZIO v. MMT, IPR2024-00722

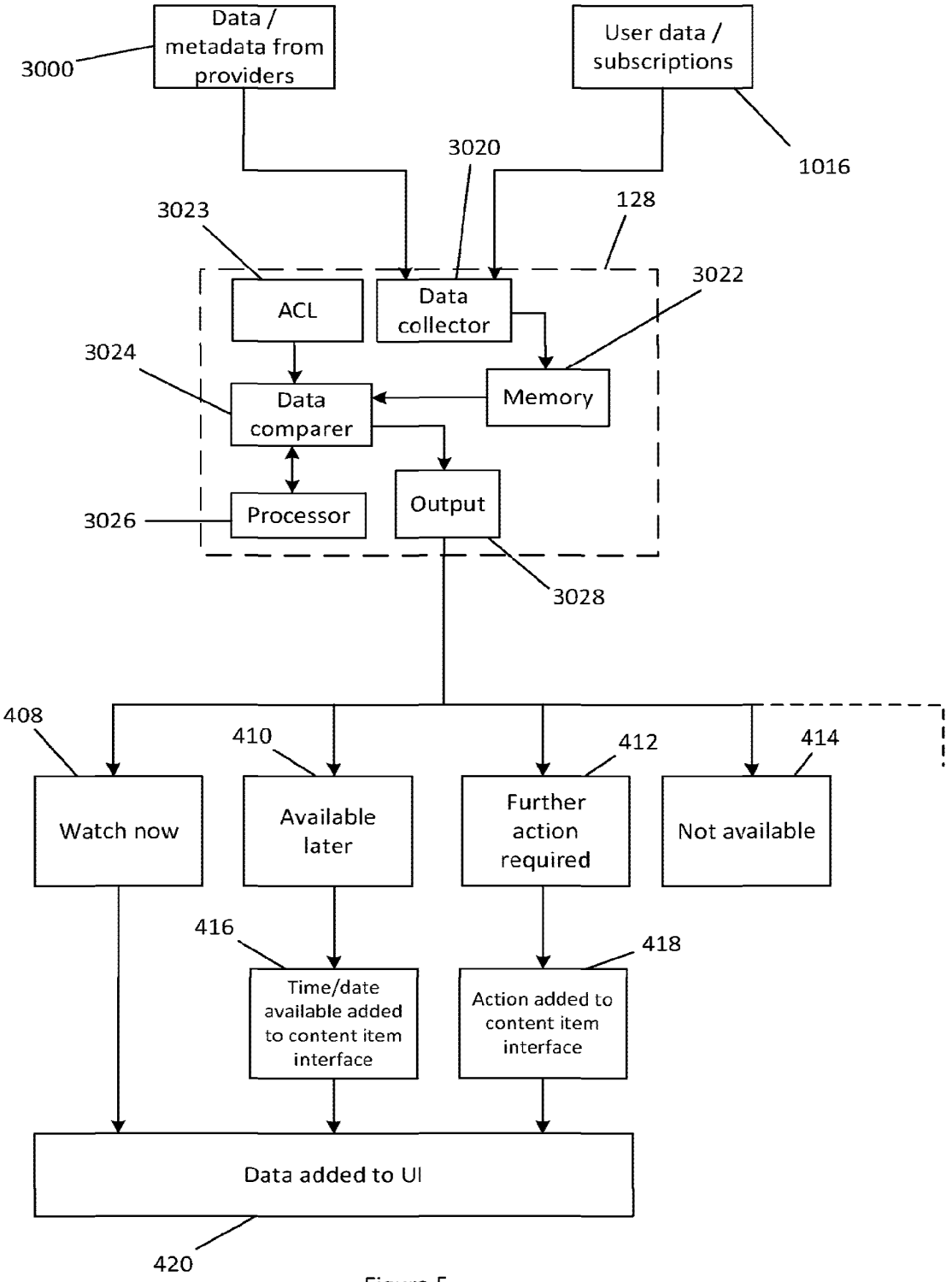


Figure 5

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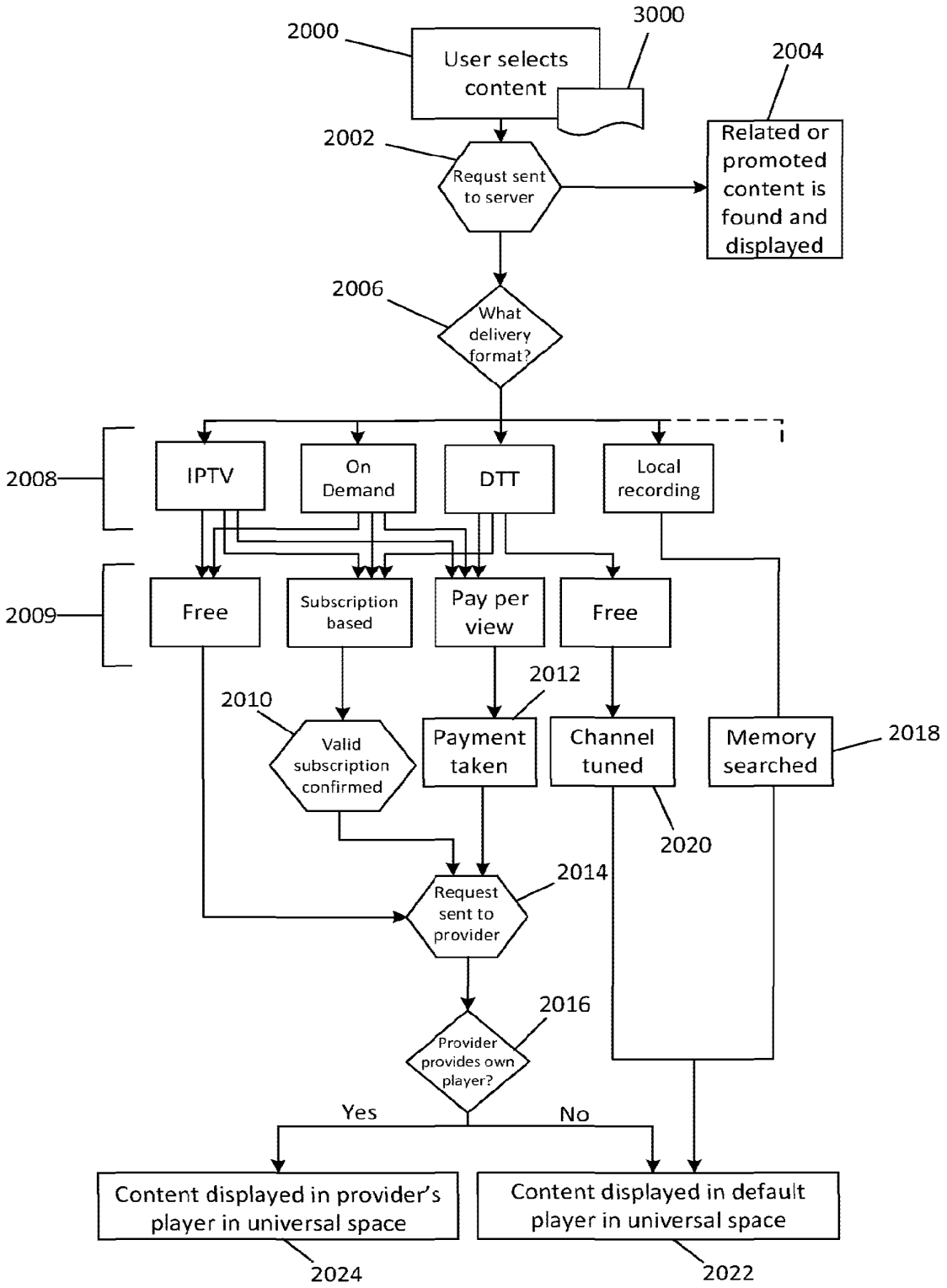


Figure 6

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VIZIO v. MMT, IPR2024-00722

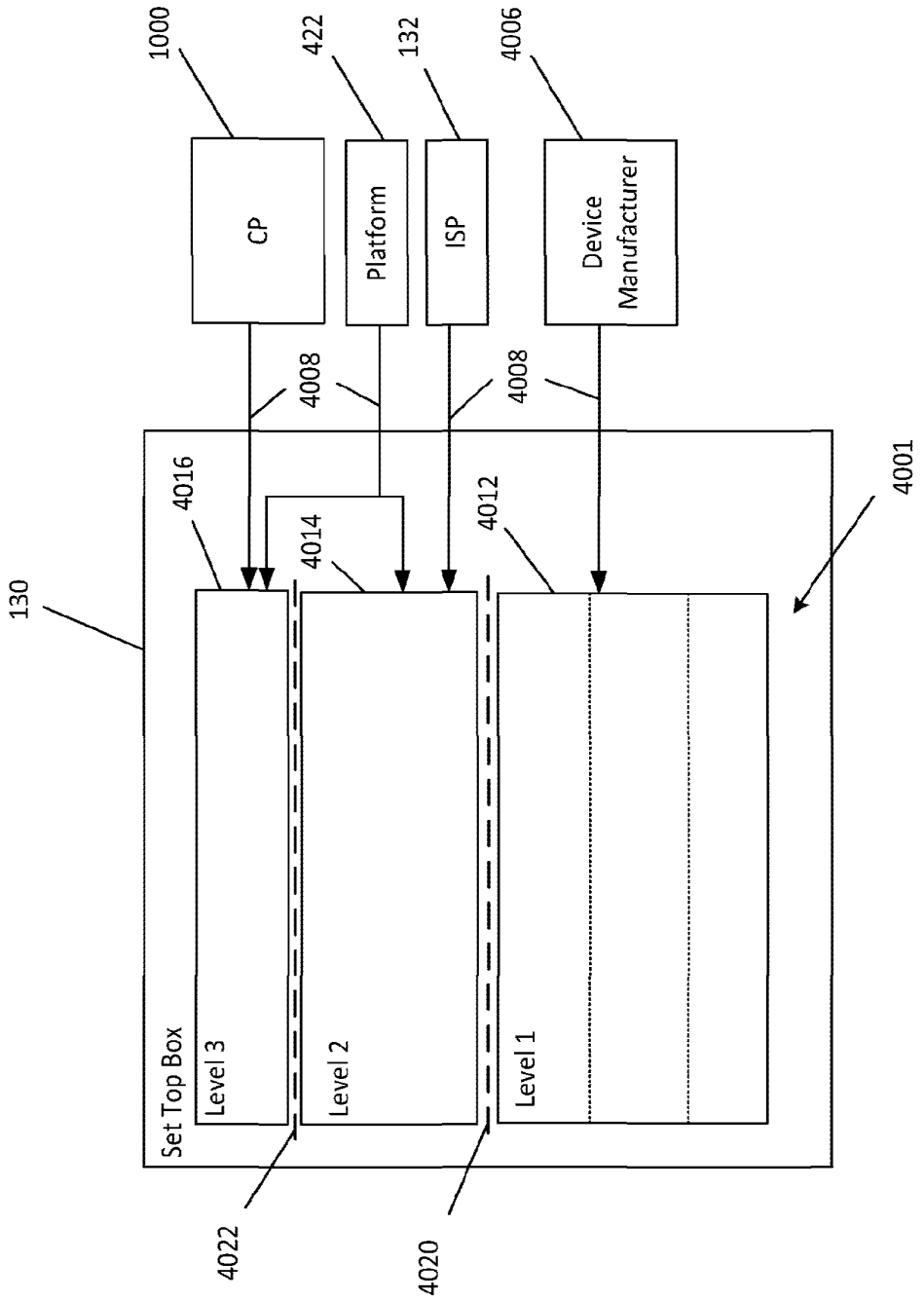


Figure 7

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VIZIO v. MMT, IPR2024-00722

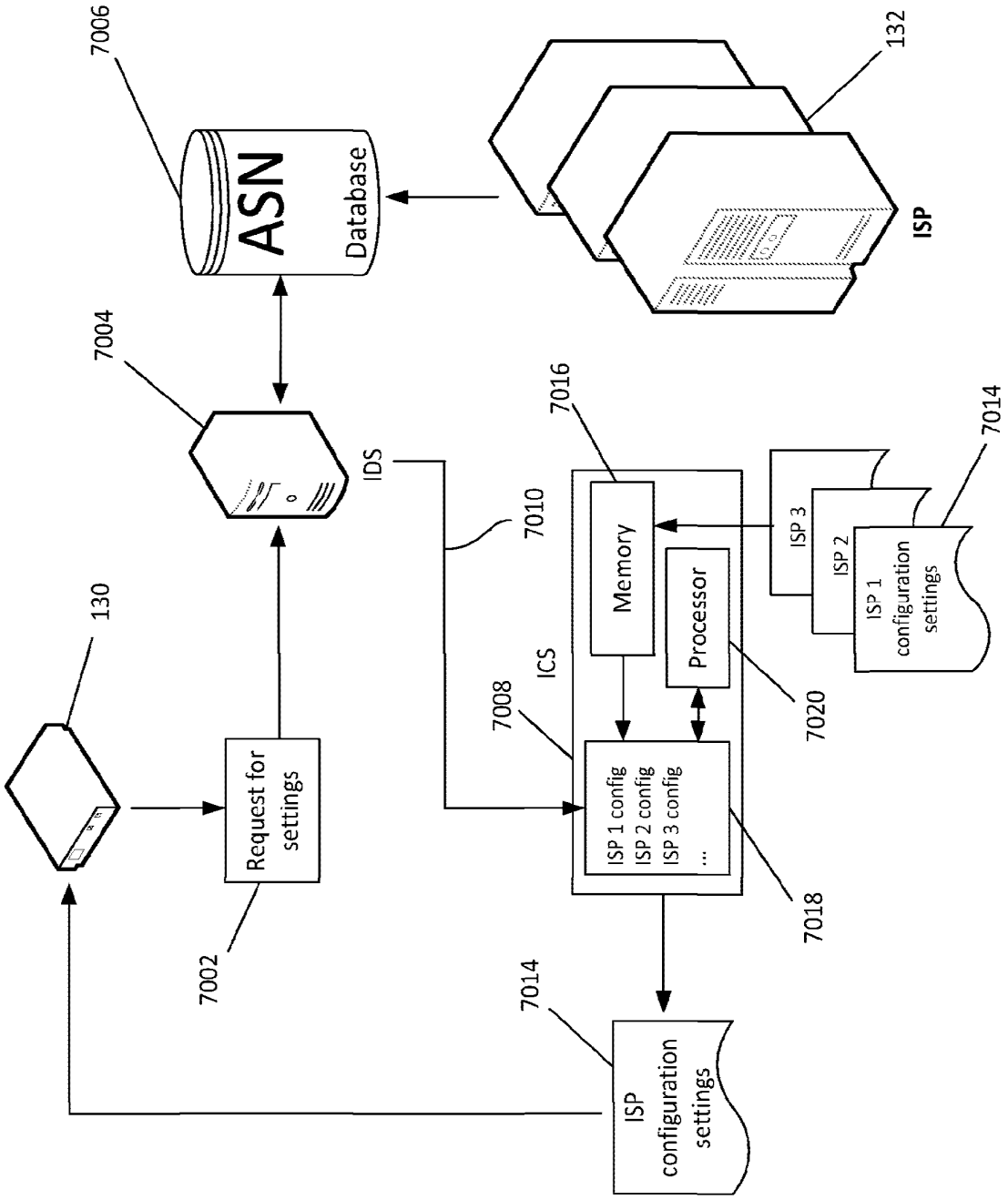


Figure 8

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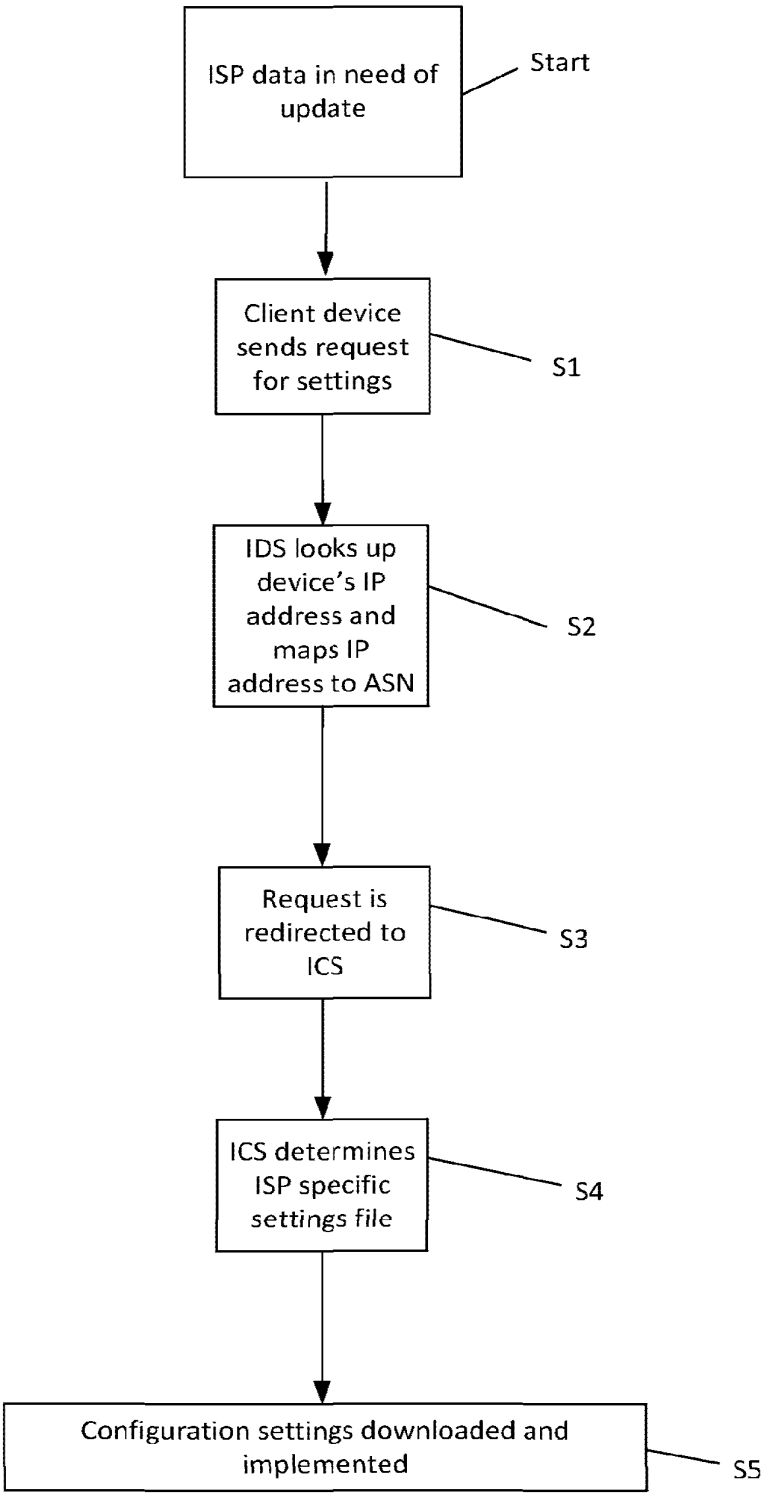


Figure 9

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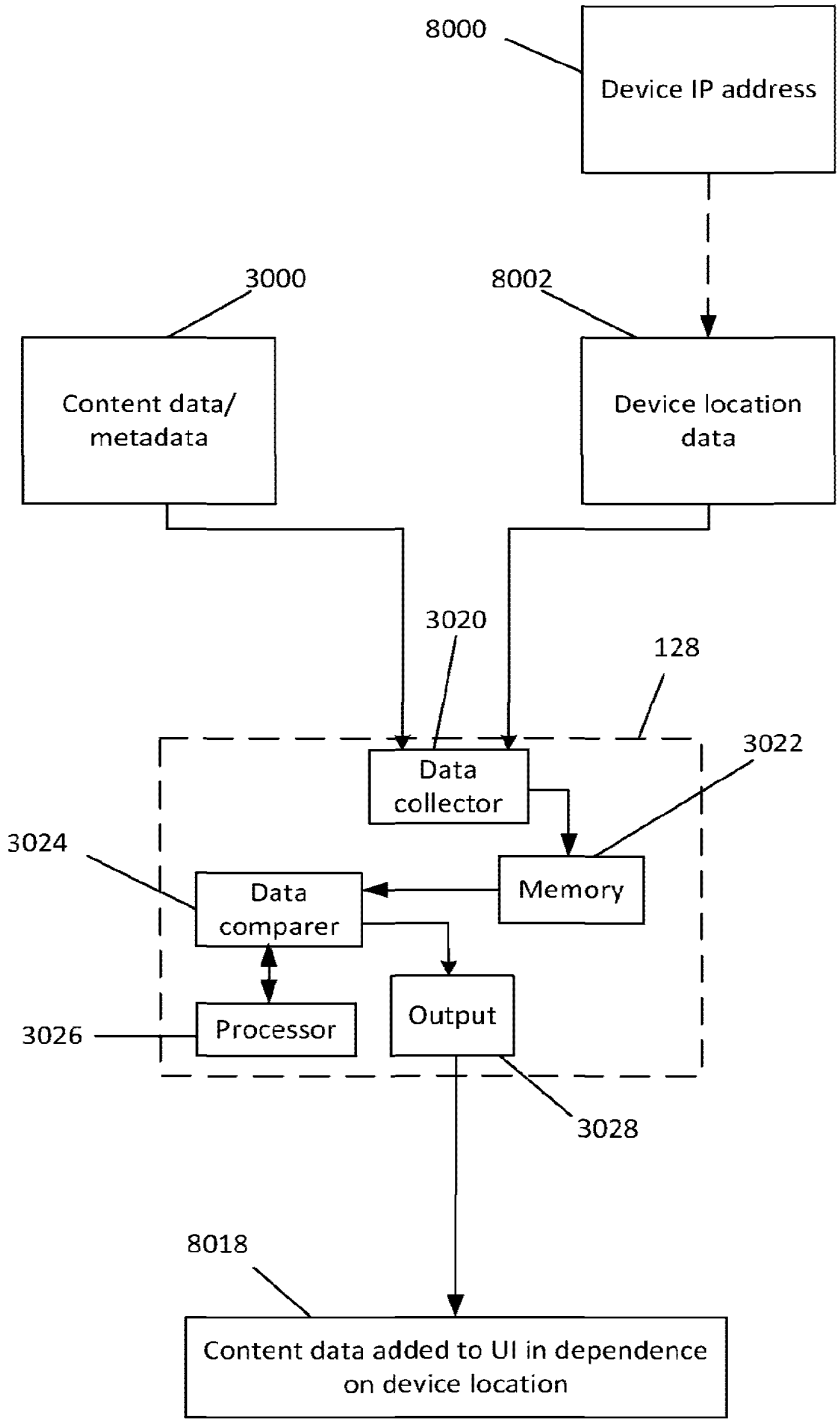


Figure 10

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VIZIO v. MMT, IPR2024-00722

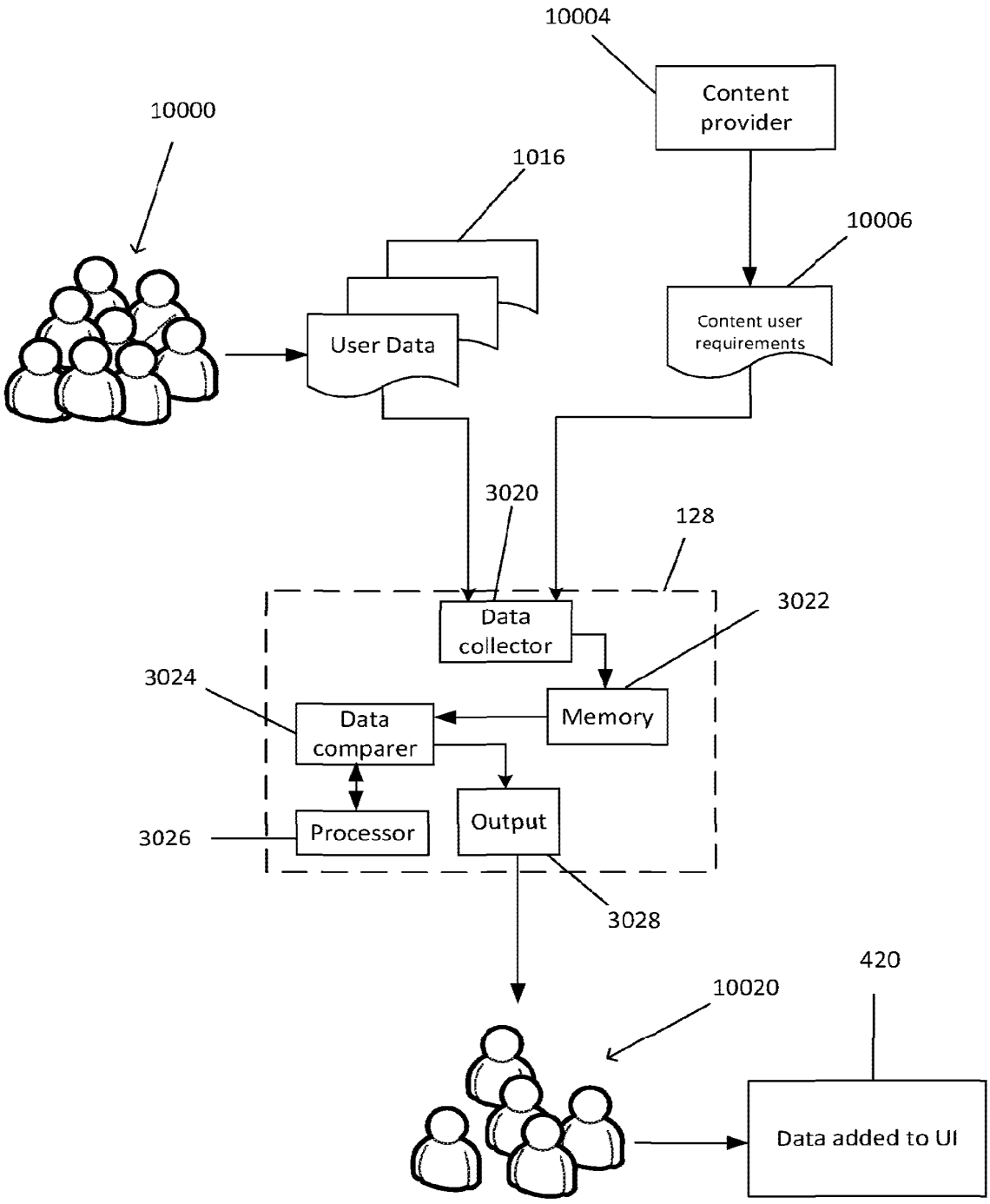


Figure 11

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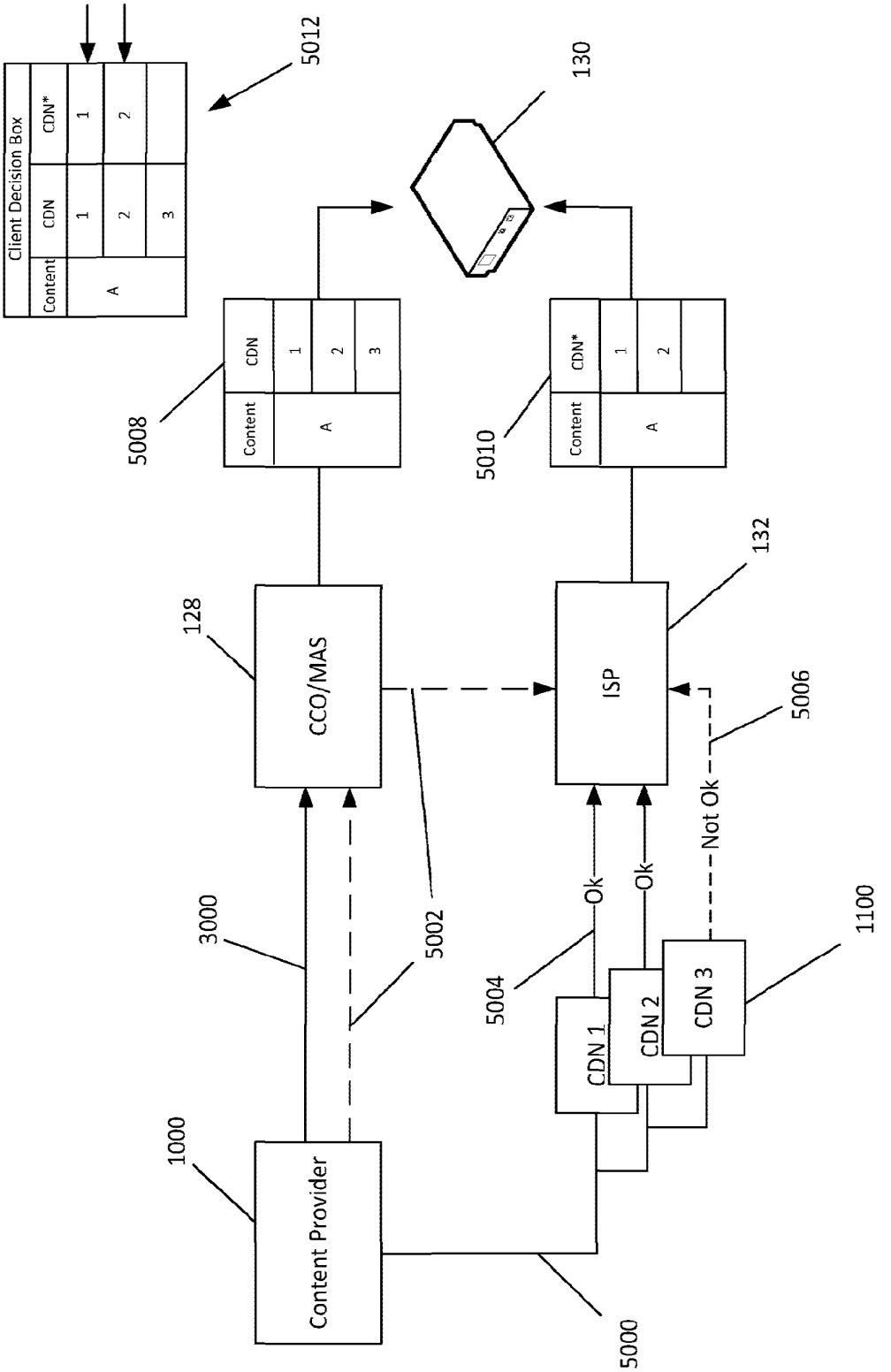


Figure 12

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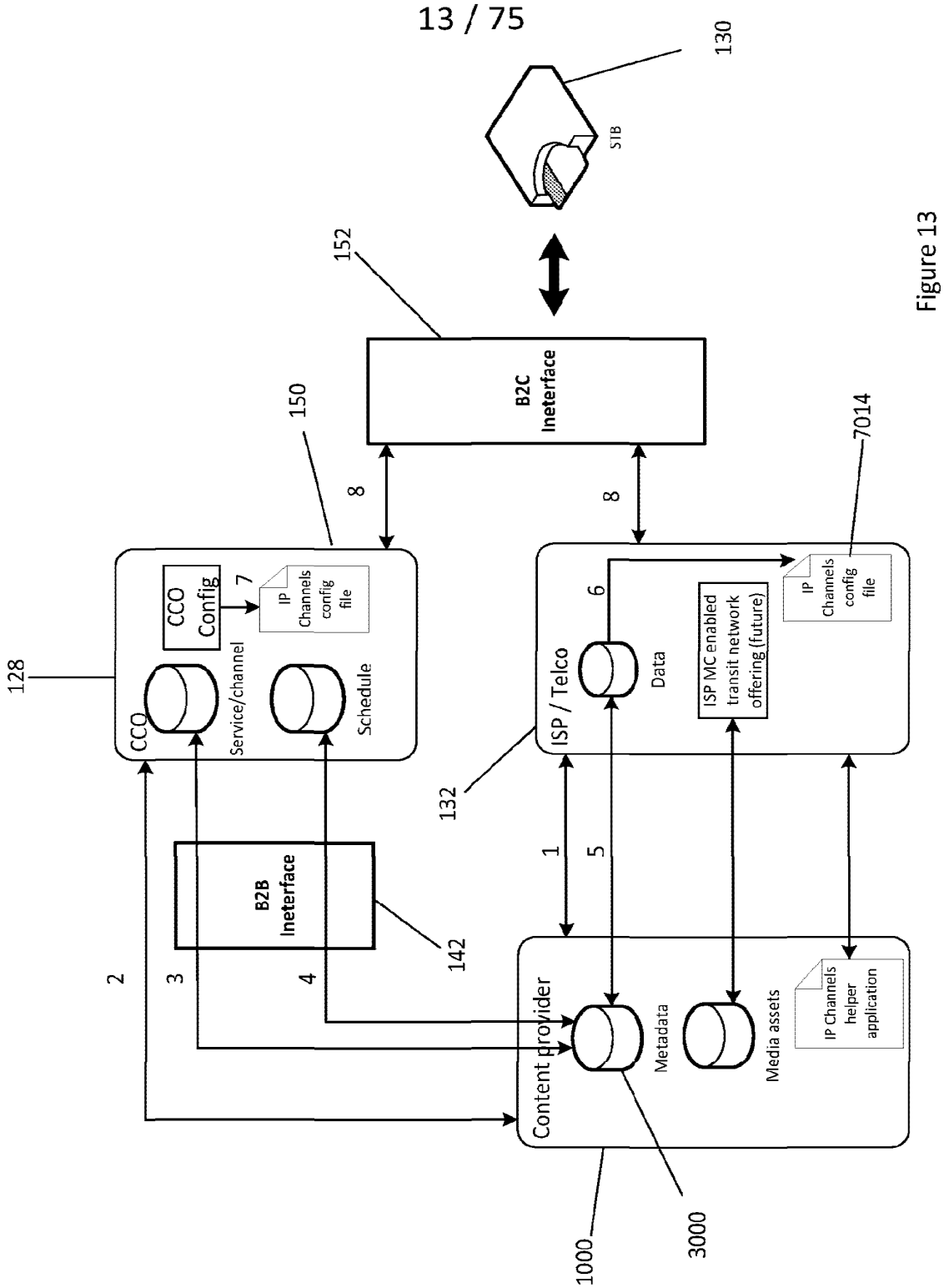


Figure 13

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VIZIO v. MMT, IPR2024-00722

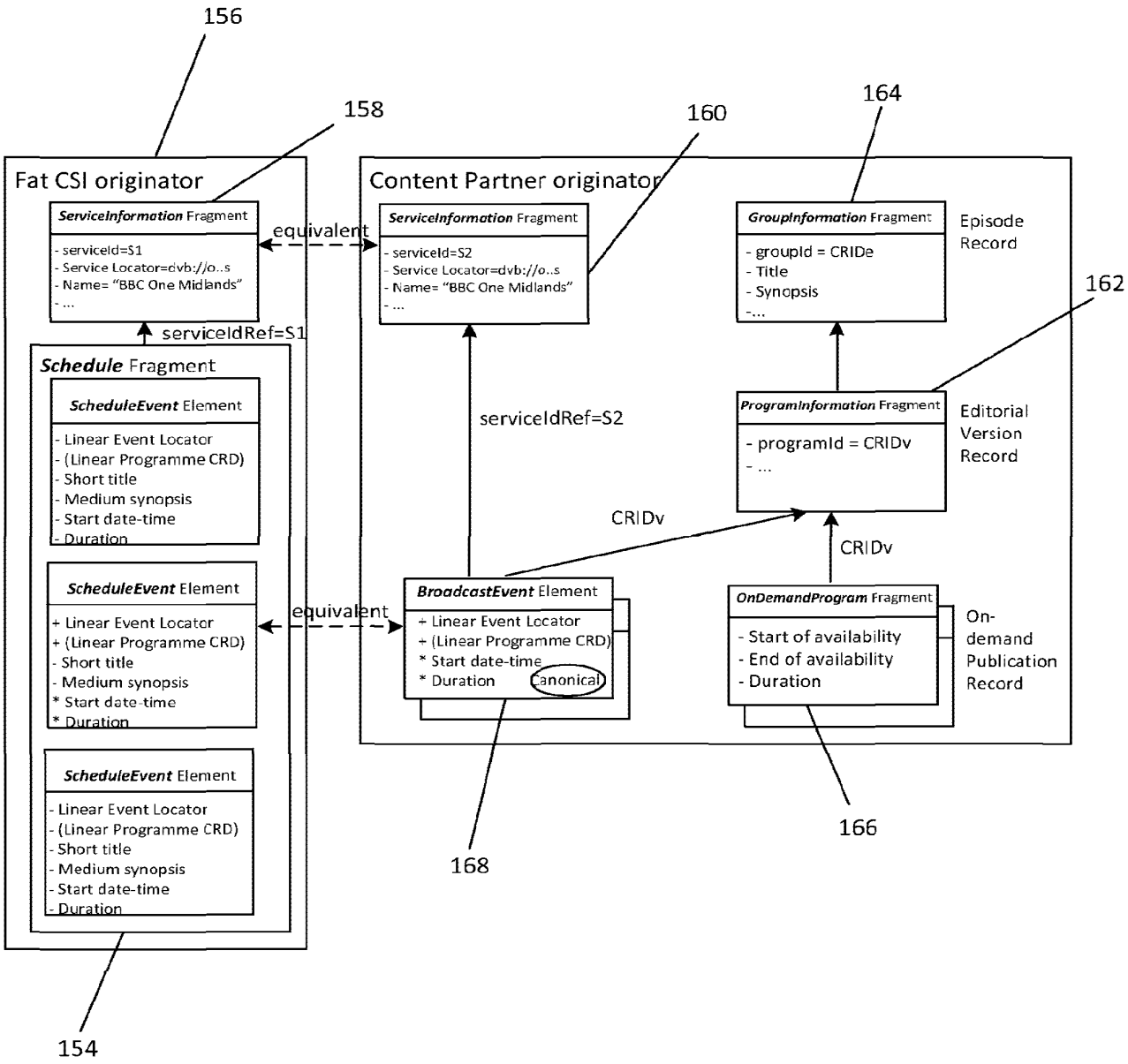


Figure 14

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VIZIO v. MMT, IPR2024-00722

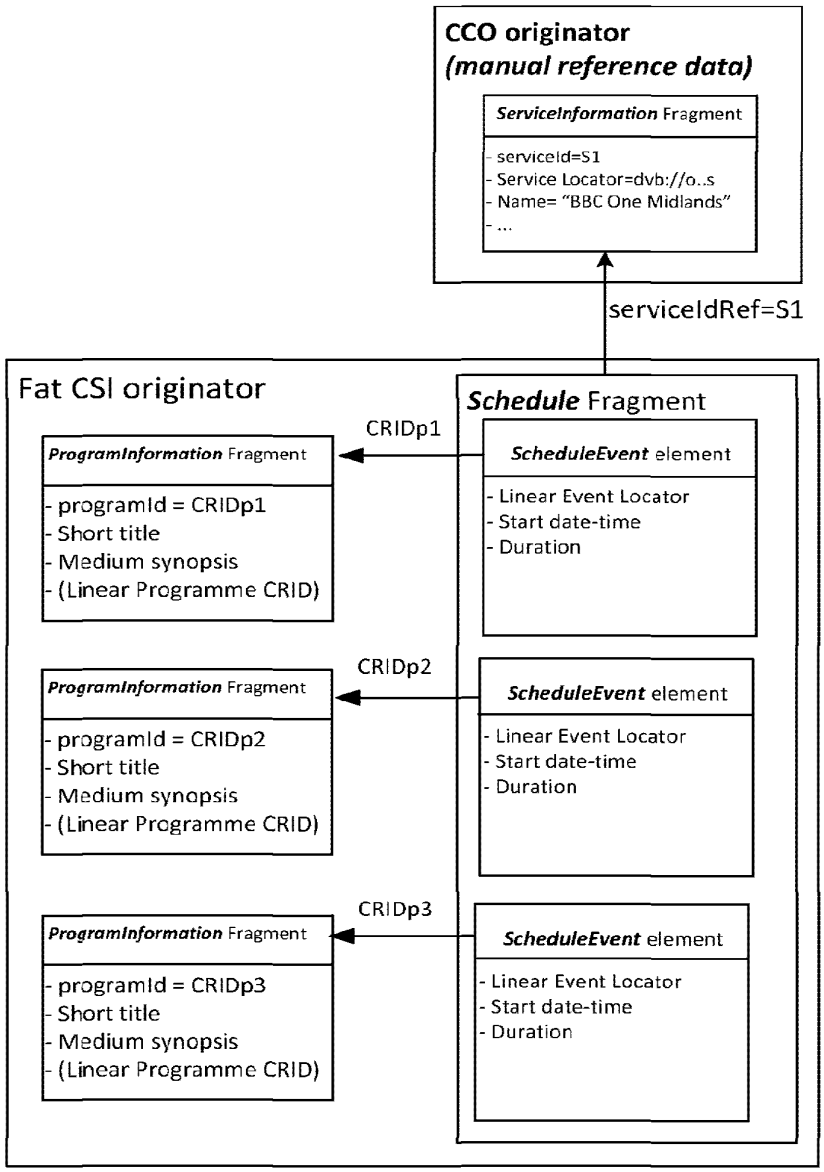


Figure 15

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VIZIO v. MMT, IPR2024-00722

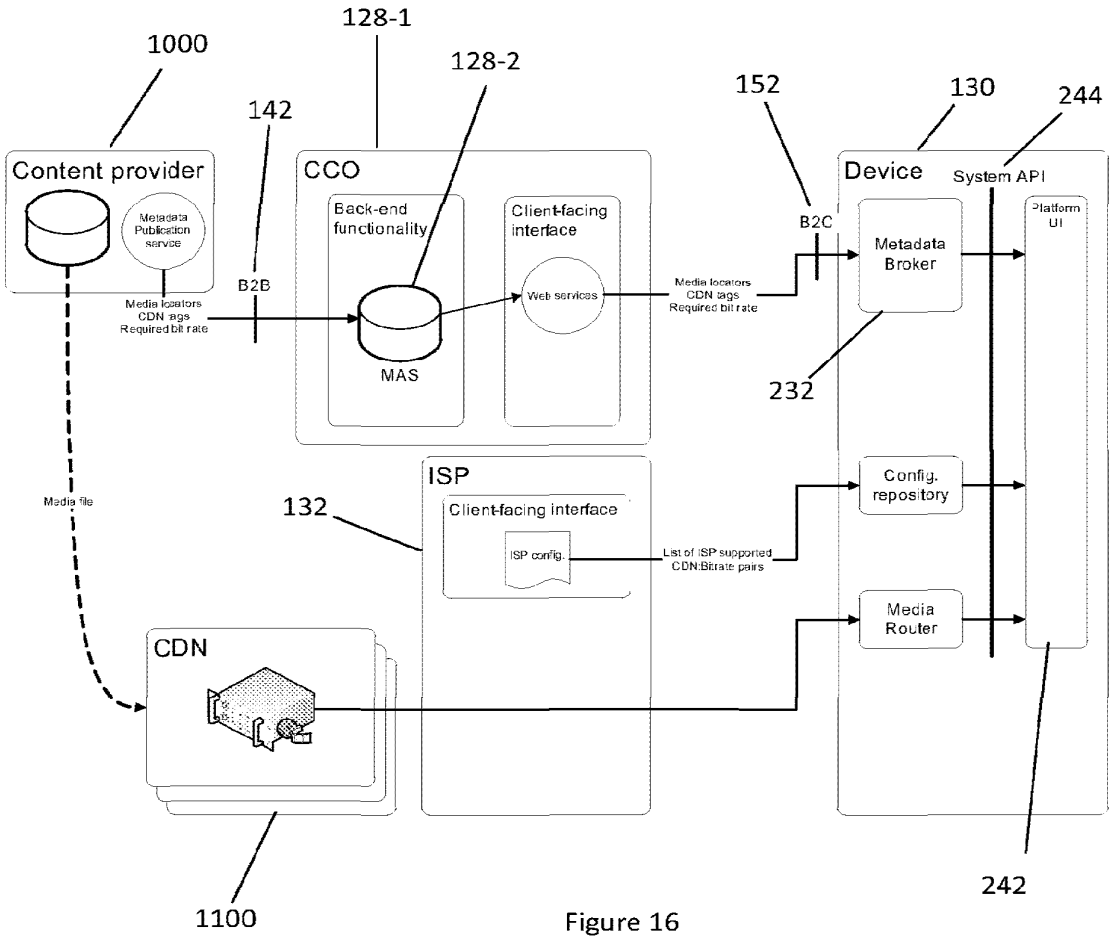


Figure 16

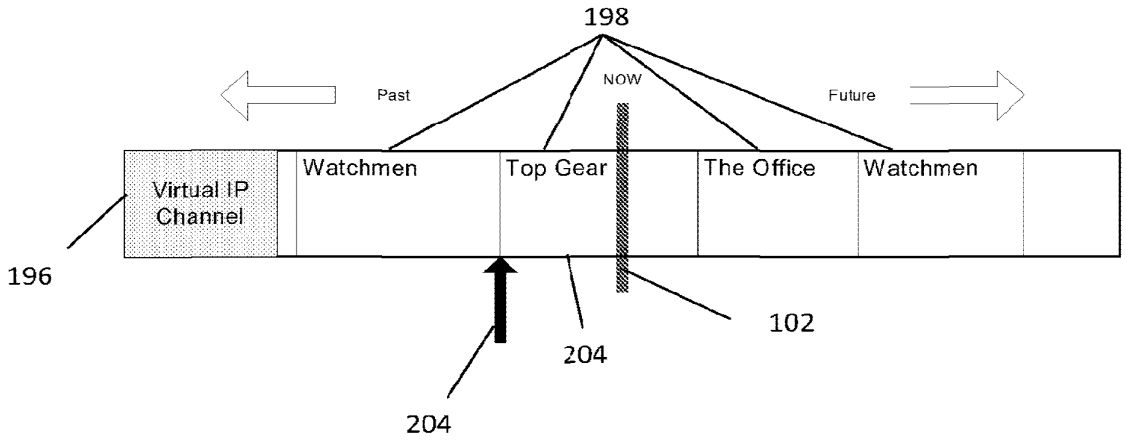


Figure 17

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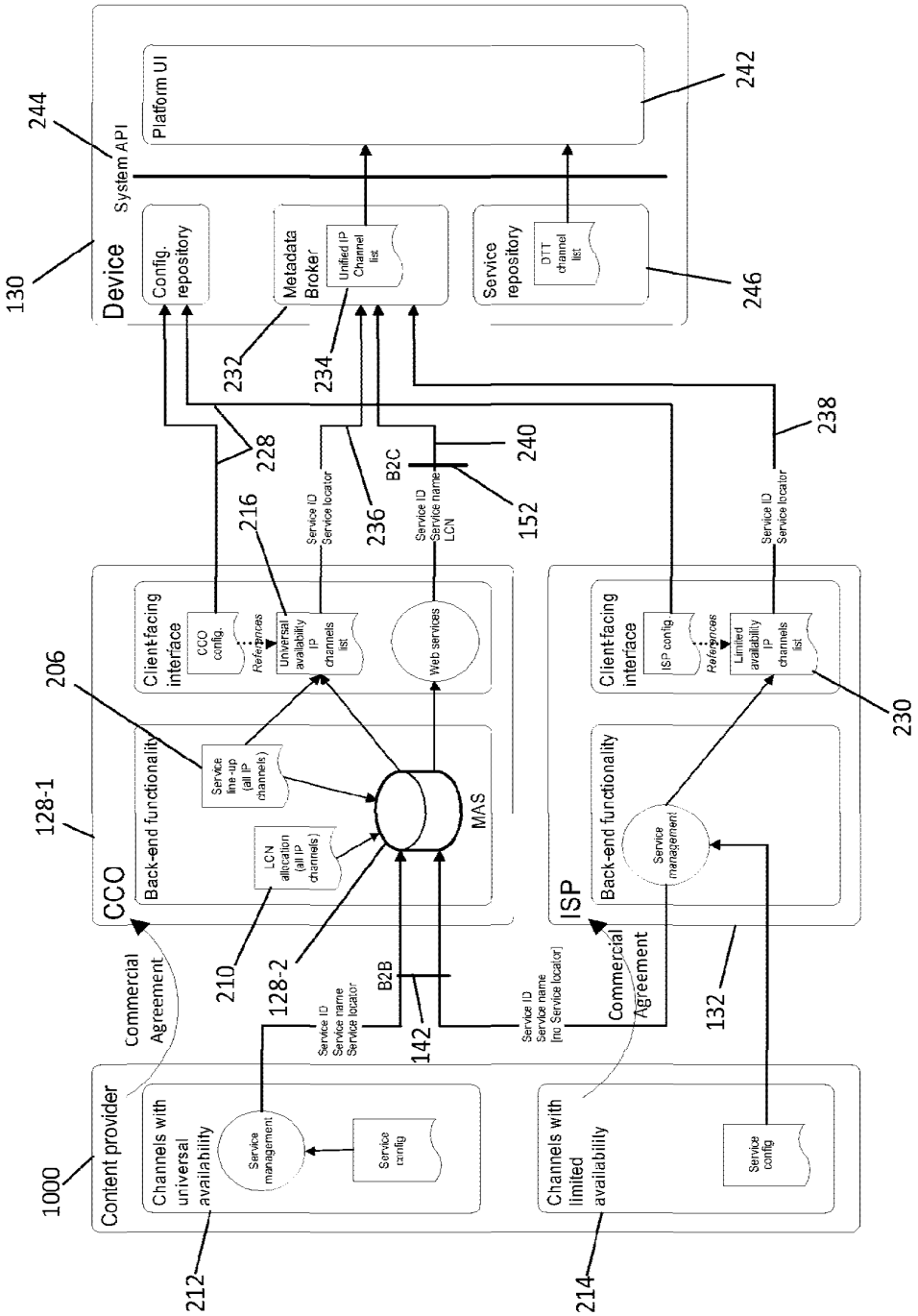


Figure 18

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VIZIO v. MMT, IPR2024-00722

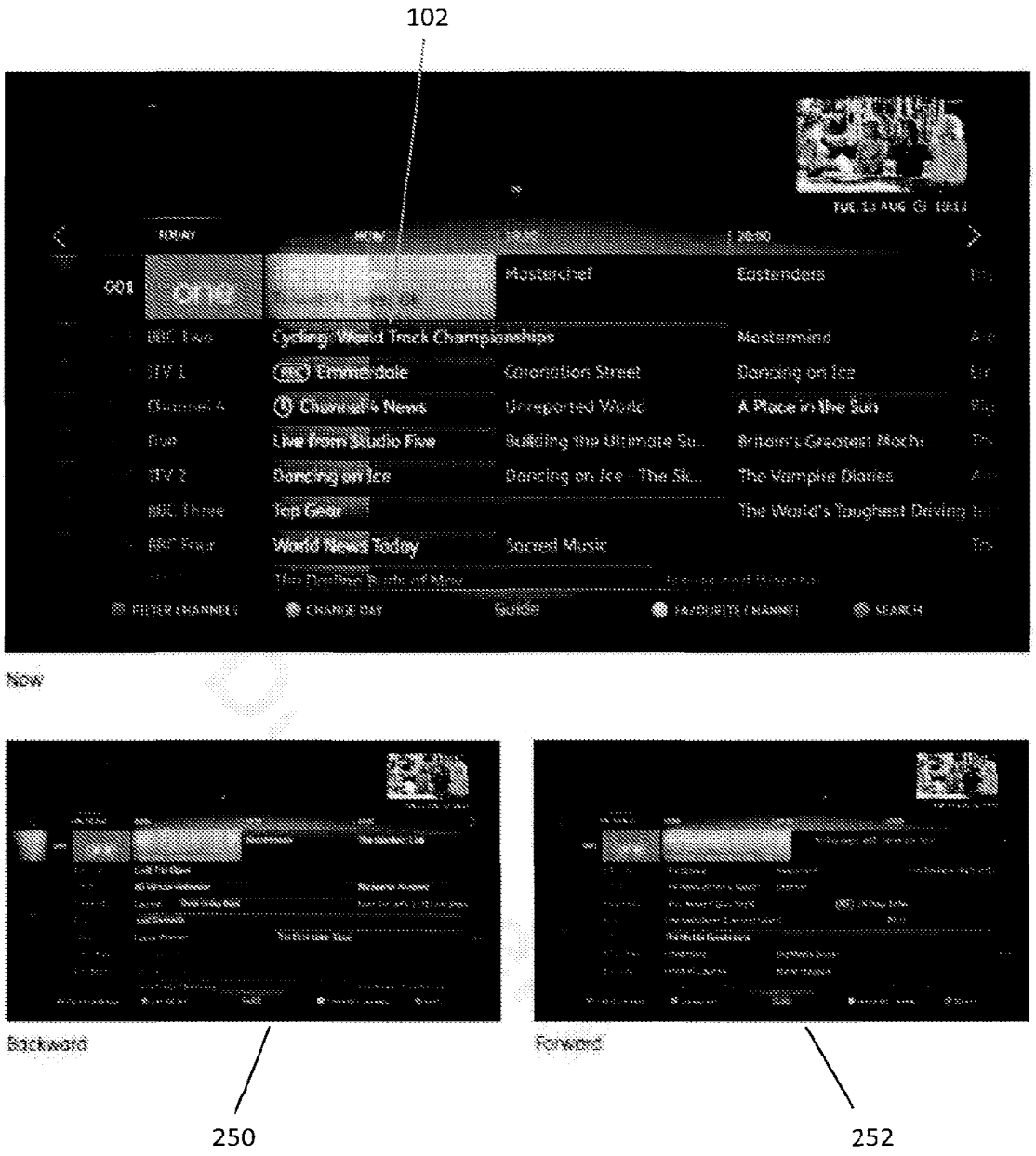


Figure 19

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VIZIO v. MMT, IPR2024-00722



Figure 20

VIZIO Ex. 1002, Page 1658 of 3573
VIZIO v. MMT, IPR2024-00722

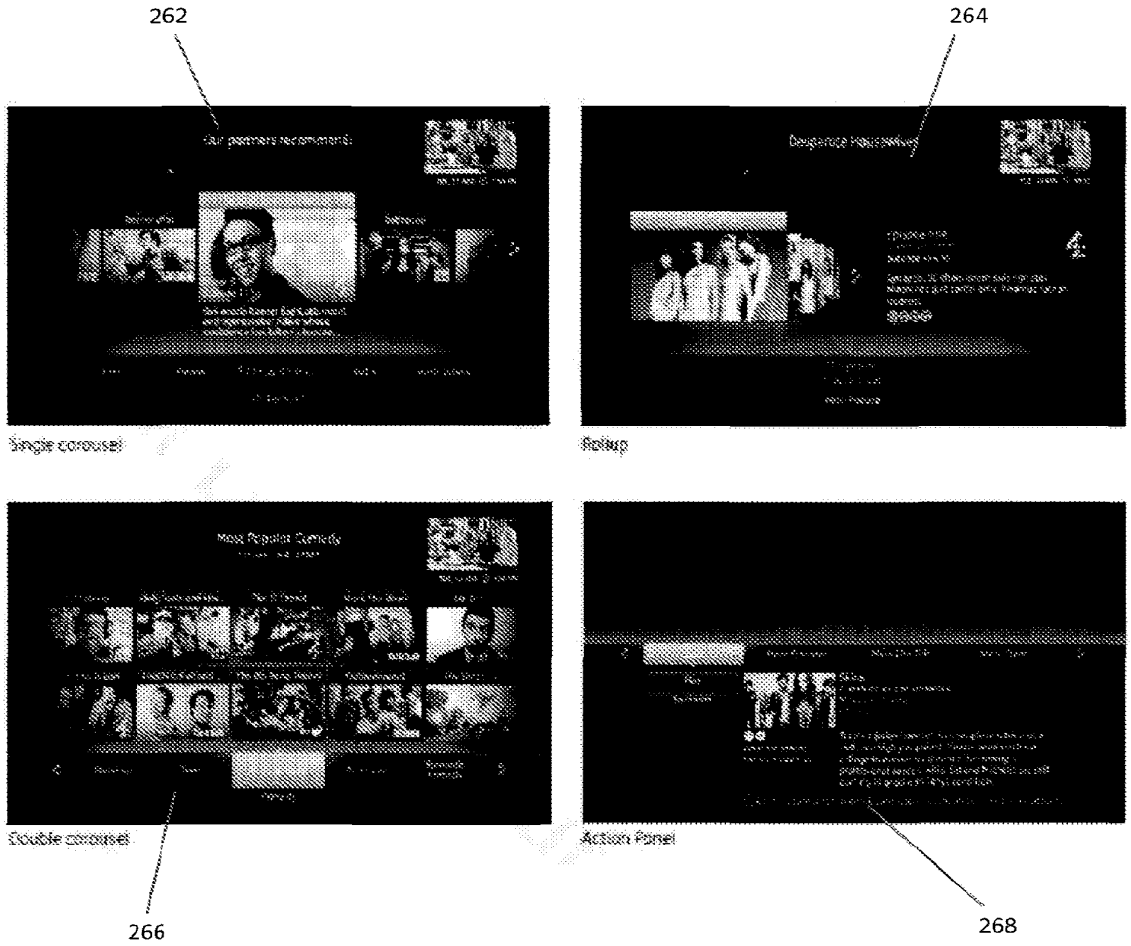


Figure 21

VIZIO Ex. 1002, Page 1659 of 3573
VIZIO v. MMT, IPR2024-00722

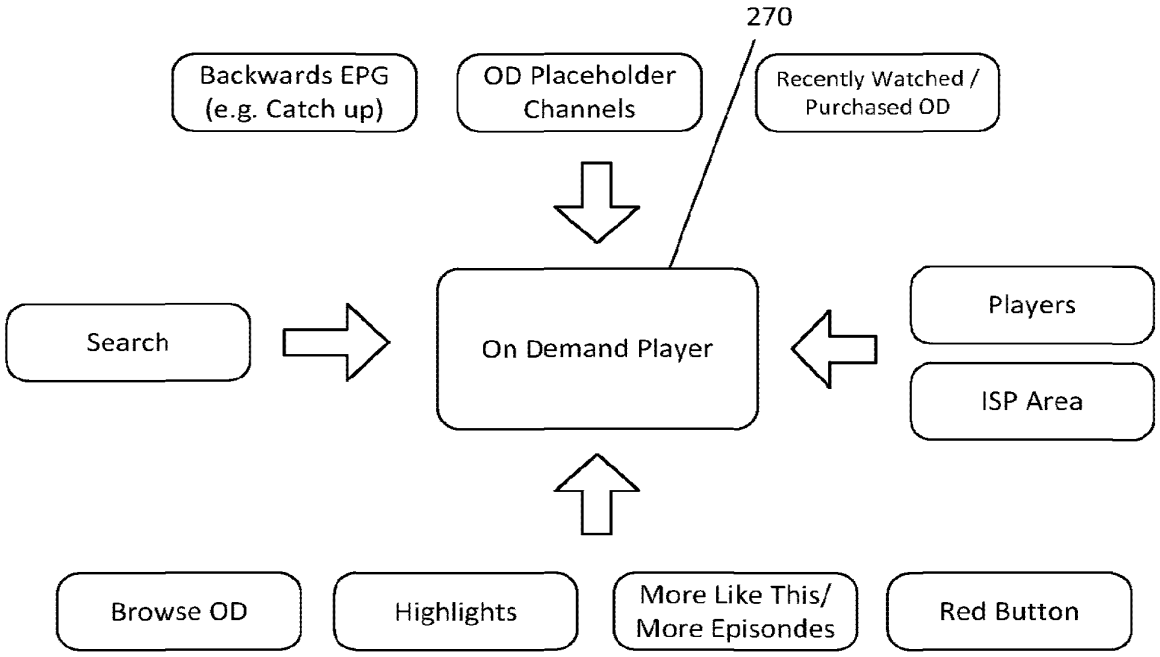


Figure 22

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VIZIO v. MMT, IPR2024-00722

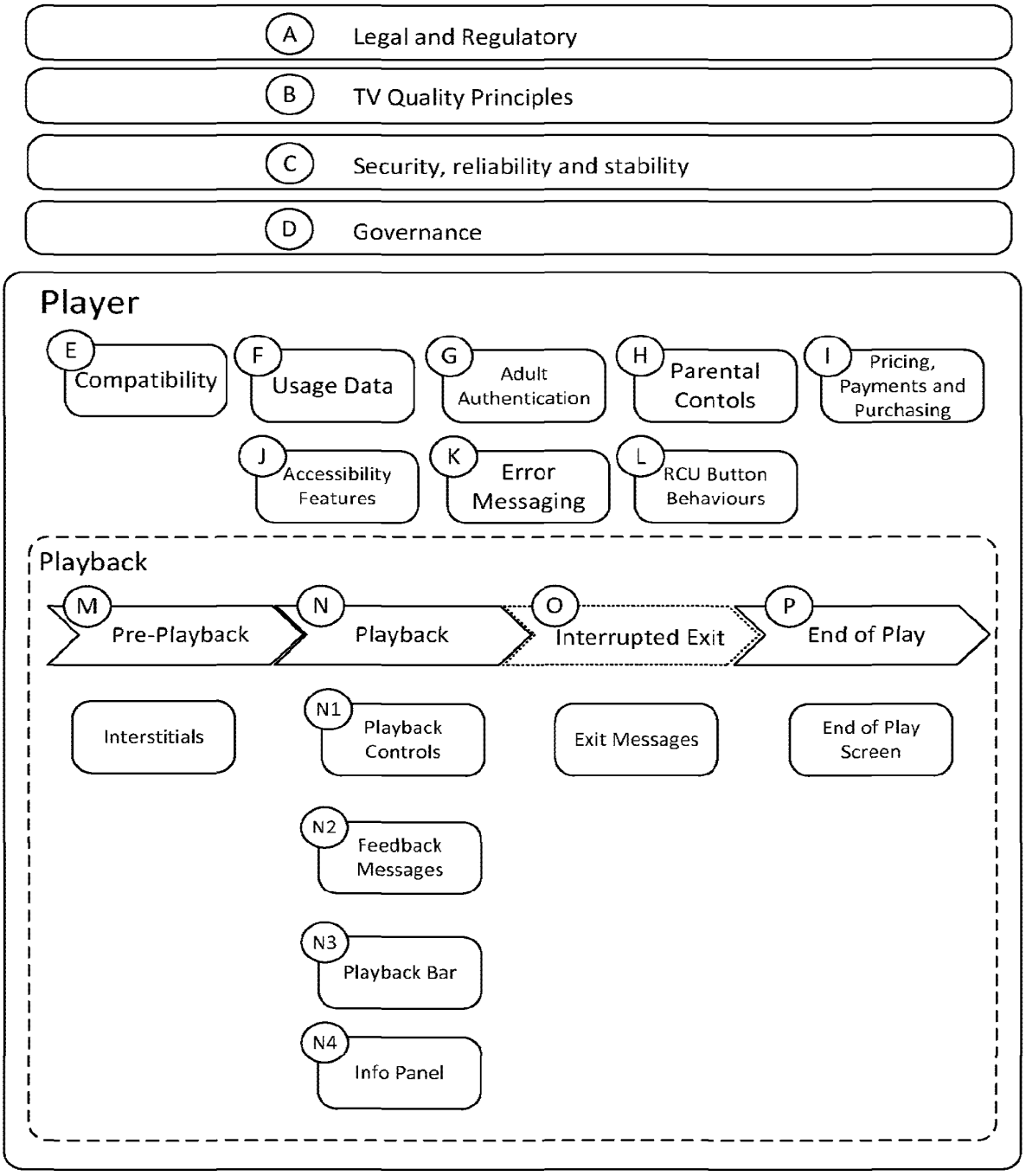


Figure 23

VIZIO Ex. 1002, Page 1661 of 3573
VIZIO v. MMT, IPR2024-00722

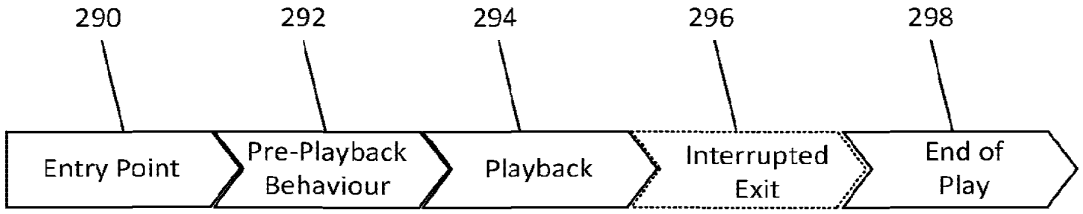


Figure 24

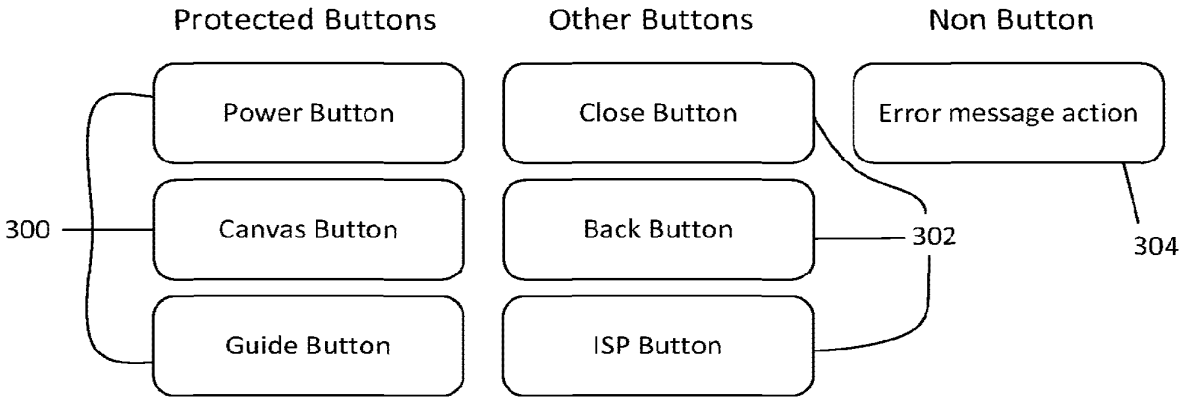


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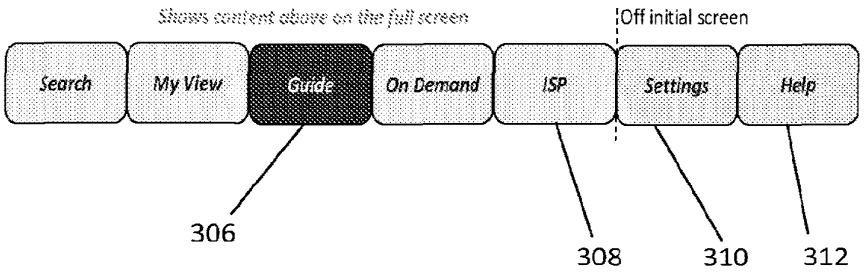


Figure 26

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VIZIO v. MMT, IPR2024-00722

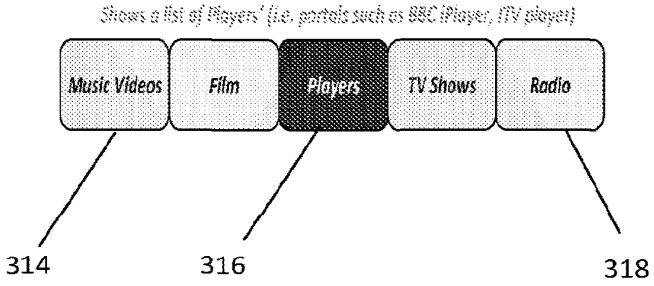


Figure 27

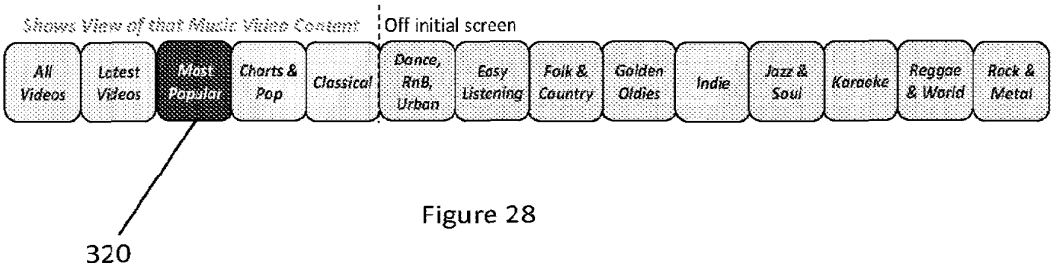


Figure 28

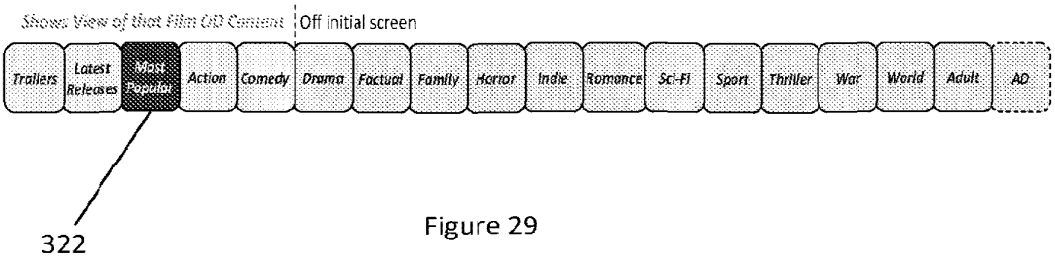


Figure 29

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VIZIO v. MMT, IPR2024-00722

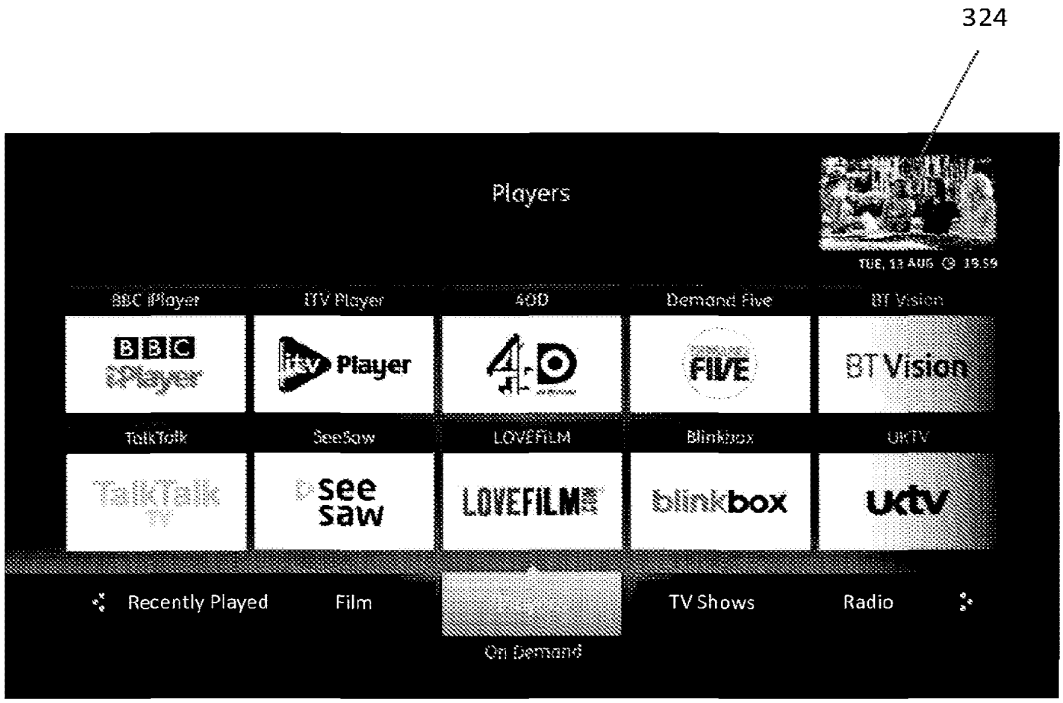


Figure 30

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VIZIO v. MMT, IPR2024-00722

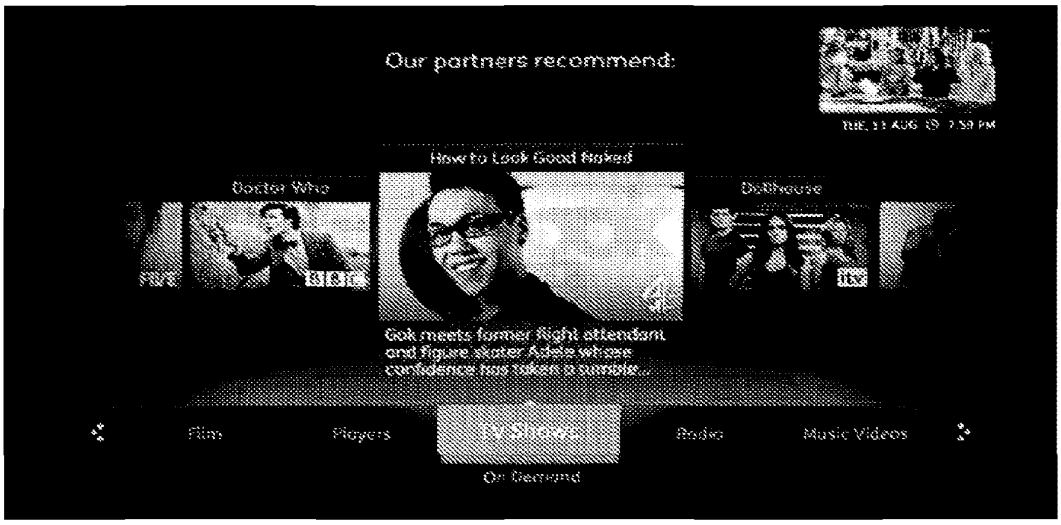


Figure 31

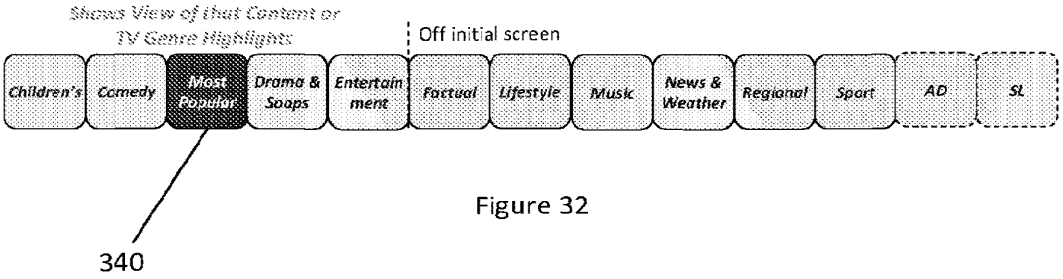


Figure 32

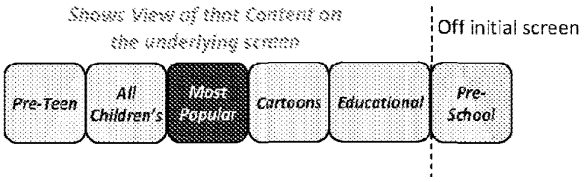


Figure 33

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VIZIO v. MMT, IPR2024-00722

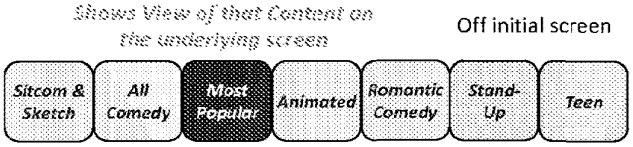


Figure 34

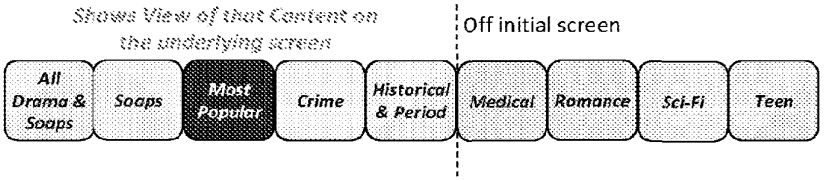


Figure 35

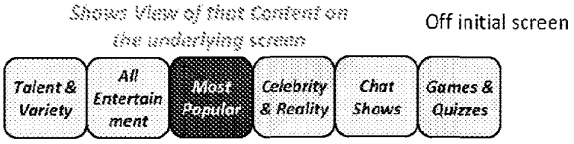


Figure 36

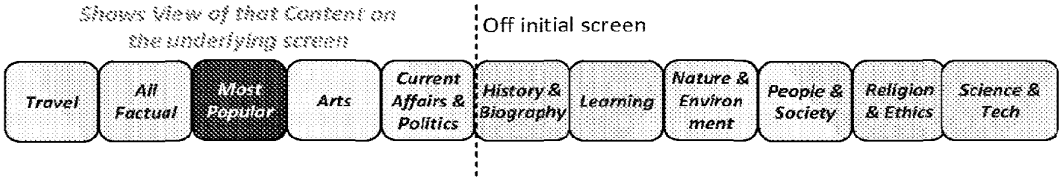


Figure 37

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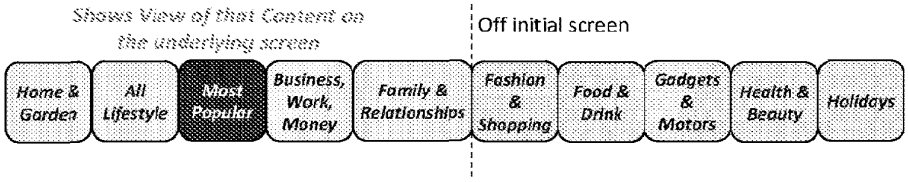


Figure 38

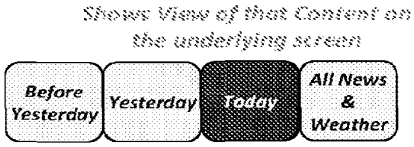


Figure 39

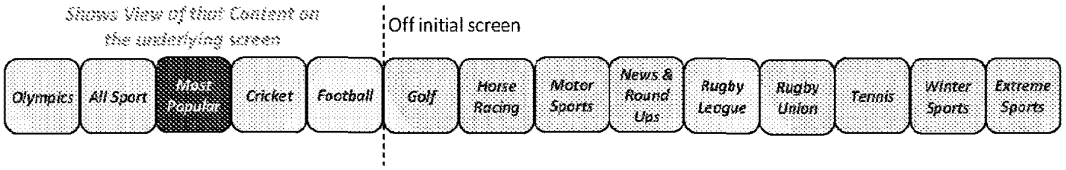


Figure 40

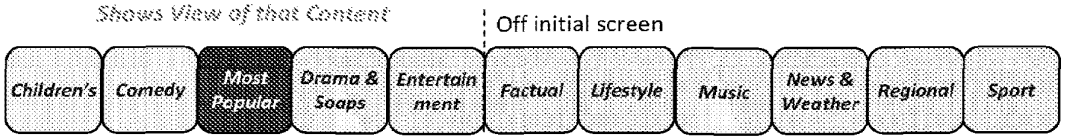


Figure 41

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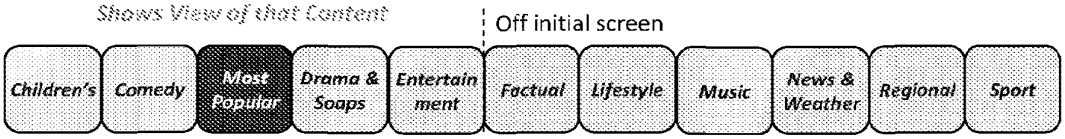


Figure 42

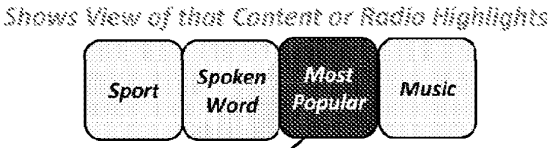


Figure 43

360

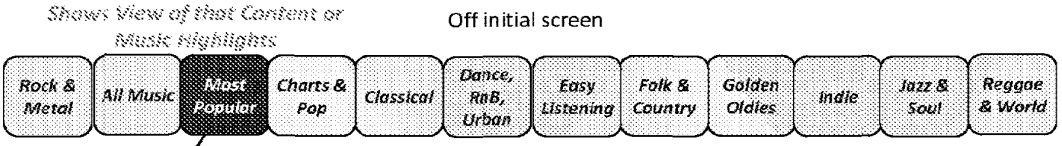


Figure 44

368

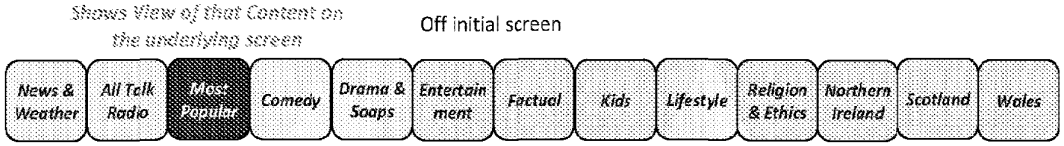


Figure 45

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VIZIO v. MMT, IPR2024-00722

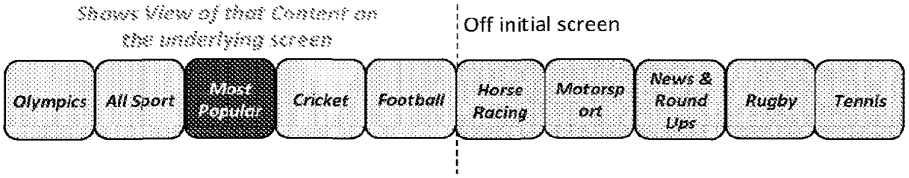


Figure 46

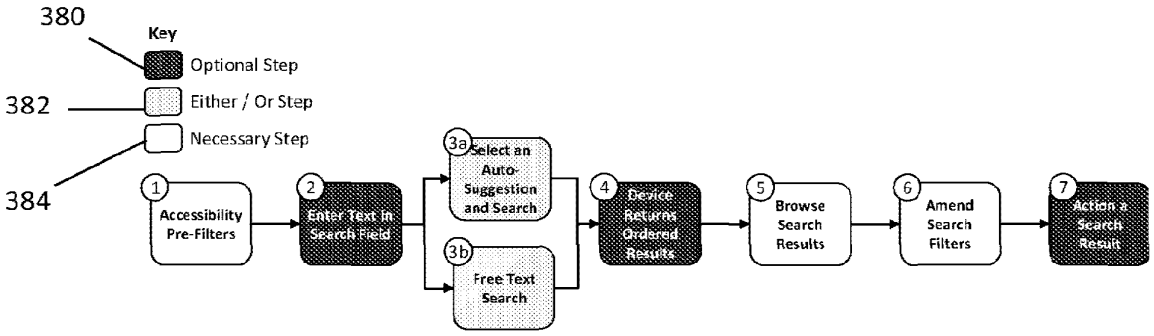


Figure 47

VIZIO Ex. 1002, Page 1669 of 3573
VIZIO v. MMT, IPR2024-00722

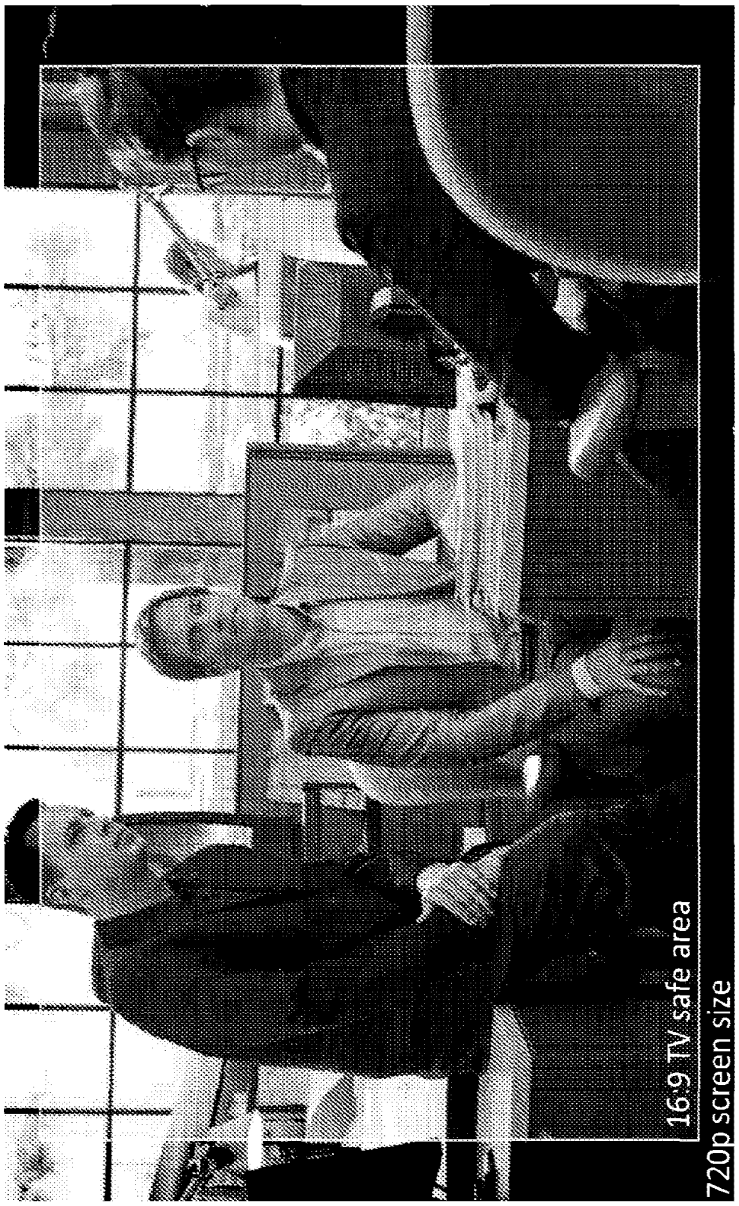


Figure 48

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VIZIO v. MMT, IPR2024-00722



Figure 49

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VIZIO v. MMT, IPR2024-00722

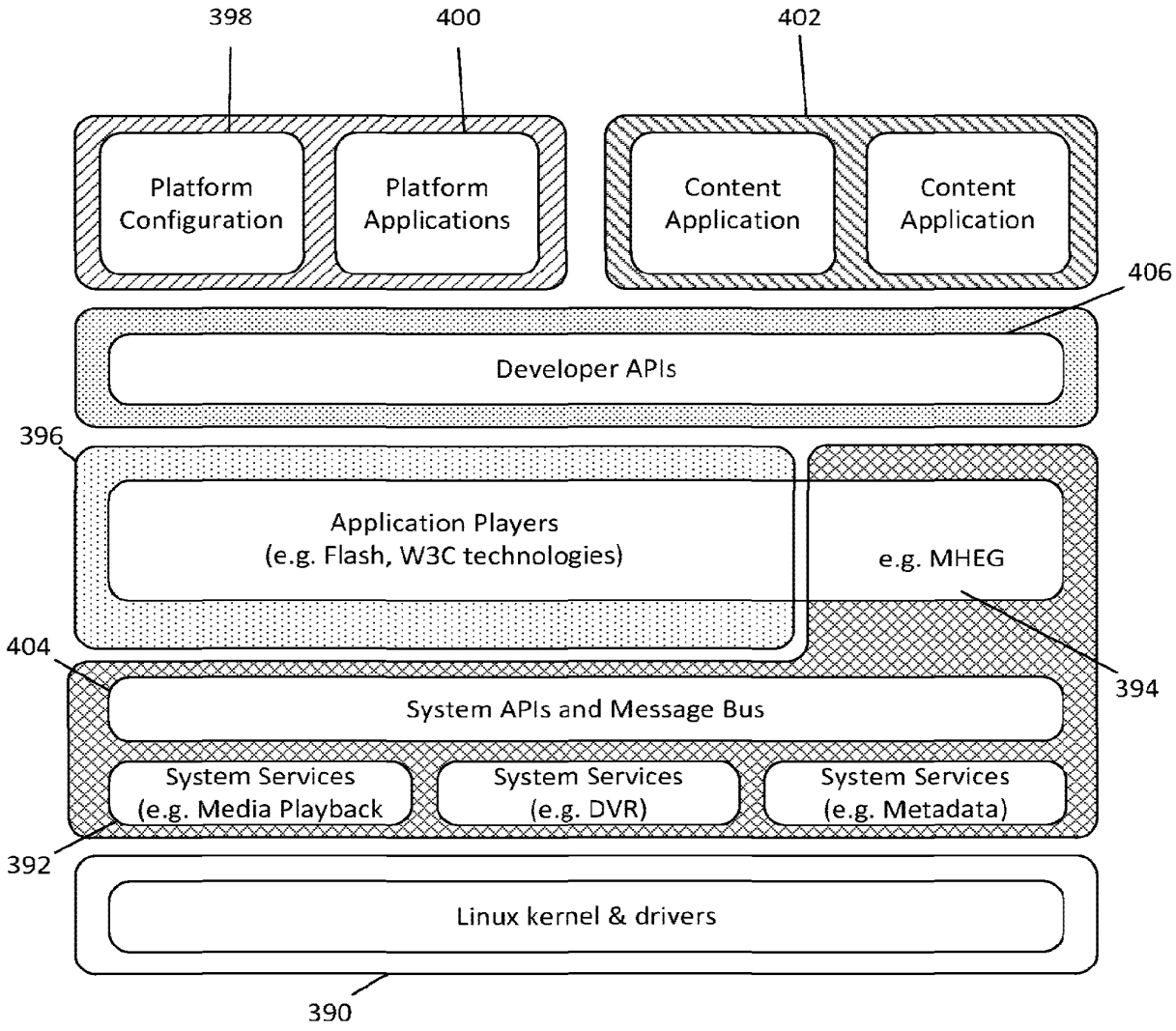


Figure 50

VIZIO Ex. 1002, Page 1672 of 3573
VIZIO v. MMT, IPR2024-00722

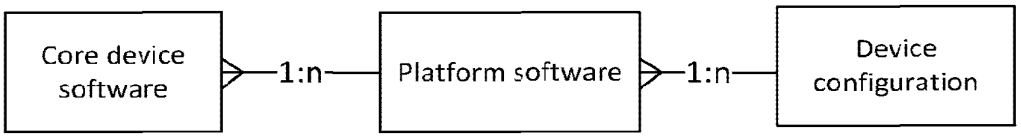


Figure 51

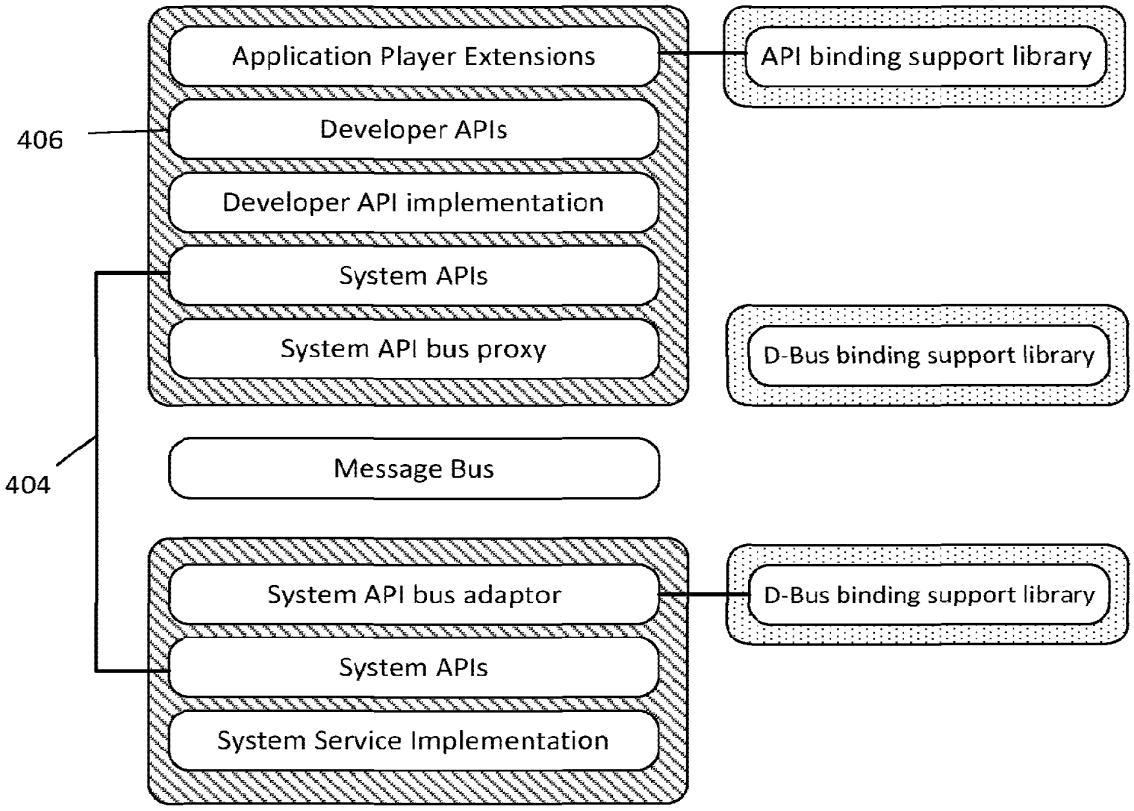


Figure 52

VIZIO Ex. 1002, Page 1673 of 3573
VIZIO v. MMT, IPR2024-00722

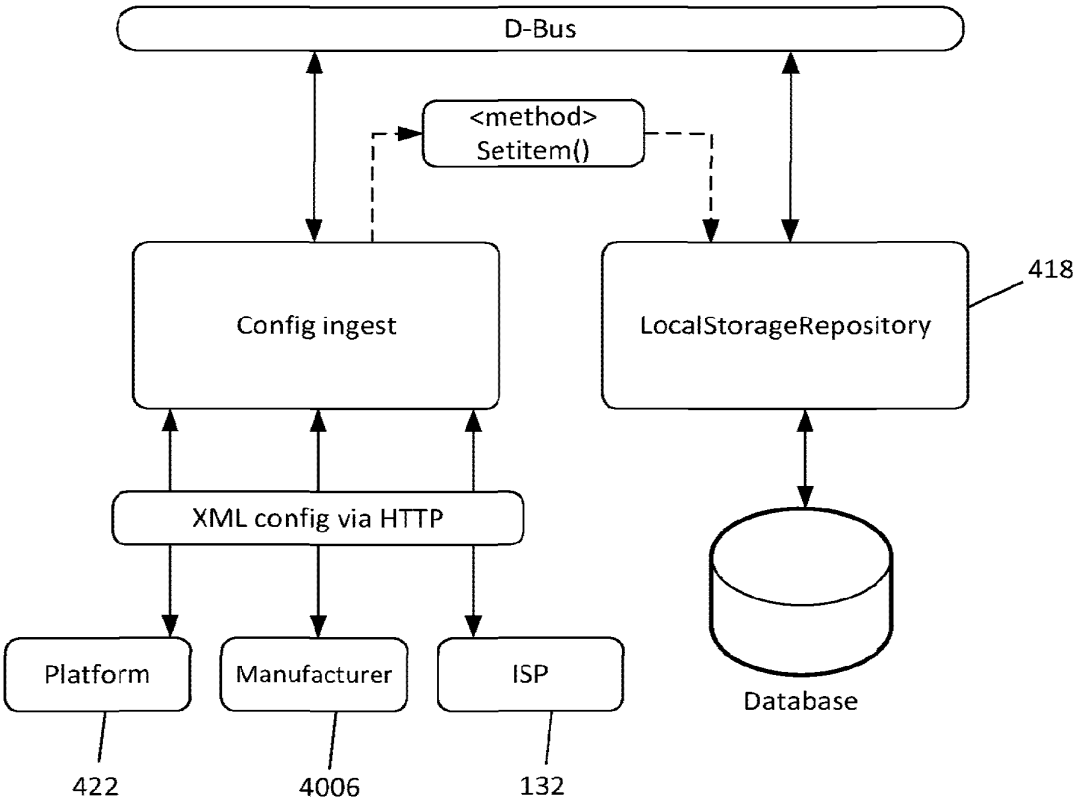


Figure 53

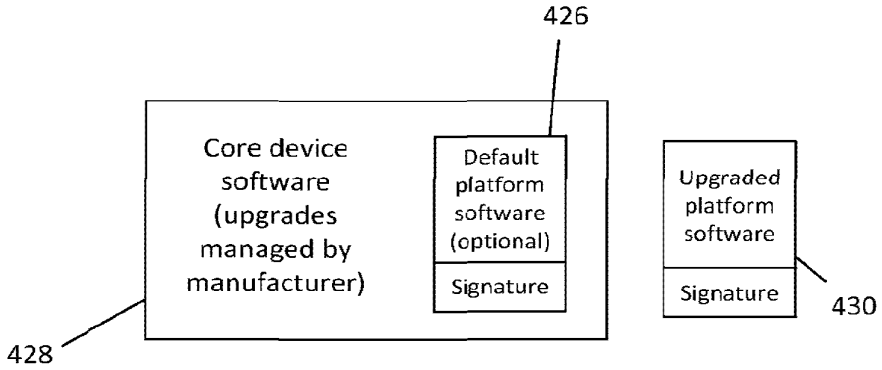


Figure 54

VIZIO Ex. 1002, Page 1674 of 3573
VIZIO v. MMT, IPR2024-00722

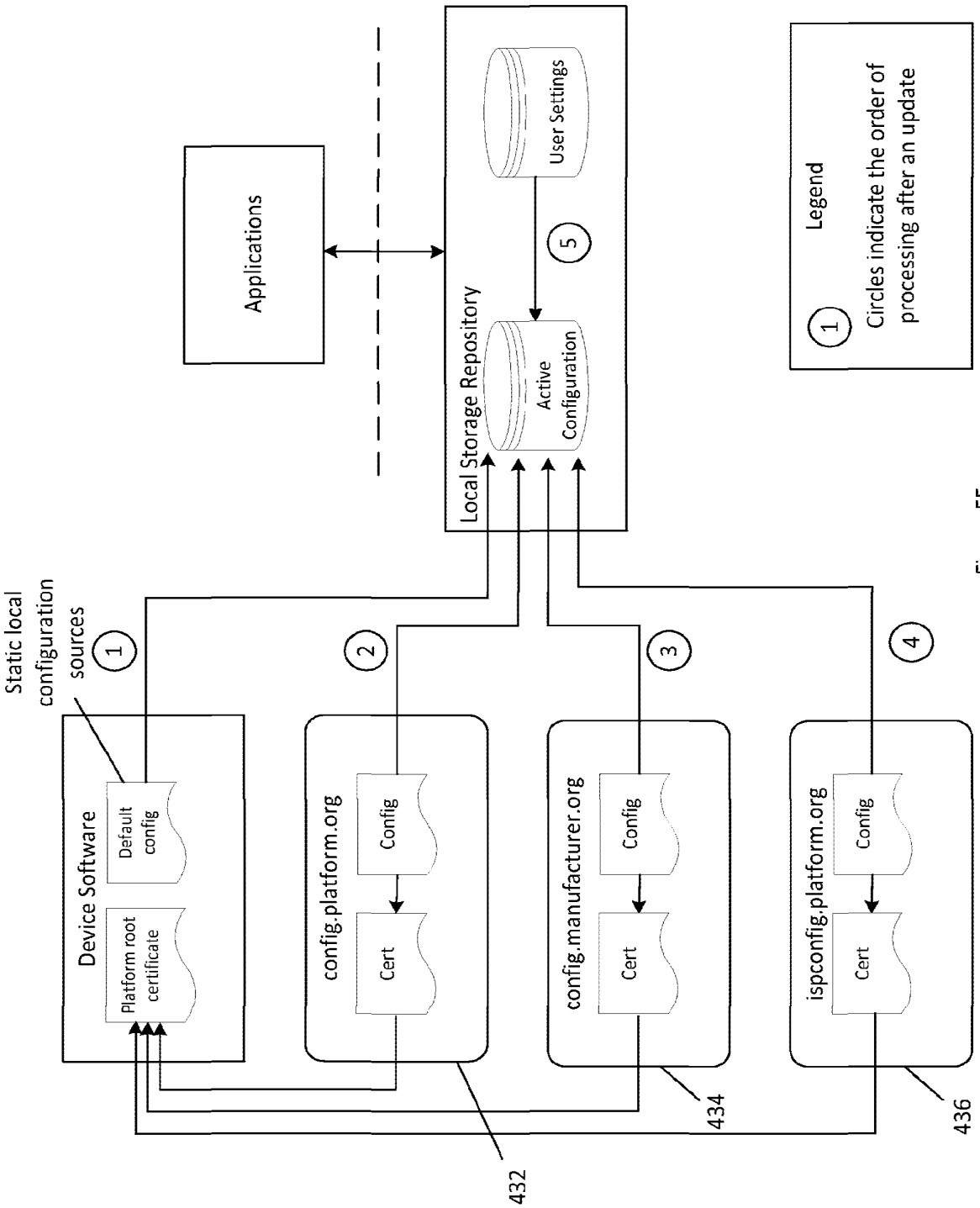


Figure 55

VIZIO Ex. 1002, Page 1675 of 3573
VIZIO v. MMT, IPR2024-00722

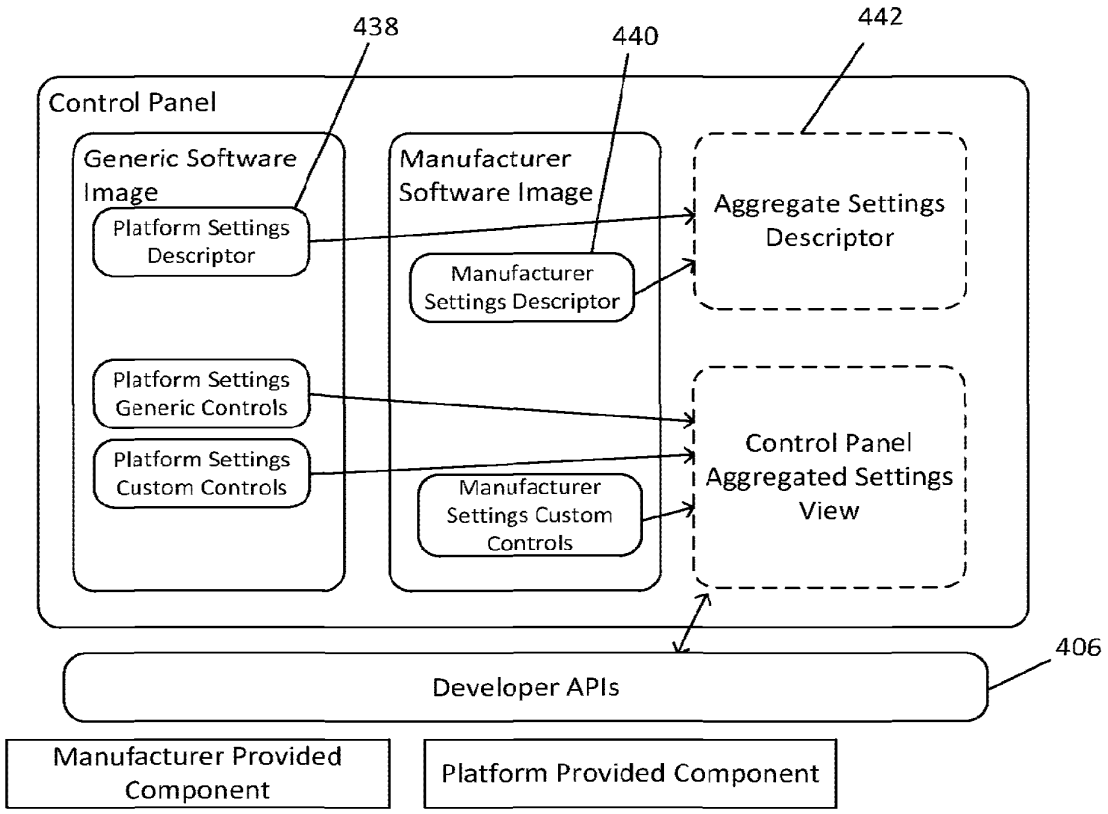


Figure 56

VIZIO Ex. 1002, Page 1676 of 3573
VIZIO v. MMT, IPR2024-00722

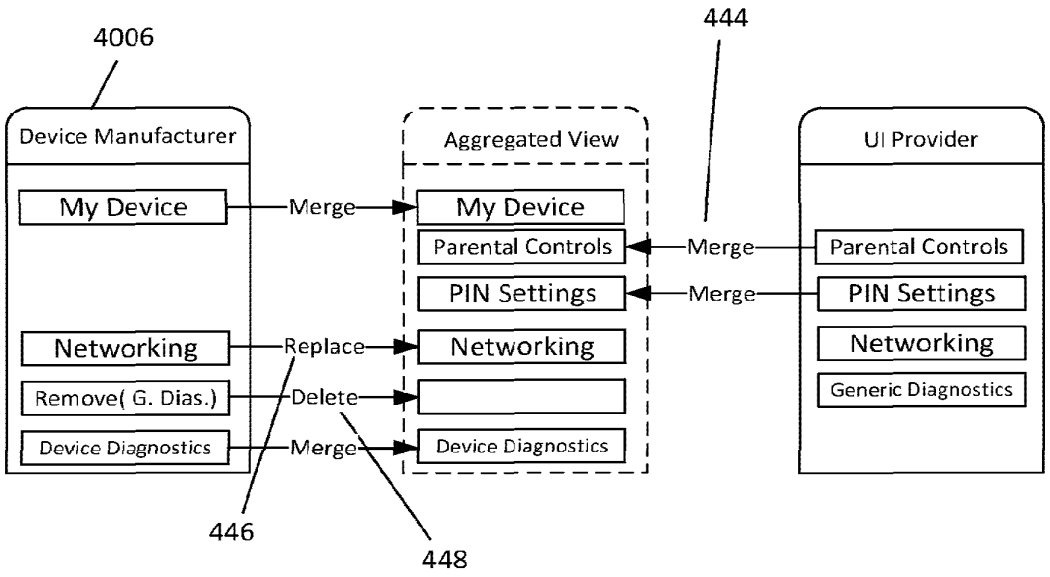


Figure 57

VIZIO Ex. 1002, Page 1677 of 3573
VIZIO v. MMT, IPR2024-00722

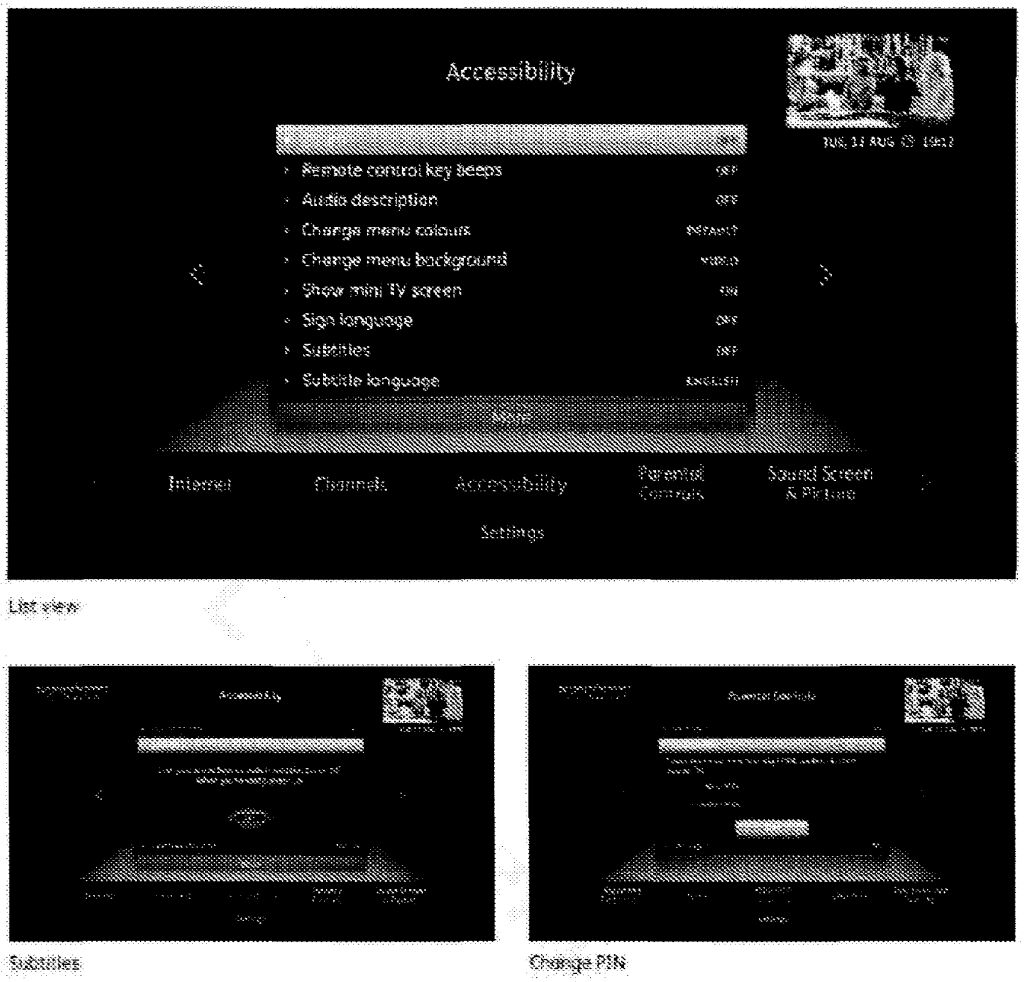


Figure 58

VIZIO Ex. 1002, Page 1678 of 3573
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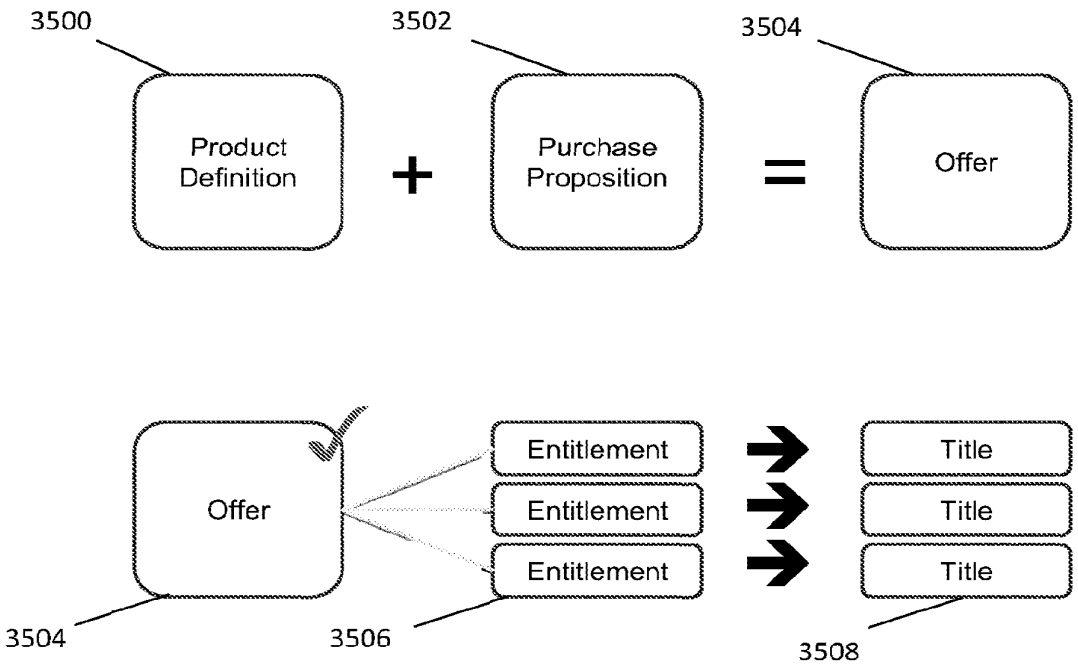


Figure 59

VIZIO Ex. 1002, Page 1679 of 3573
VIZIO v. MMT, IPR2024-00722

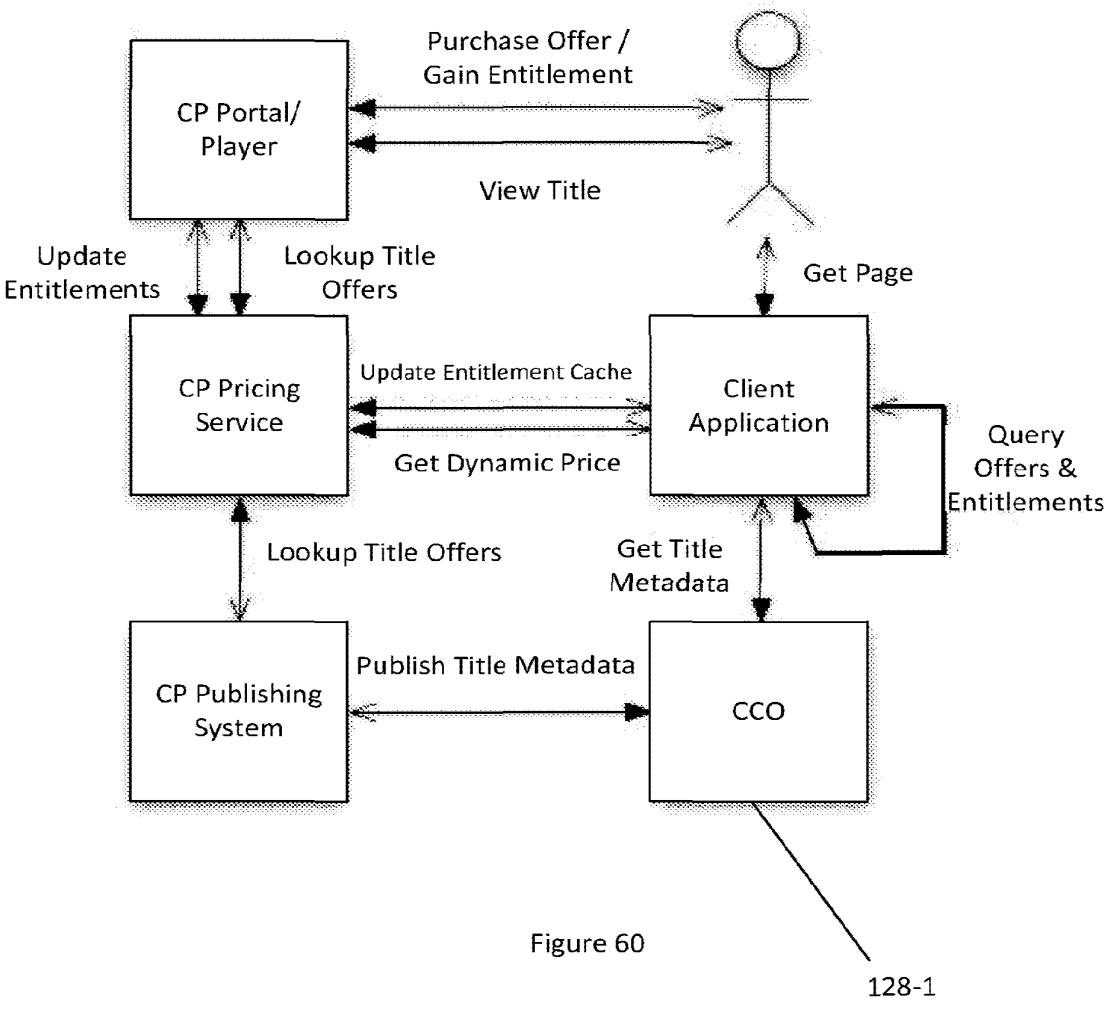


Figure 60

VIZIO Ex. 1002, Page 1680 of 3573
VIZIO v. MMT, IPR2024-00722

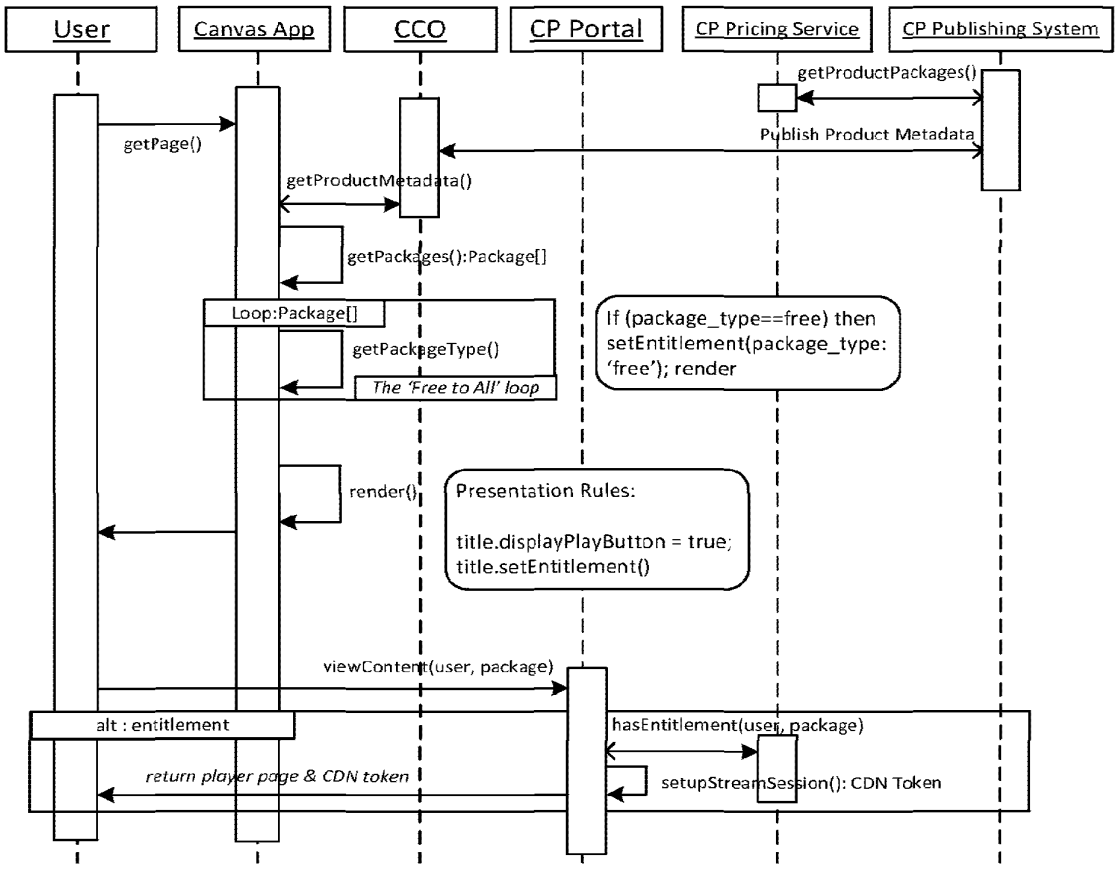


Figure 61

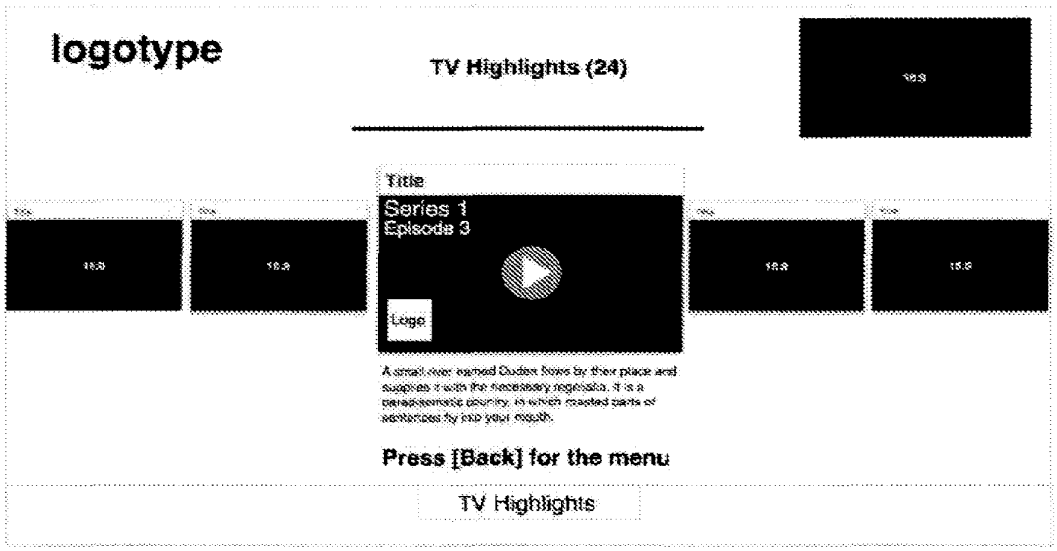


Figure 62

VIZIO Ex. 1002, Page 1681 of 3573
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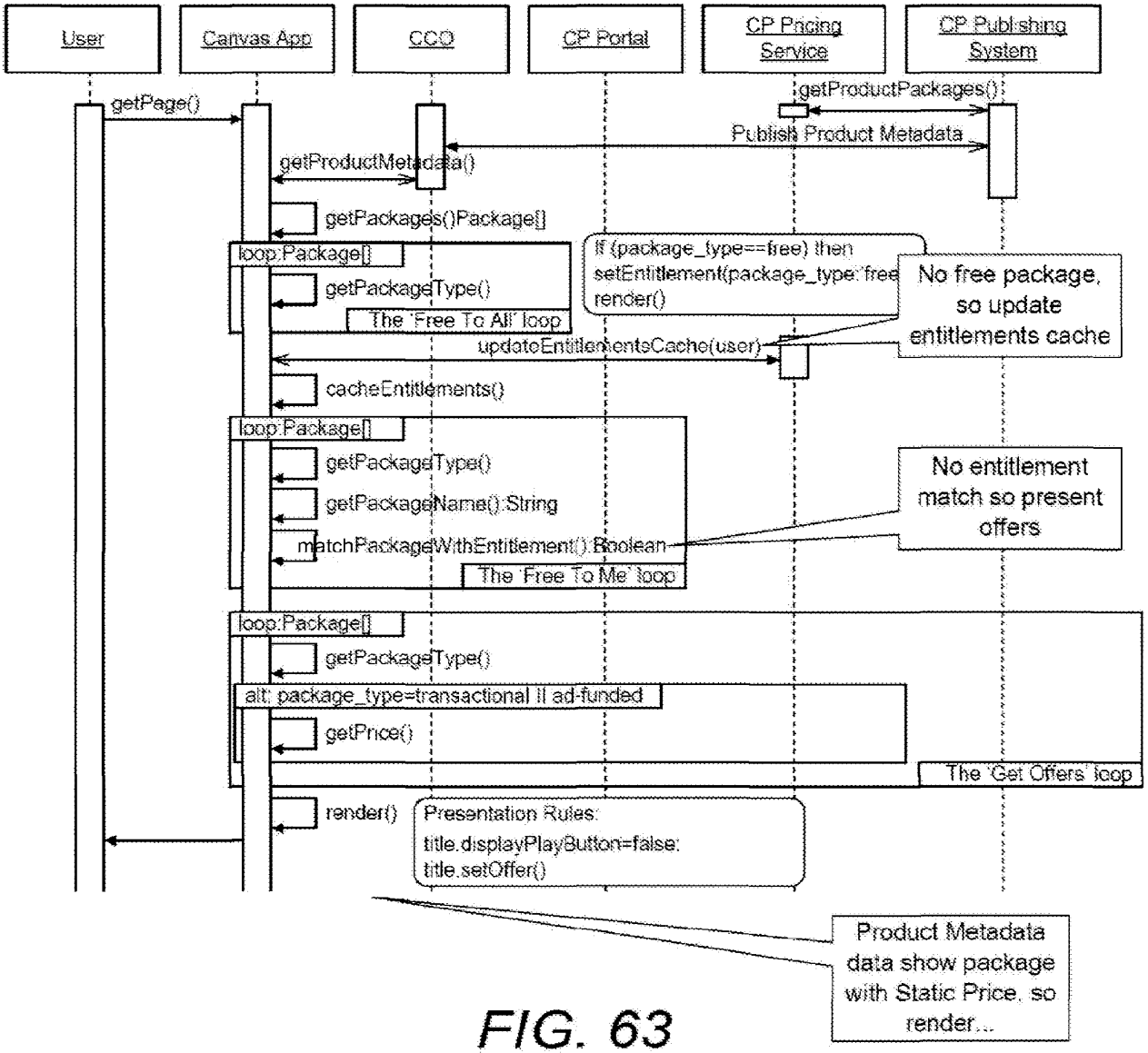


FIG. 63

VIZIO Ex. 1002, Page 1682 of 3573
VIZIO v. MMT, IPR2024-00722

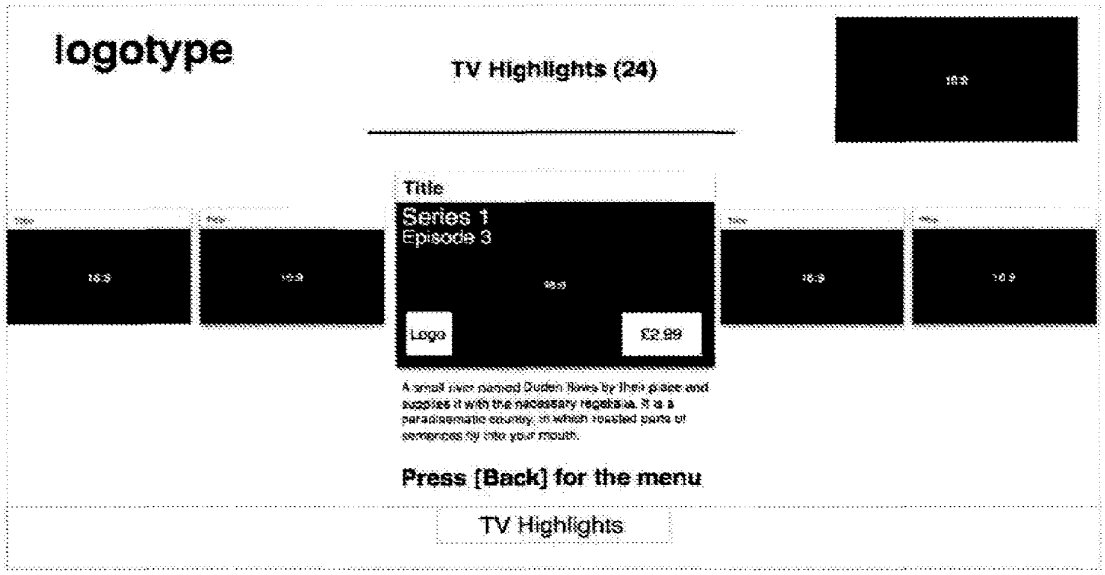


Figure 64

VIZIO Ex. 1002, Page 1683 of 3573
VIZIO v. MMT, IPR2024-00722

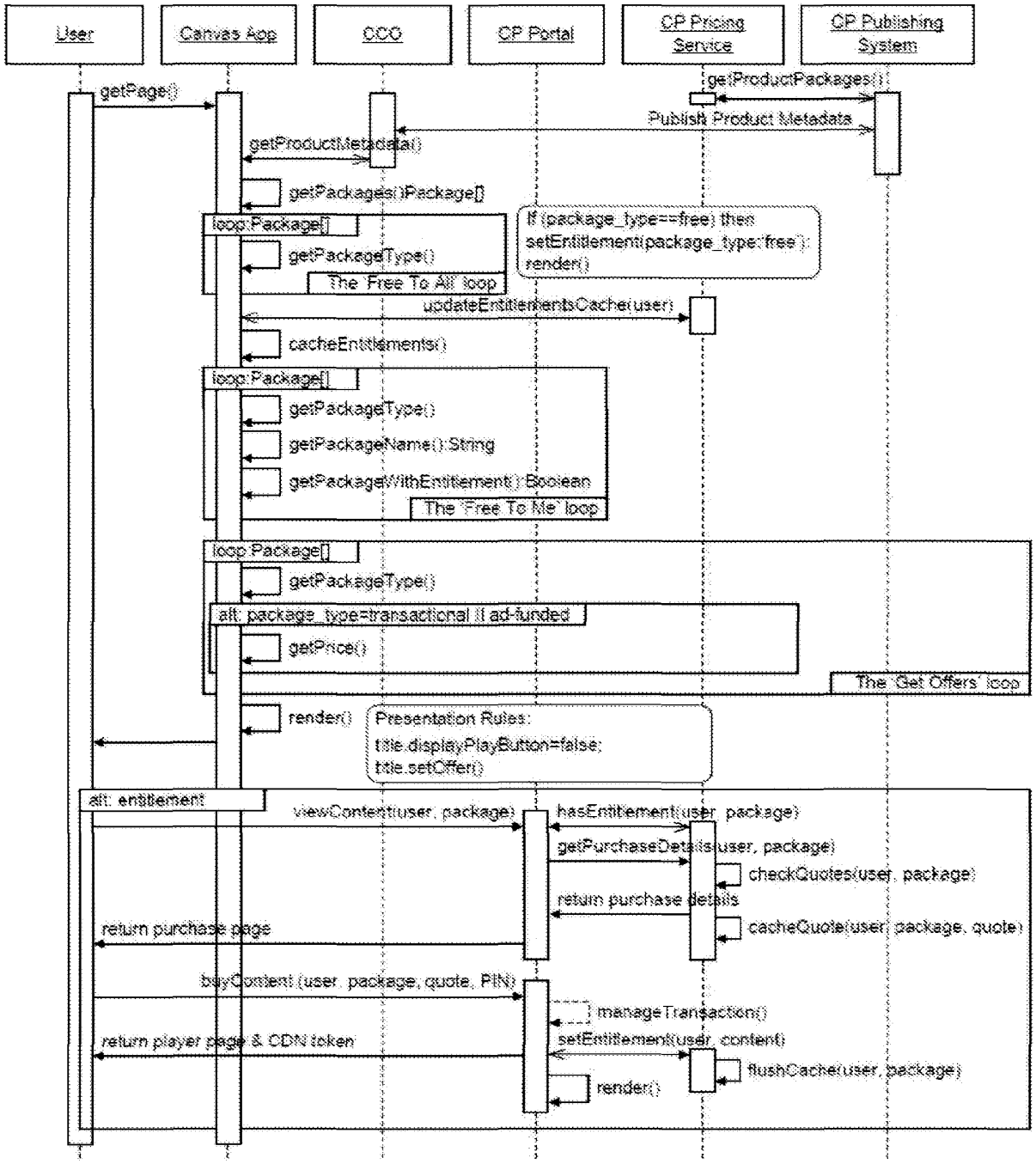


FIG. 65

VIZIO Ex. 1002, Page 1684 of 3573
VIZIO v. MMT, IPR2024-00722

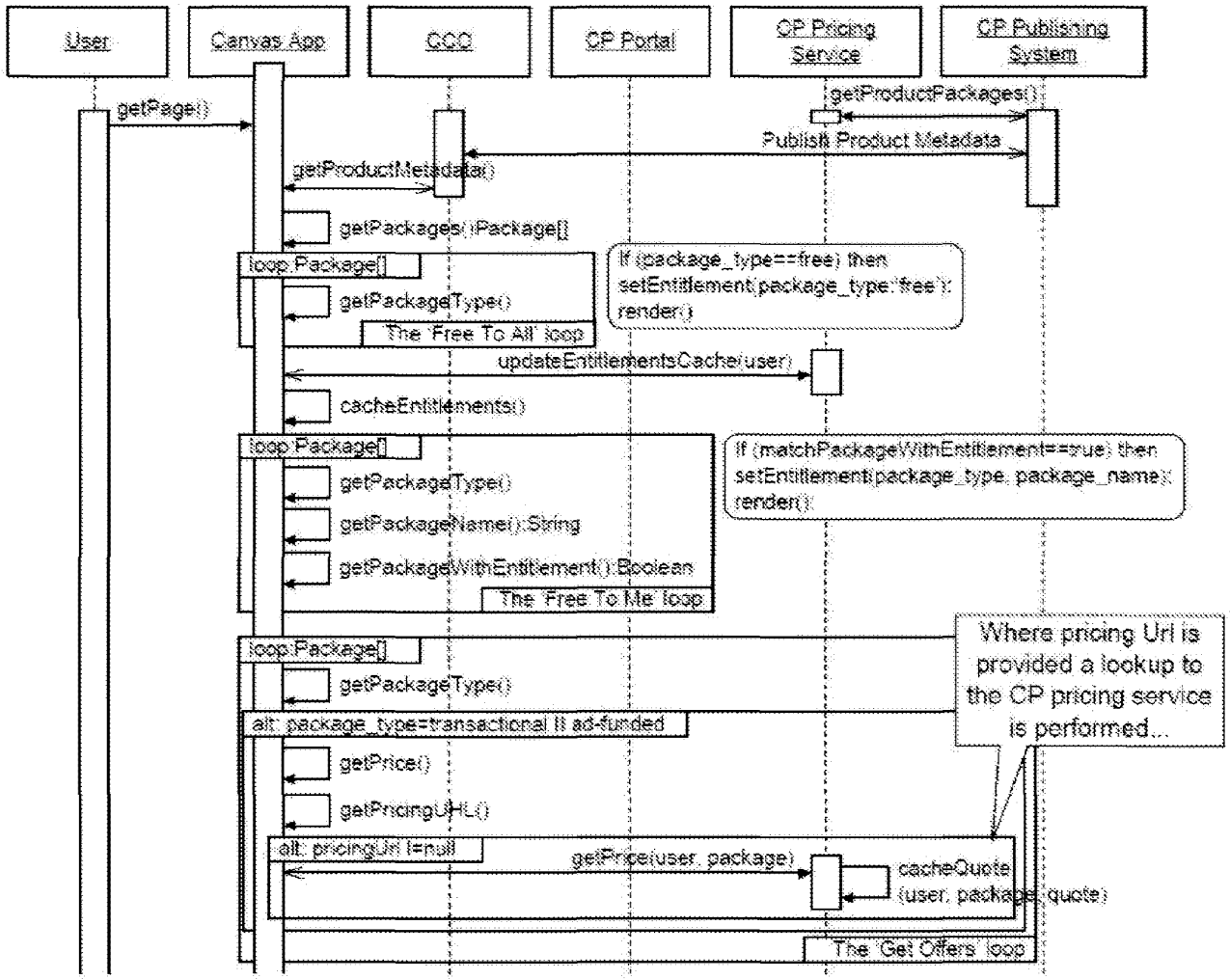


FIG. 66

VIZIO Ex. 1002, Page 1685 of 3573
VIZIO v. MMT, IPR2024-00722

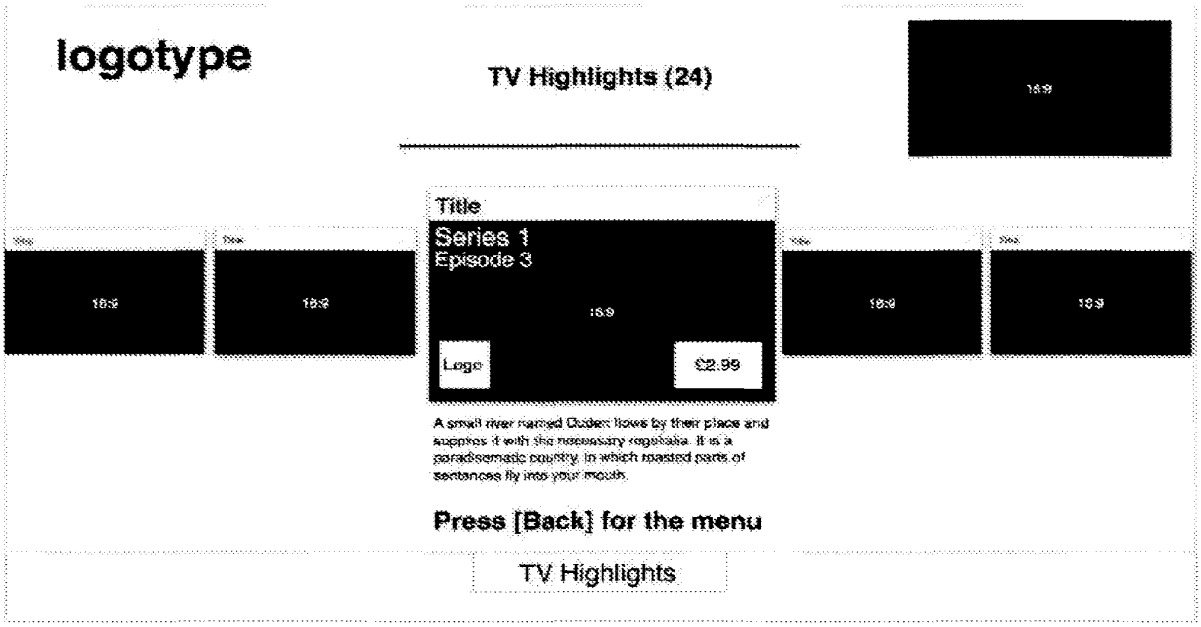


Figure 67

VIZIO Ex. 1002, Page 1686 of 3573
VIZIO v. MMT, IPR2024-00722

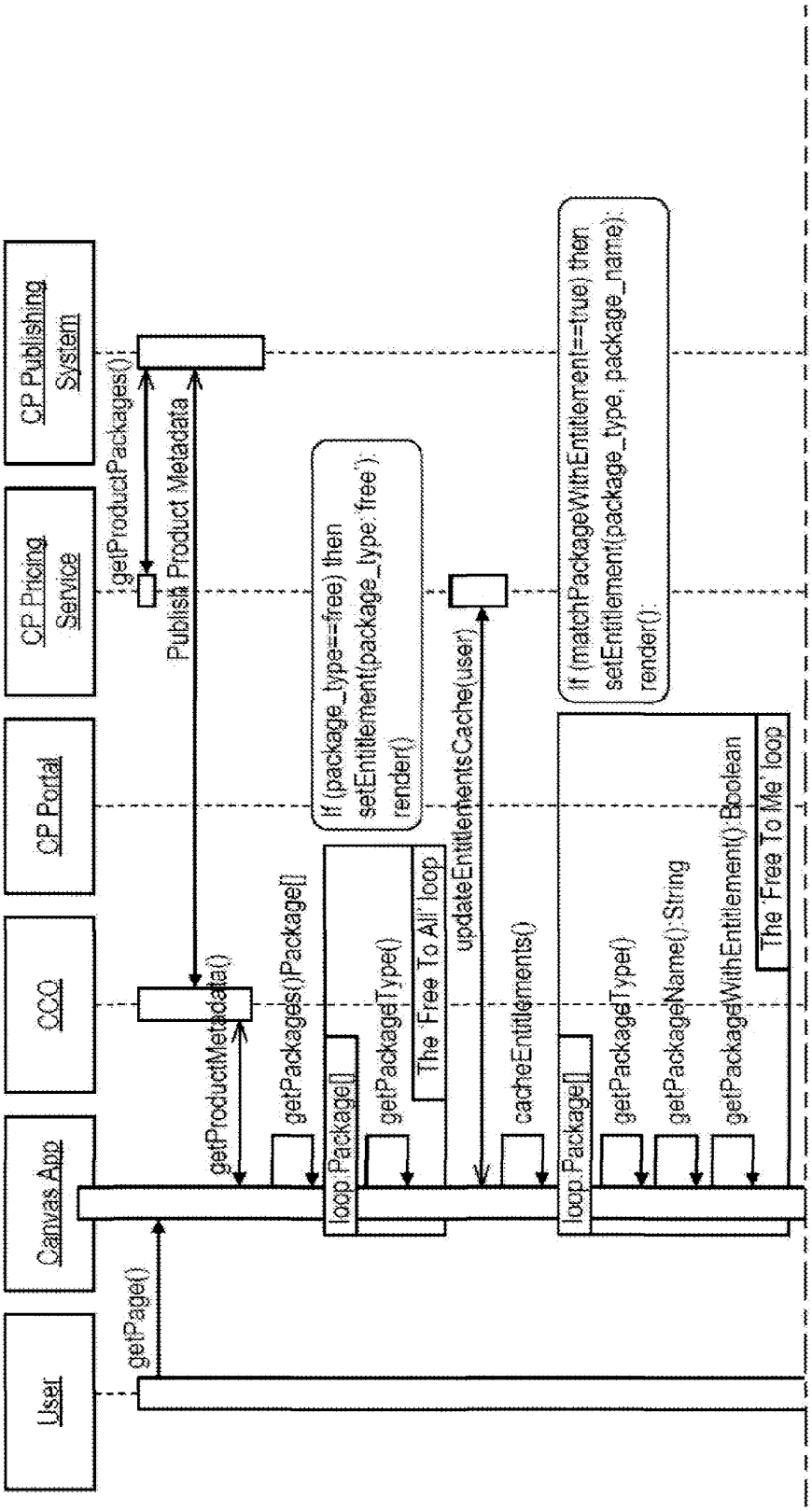


FIG. 68

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VIZIO v. MMT, IPR2024-00722

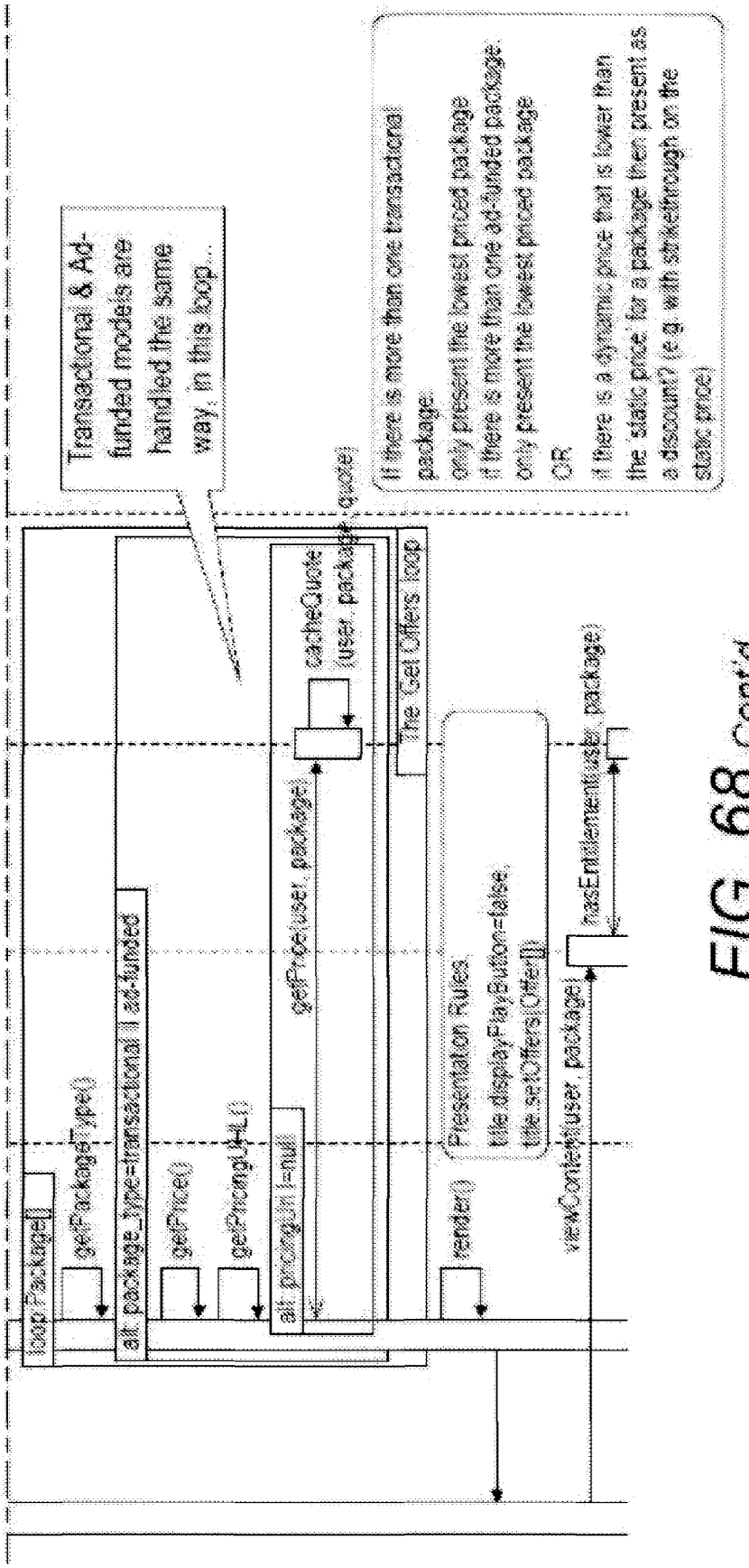


FIG. 68 Cont'd

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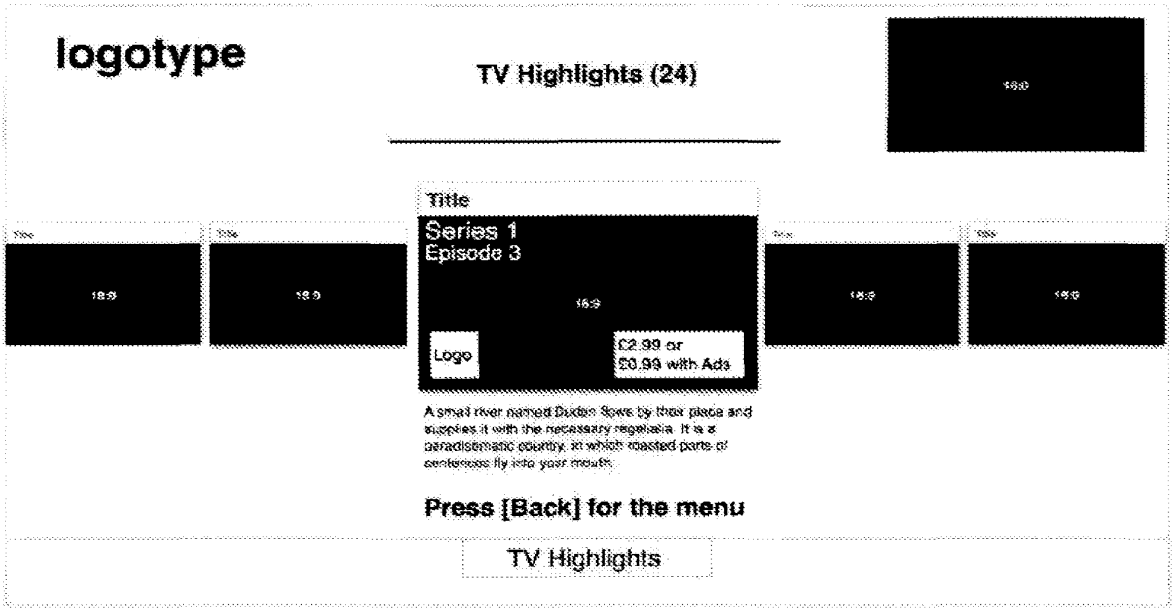


Figure 69

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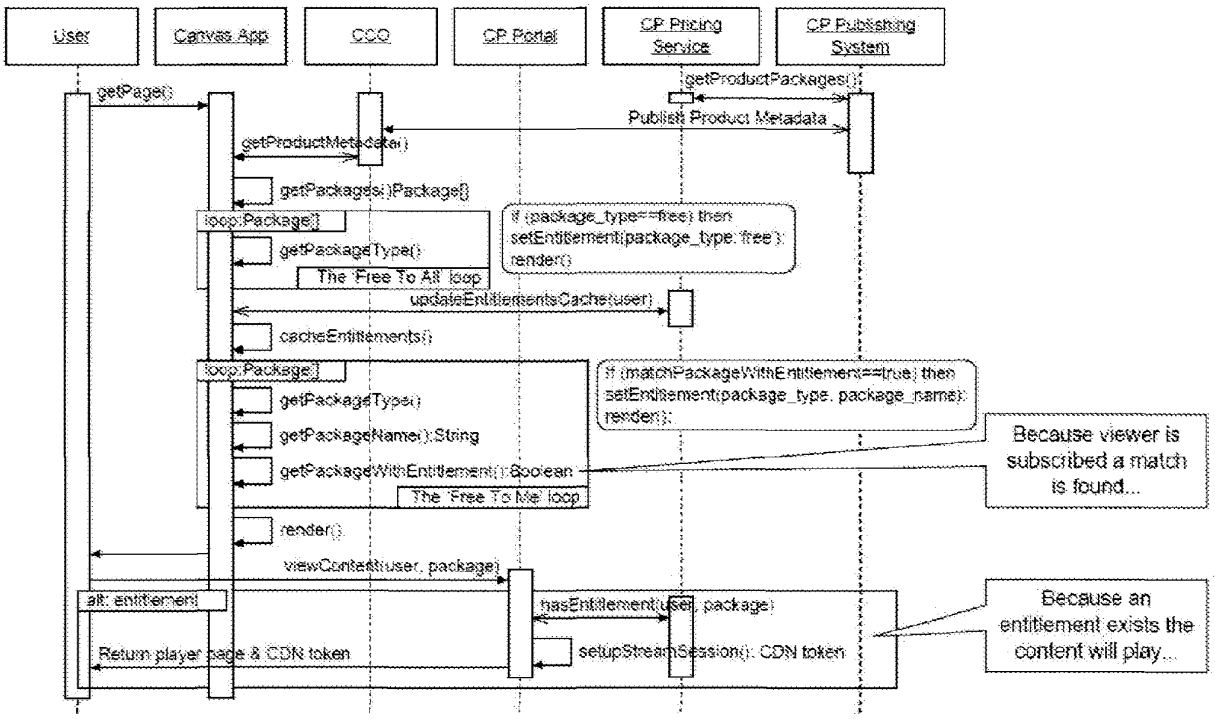


FIG. 70

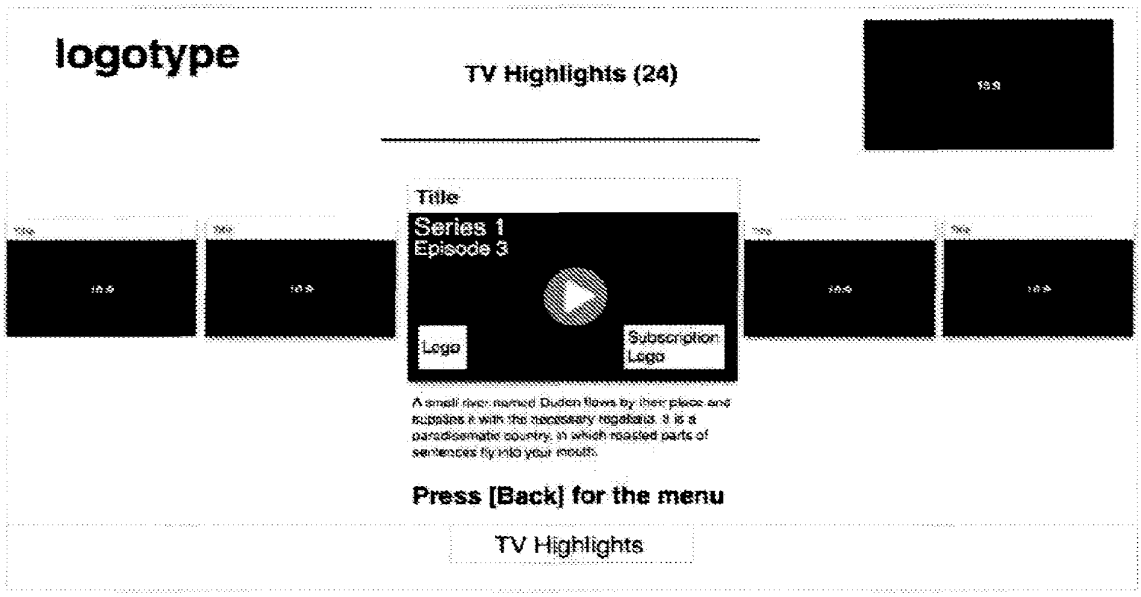


Figure 71

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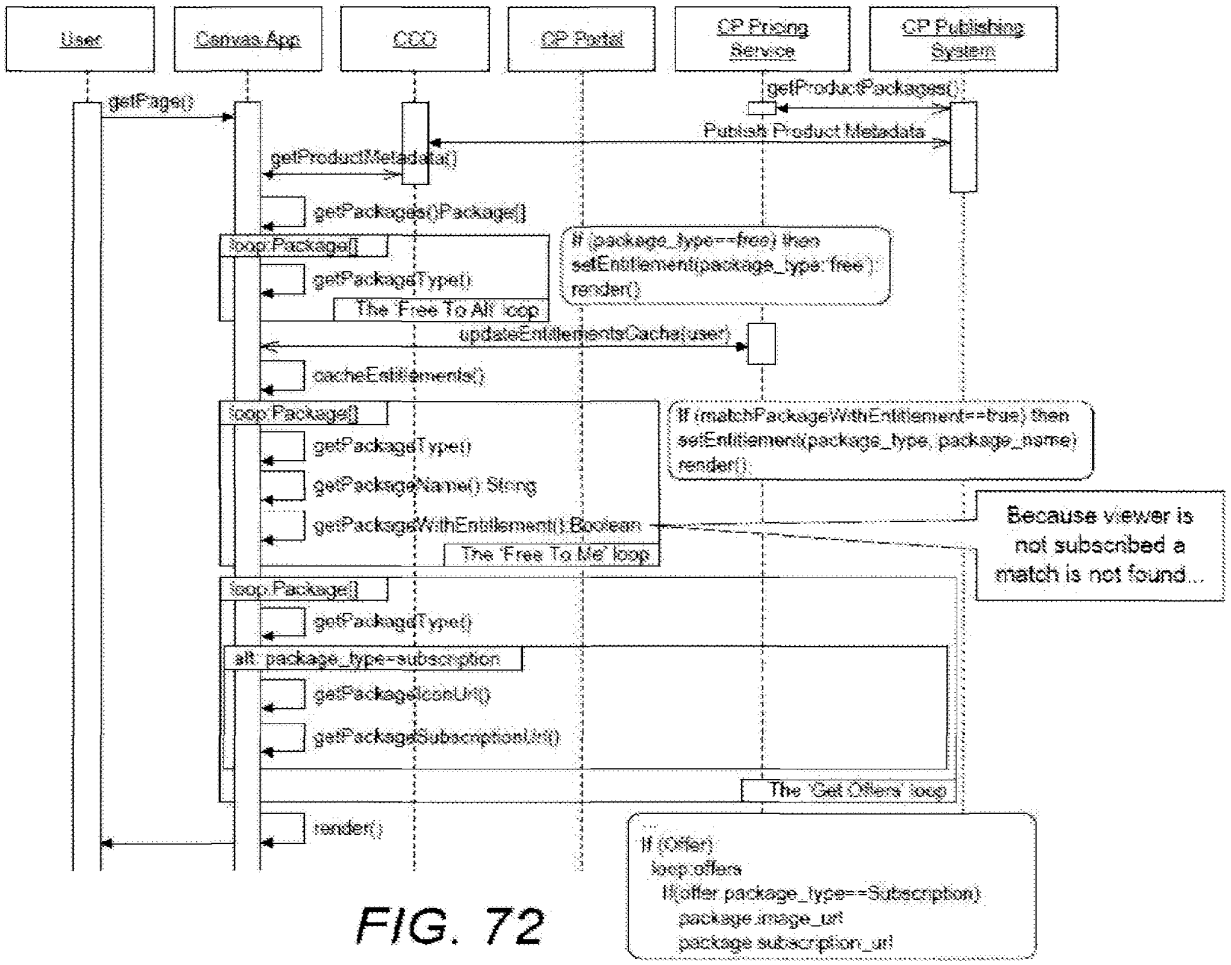


FIG. 72

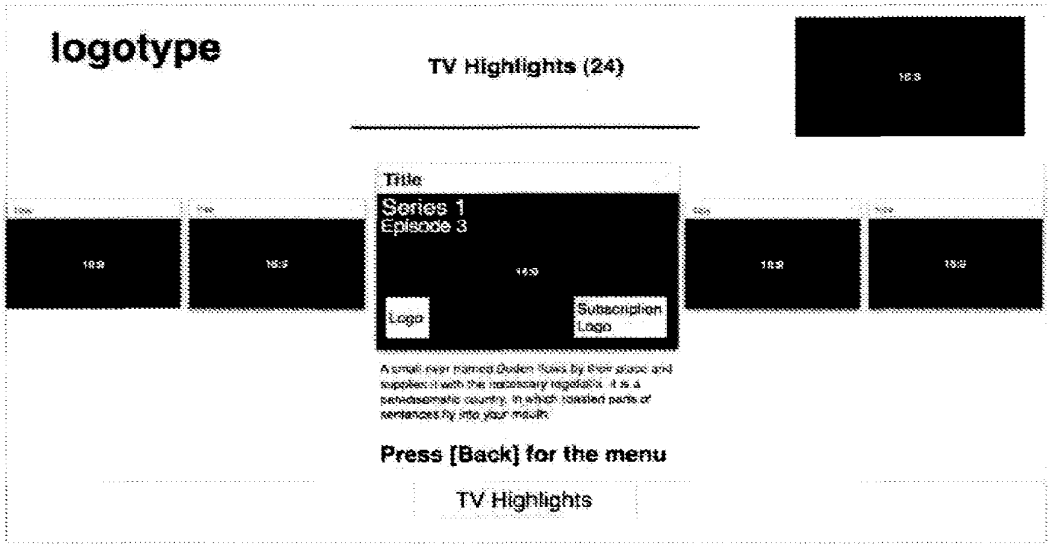


Figure 73

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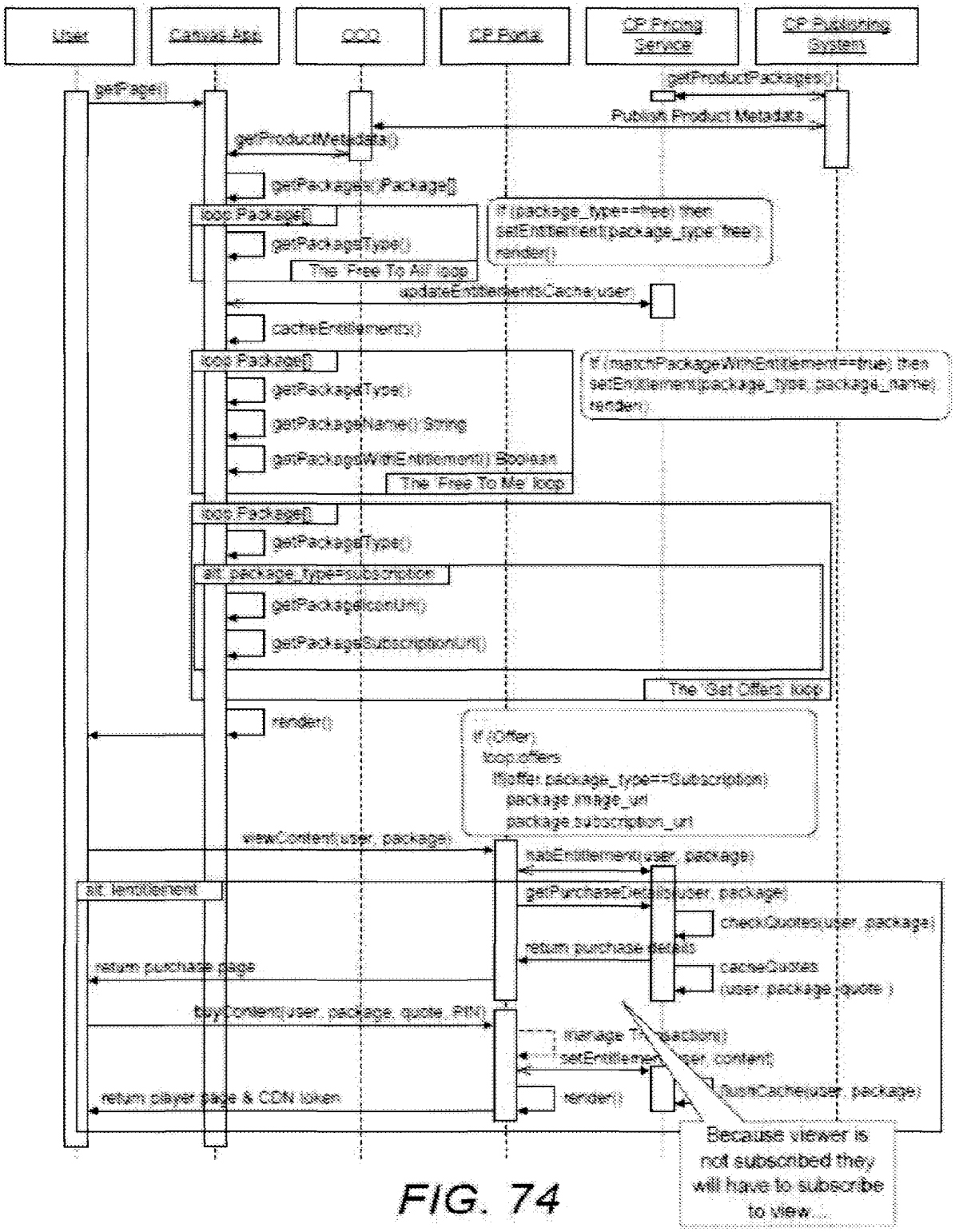


FIG. 74

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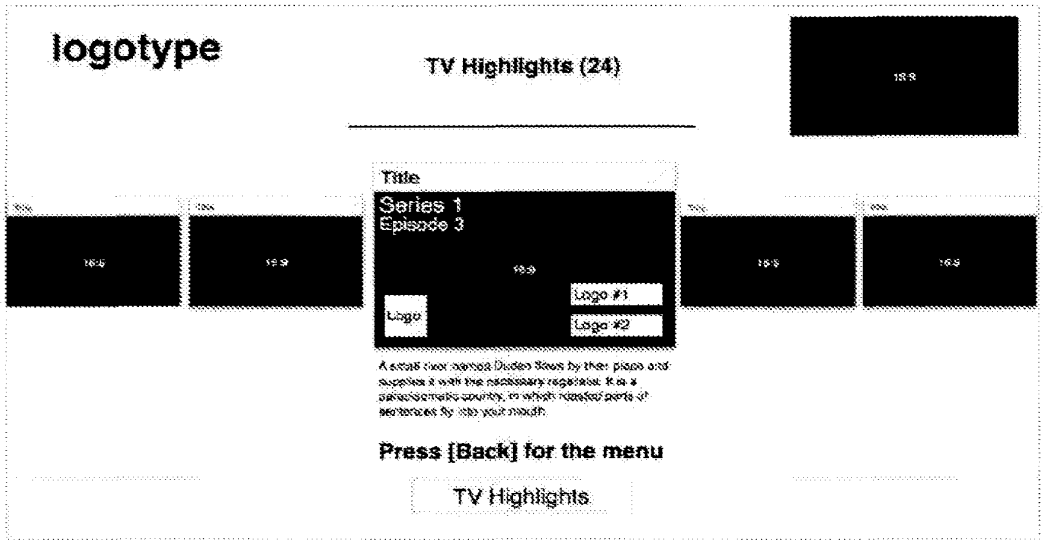


Figure 75

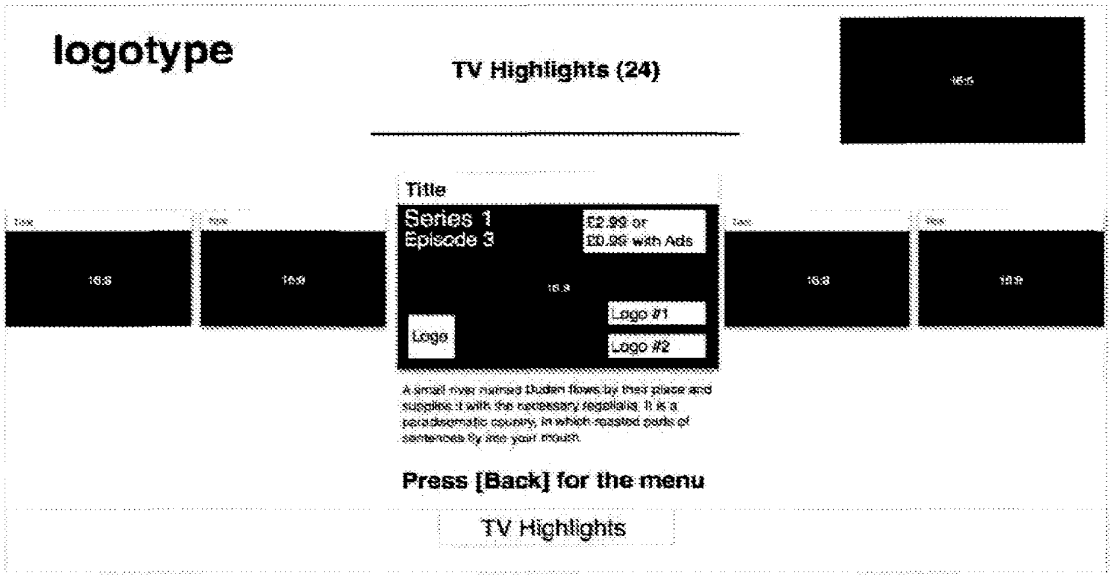


Figure 76

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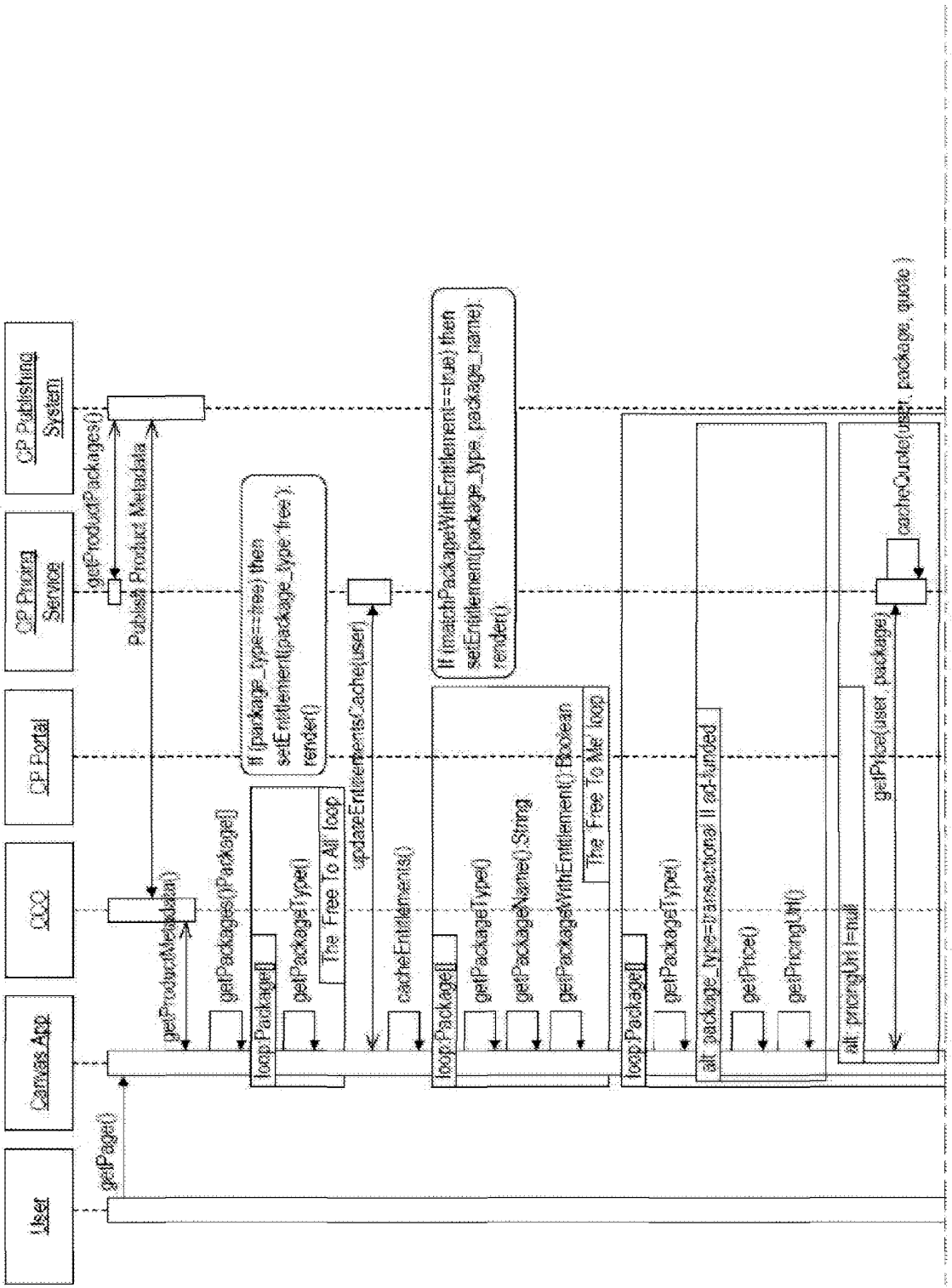


FIG. 77

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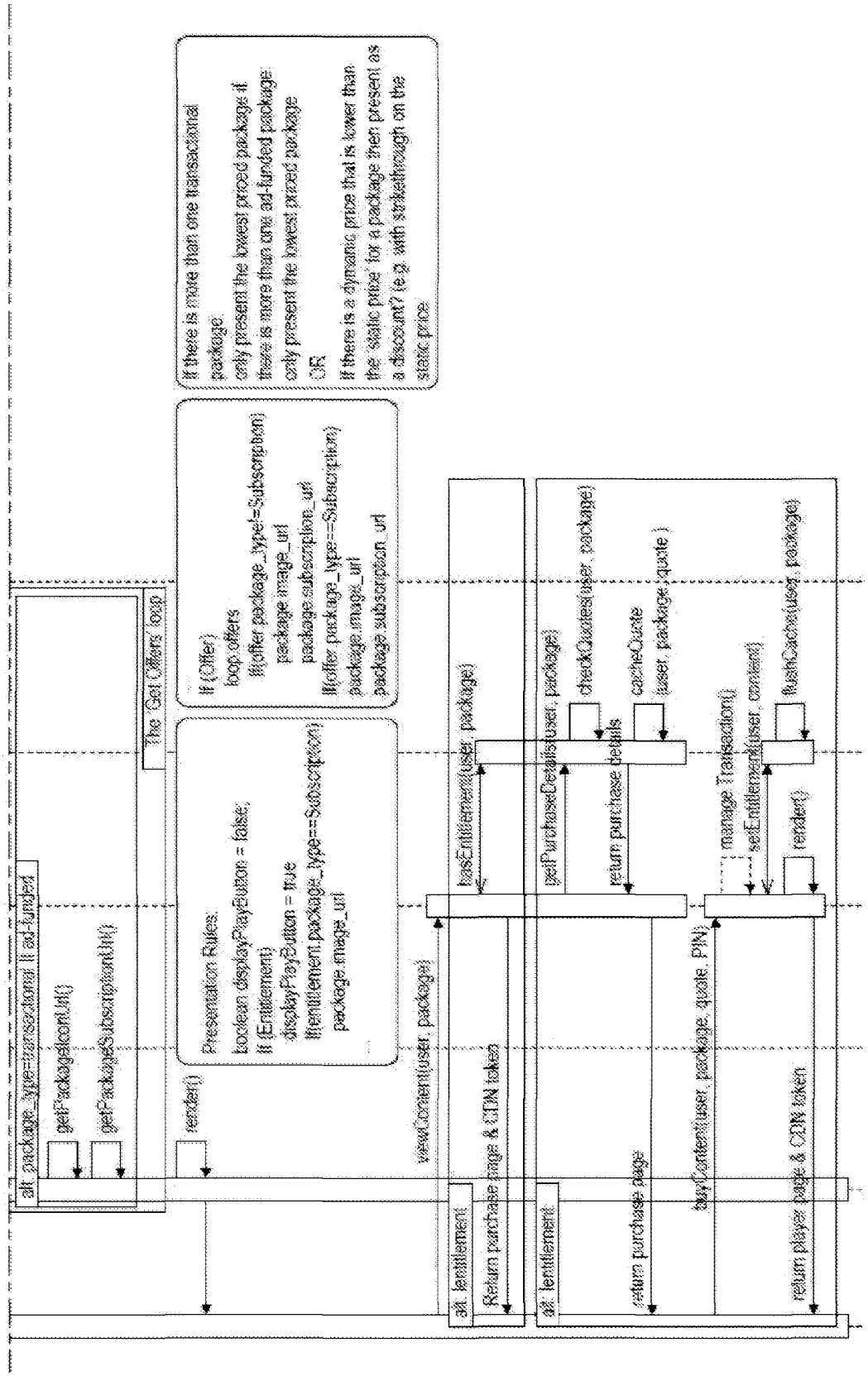


FIG. 77 Cont'd

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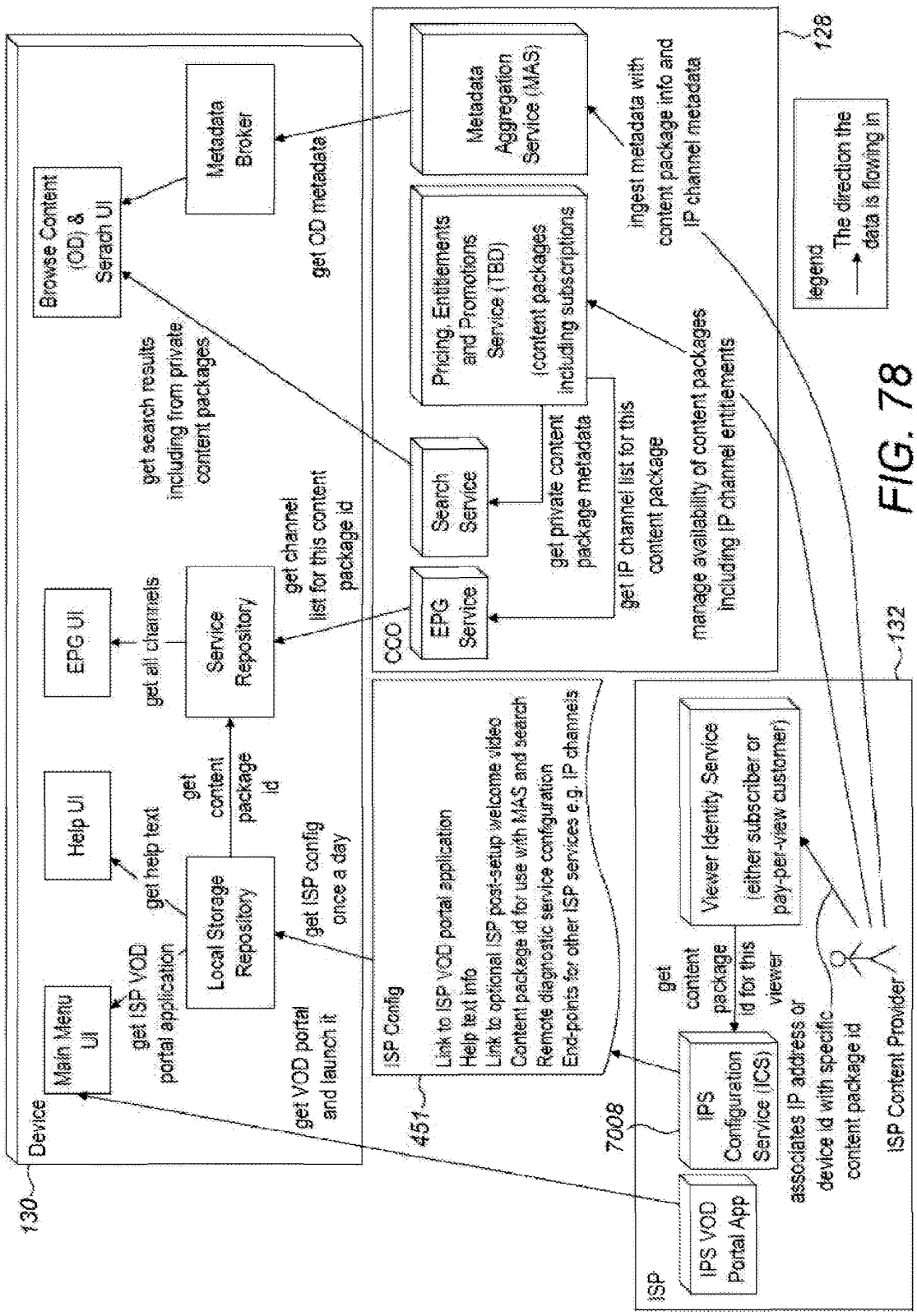


FIG. 78

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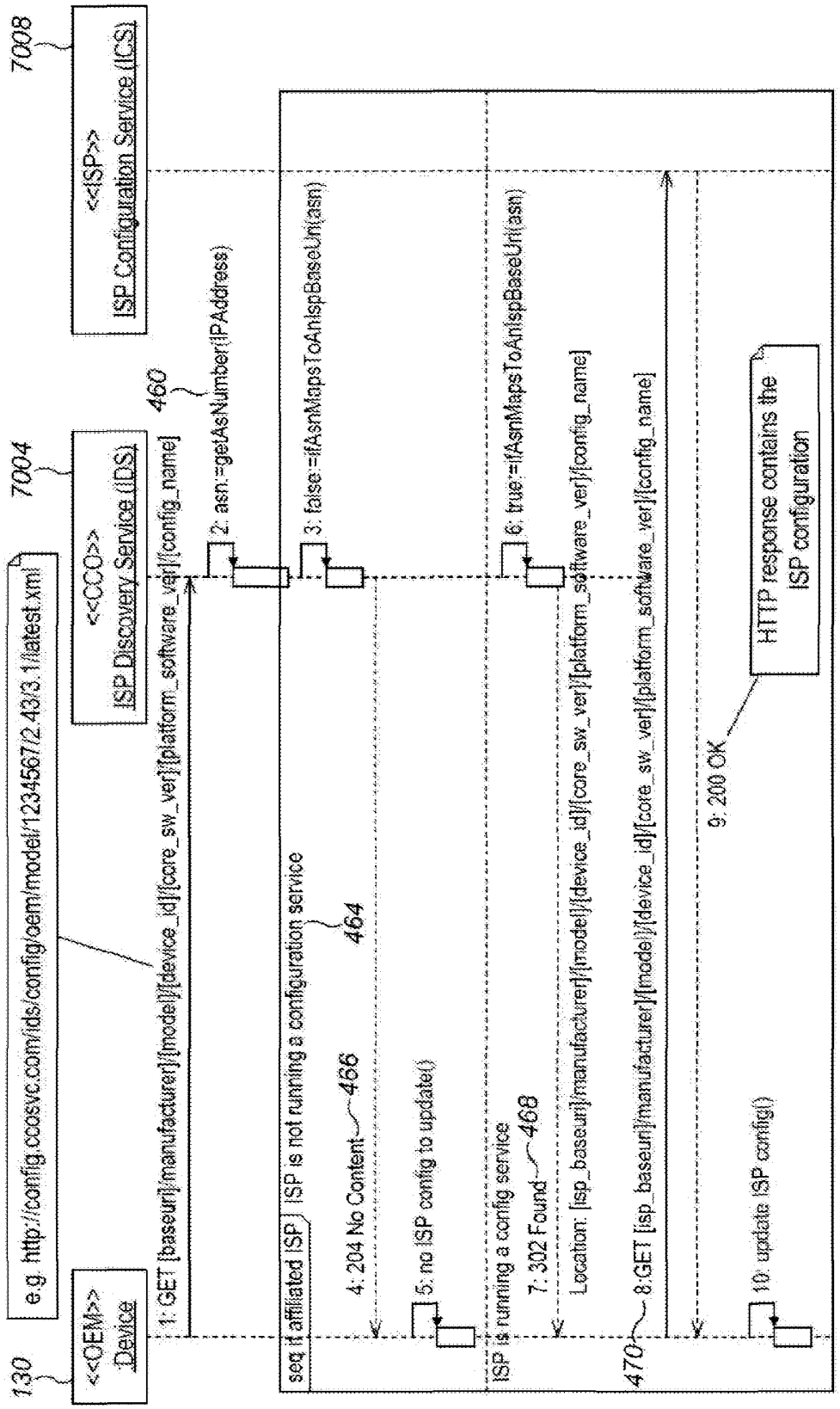


FIG. 79

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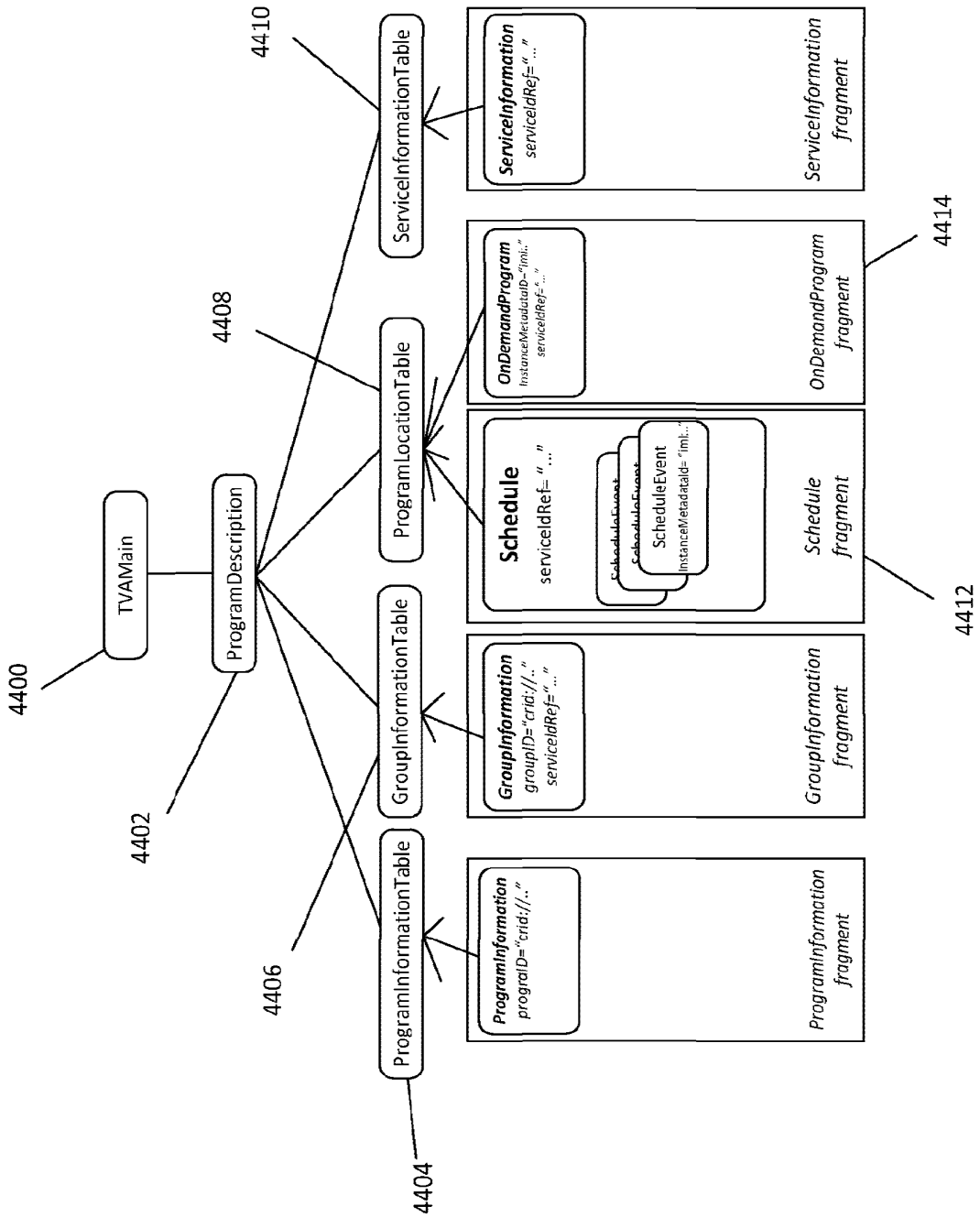


Figure 80

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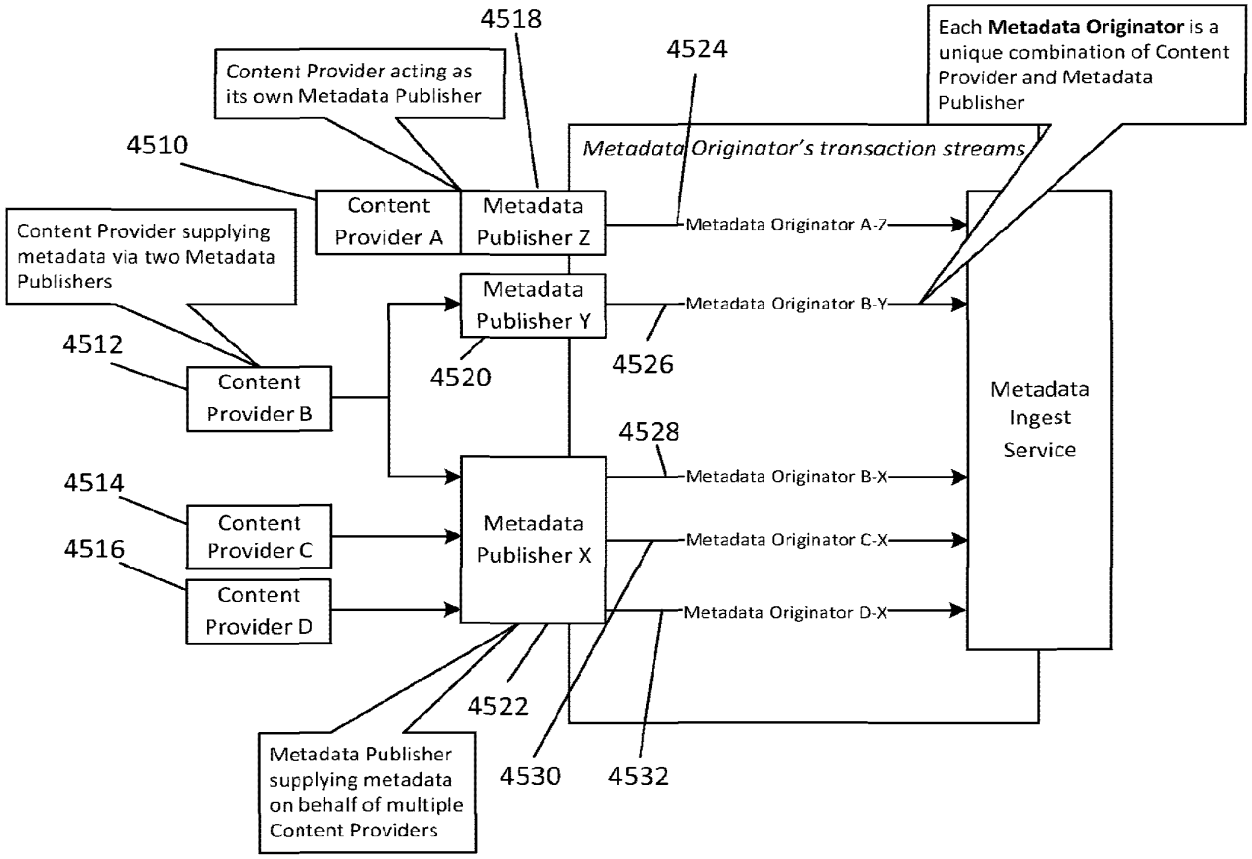


Figure 81

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Sequence: Asynchronous operation mode

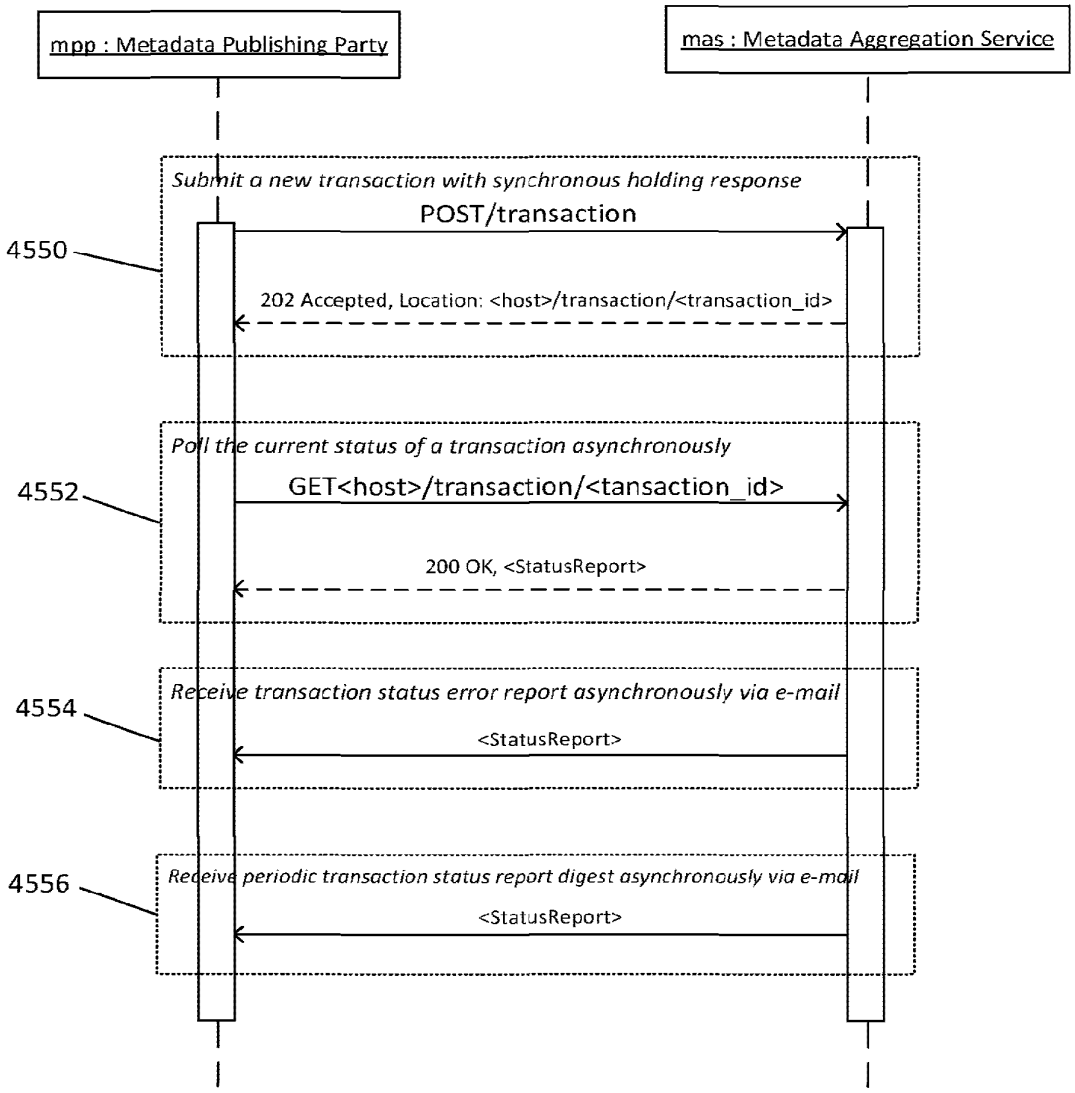


Figure 82

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Sequence: Synchronous operation mode

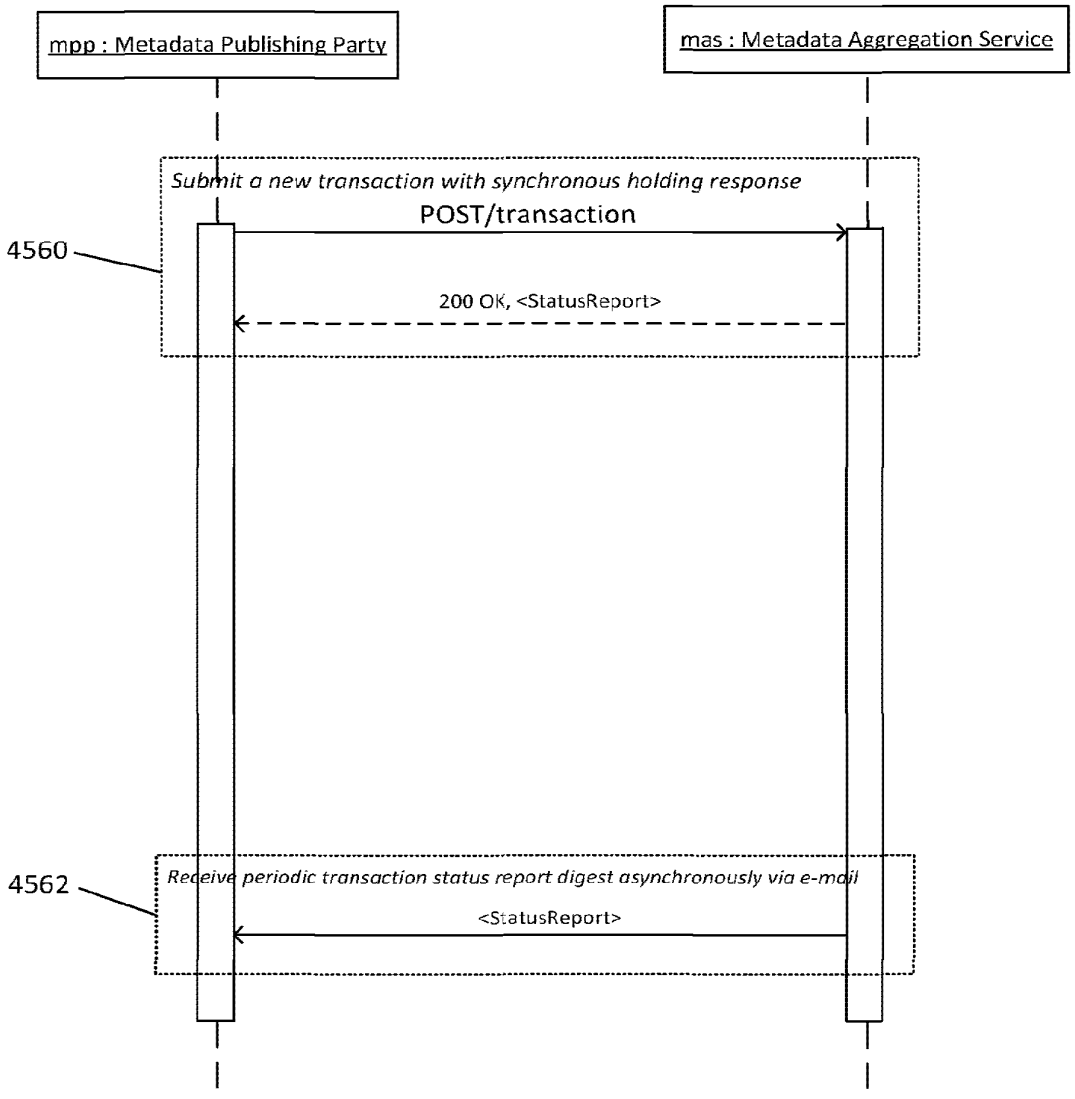


Figure 83

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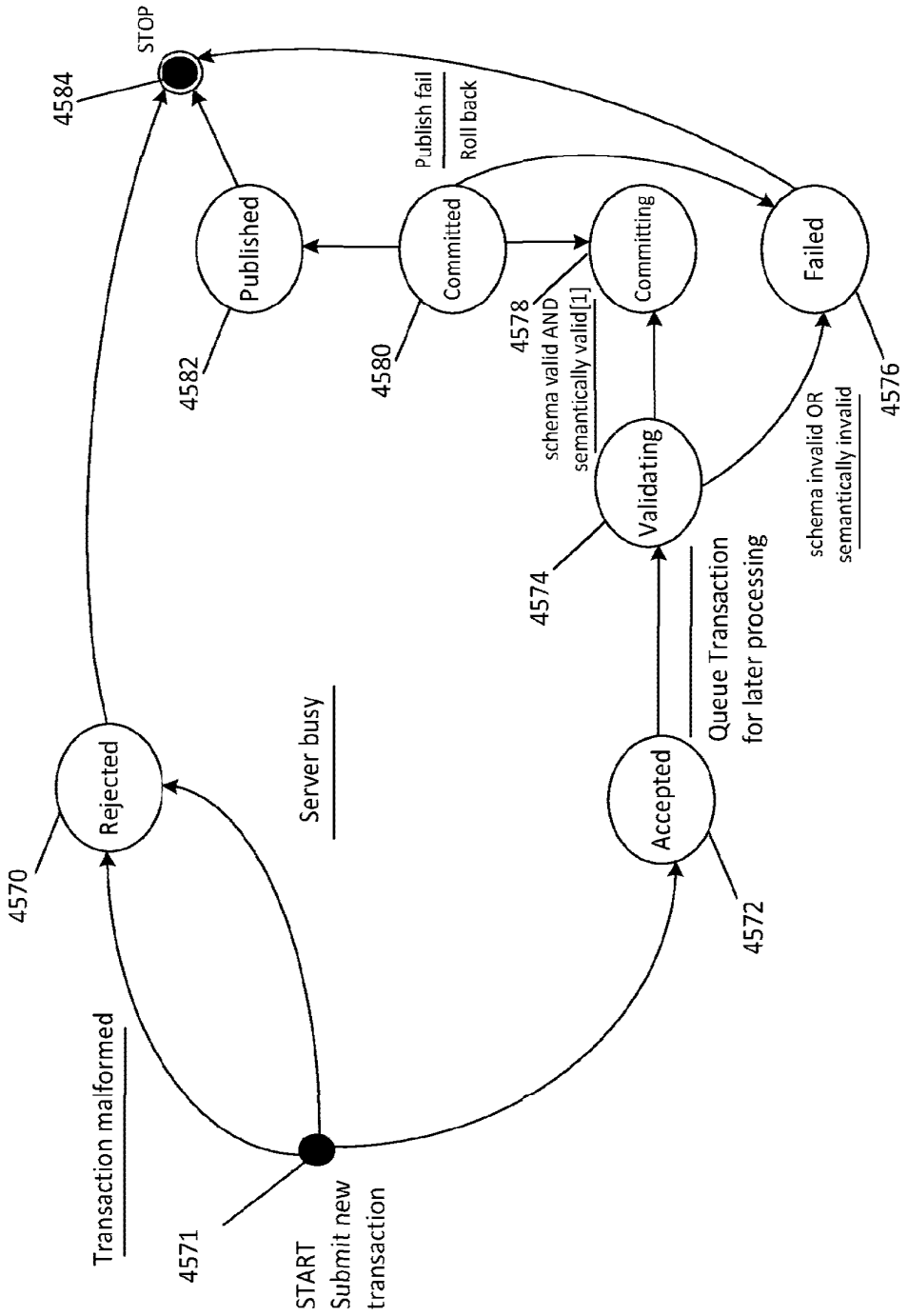


Figure 84

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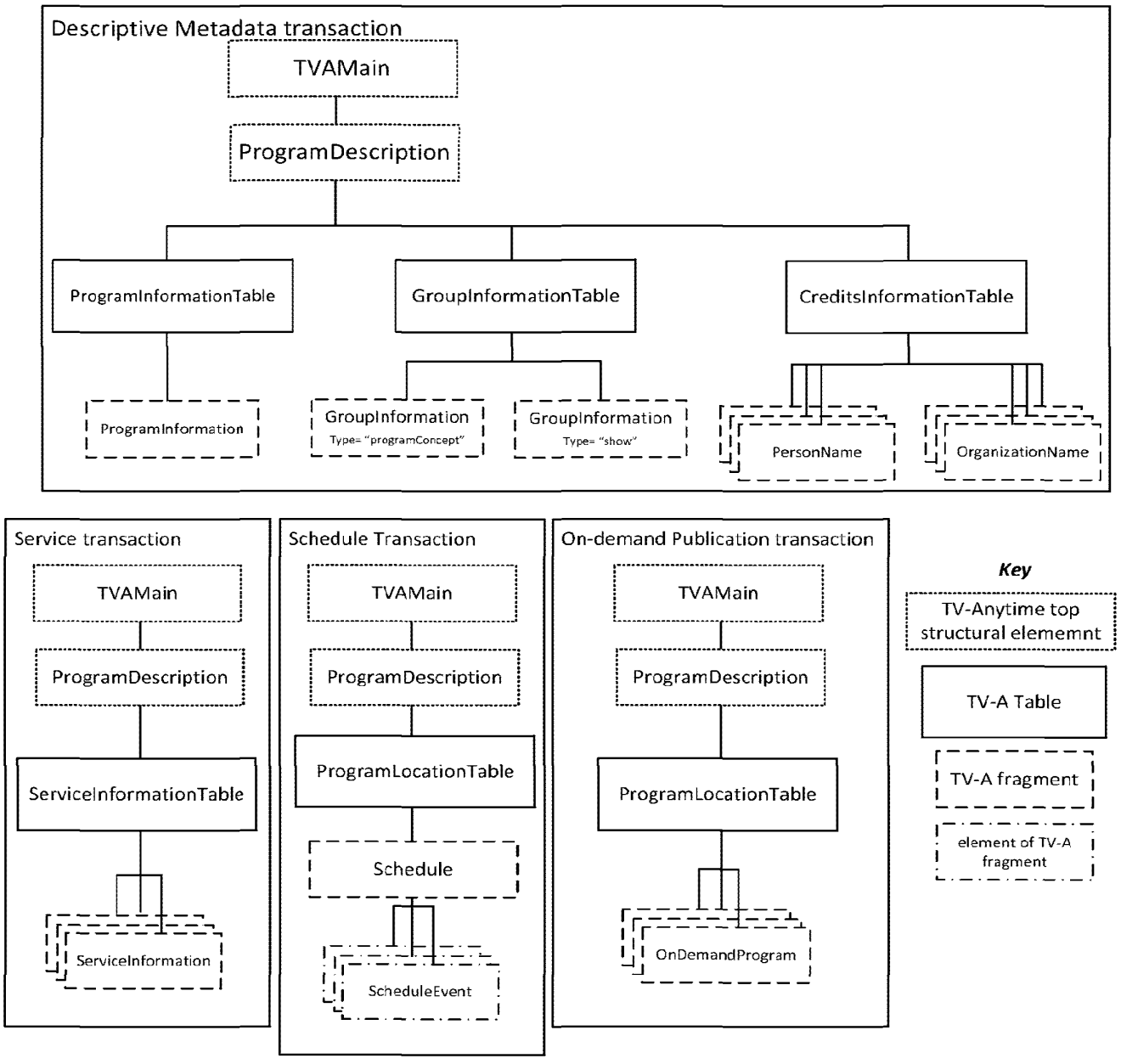


Figure 85

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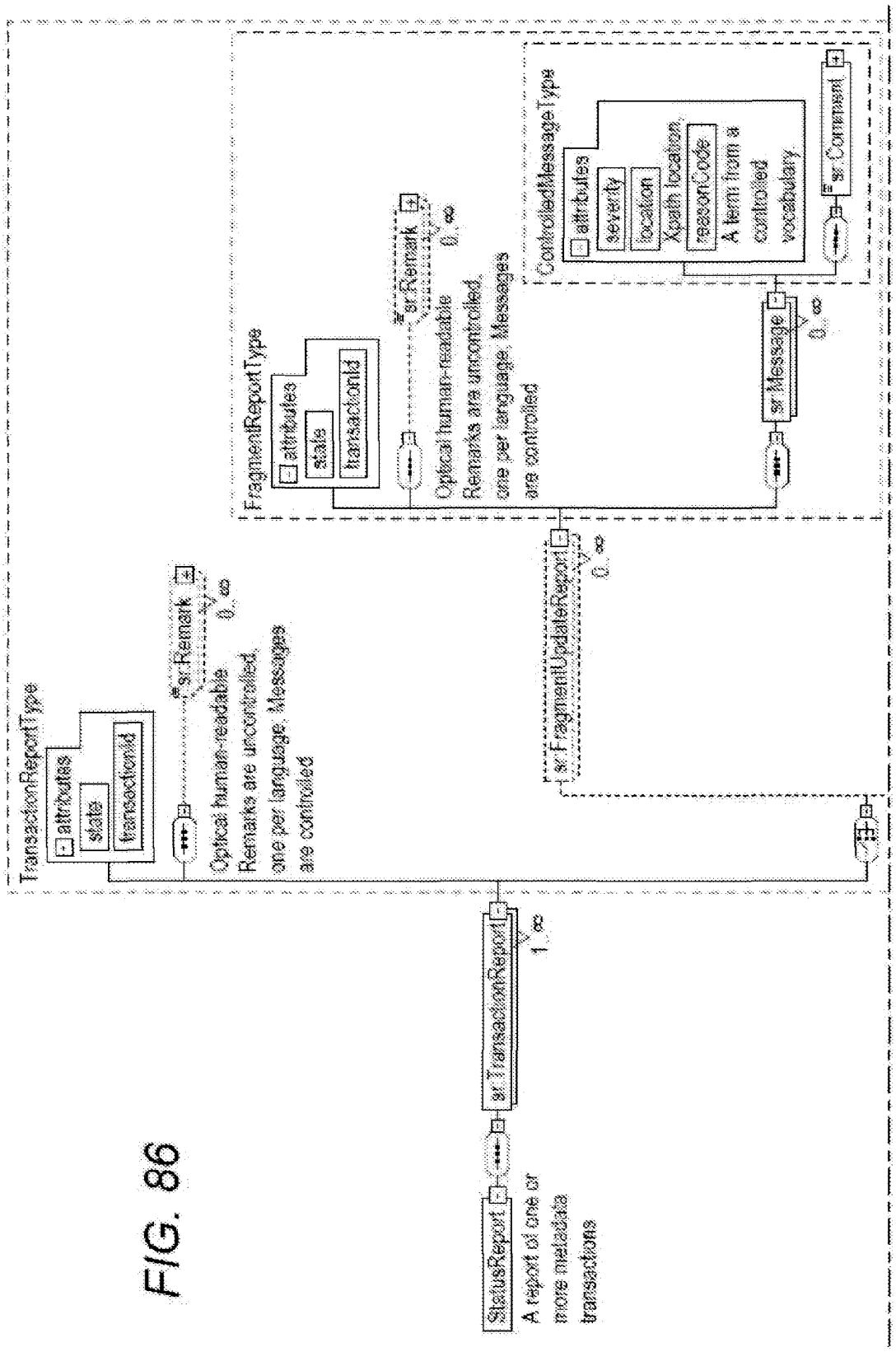


FIG. 86

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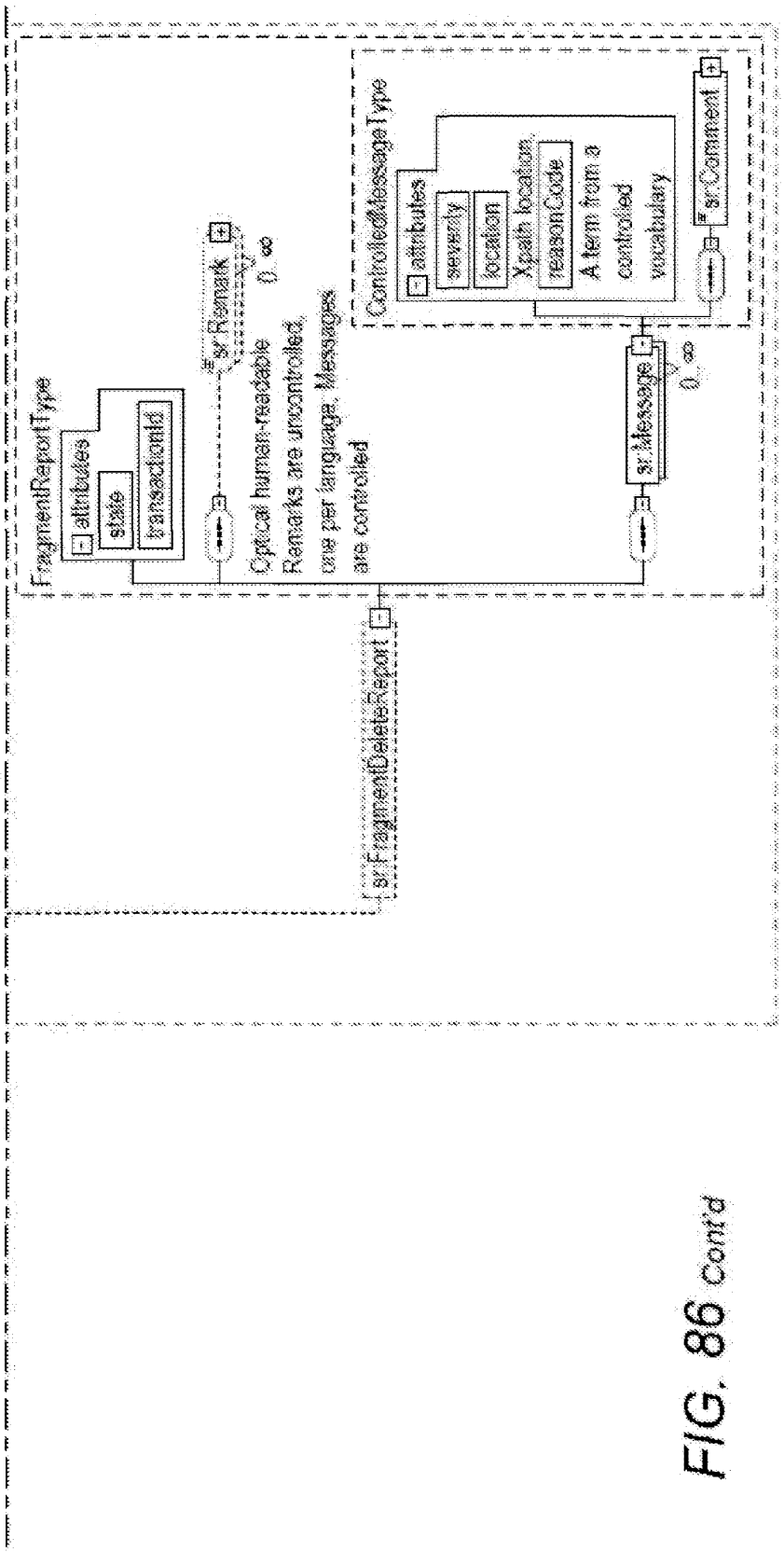


FIG. 86 Cont'd

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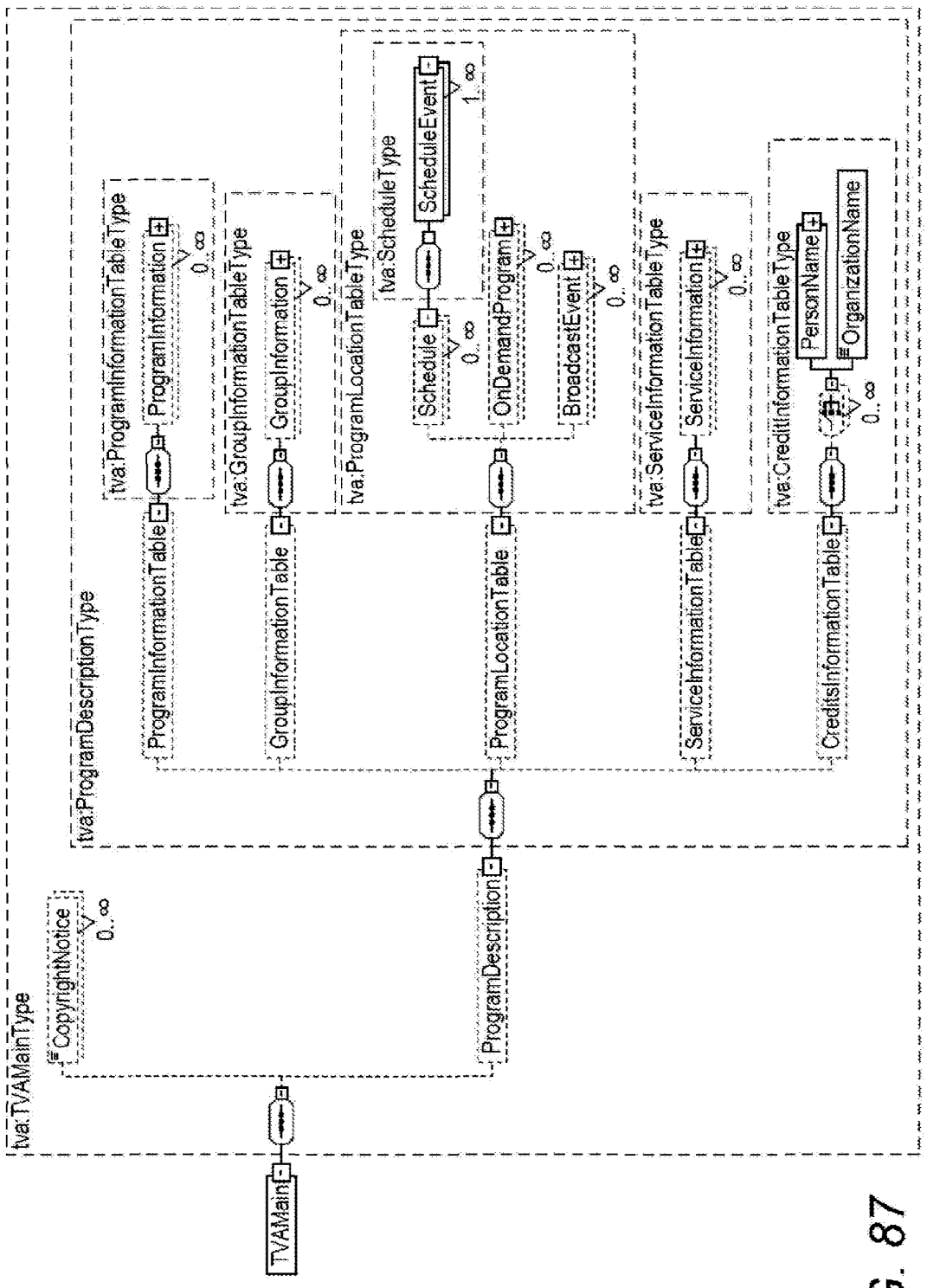


FIG. 87

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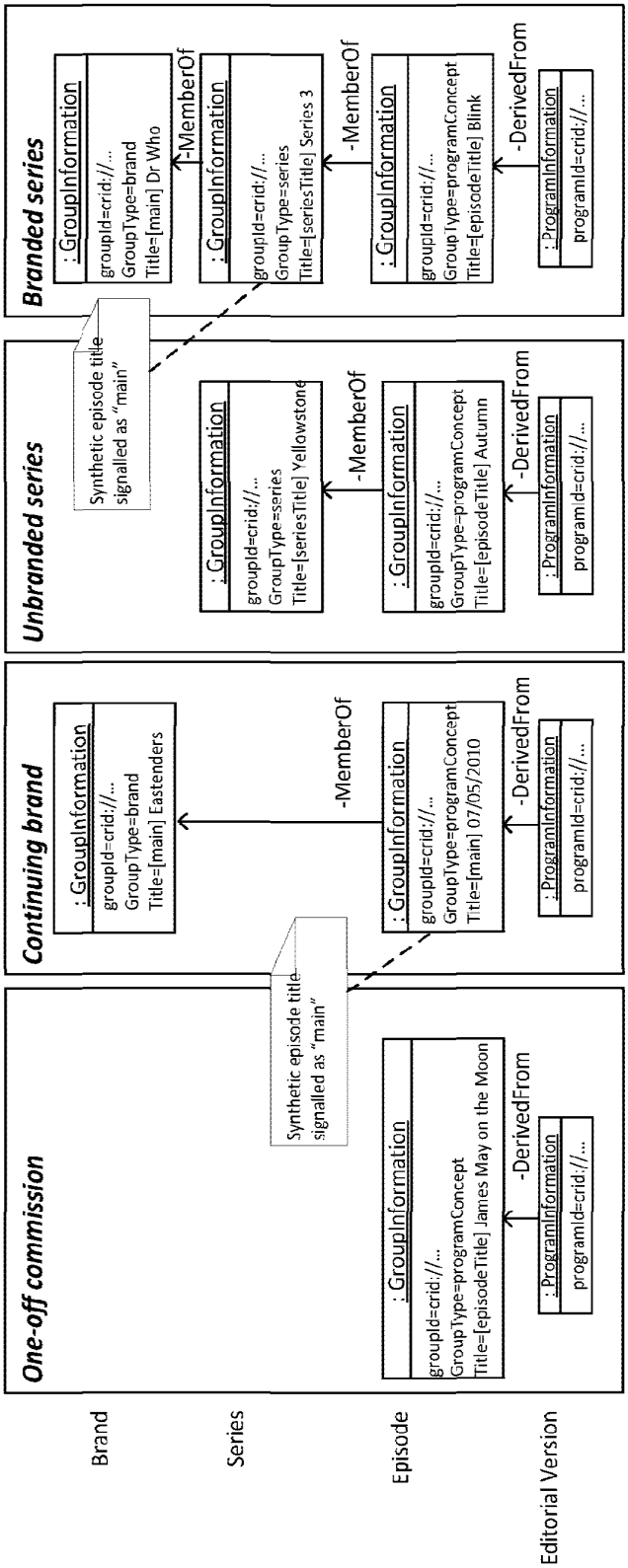


Figure 88

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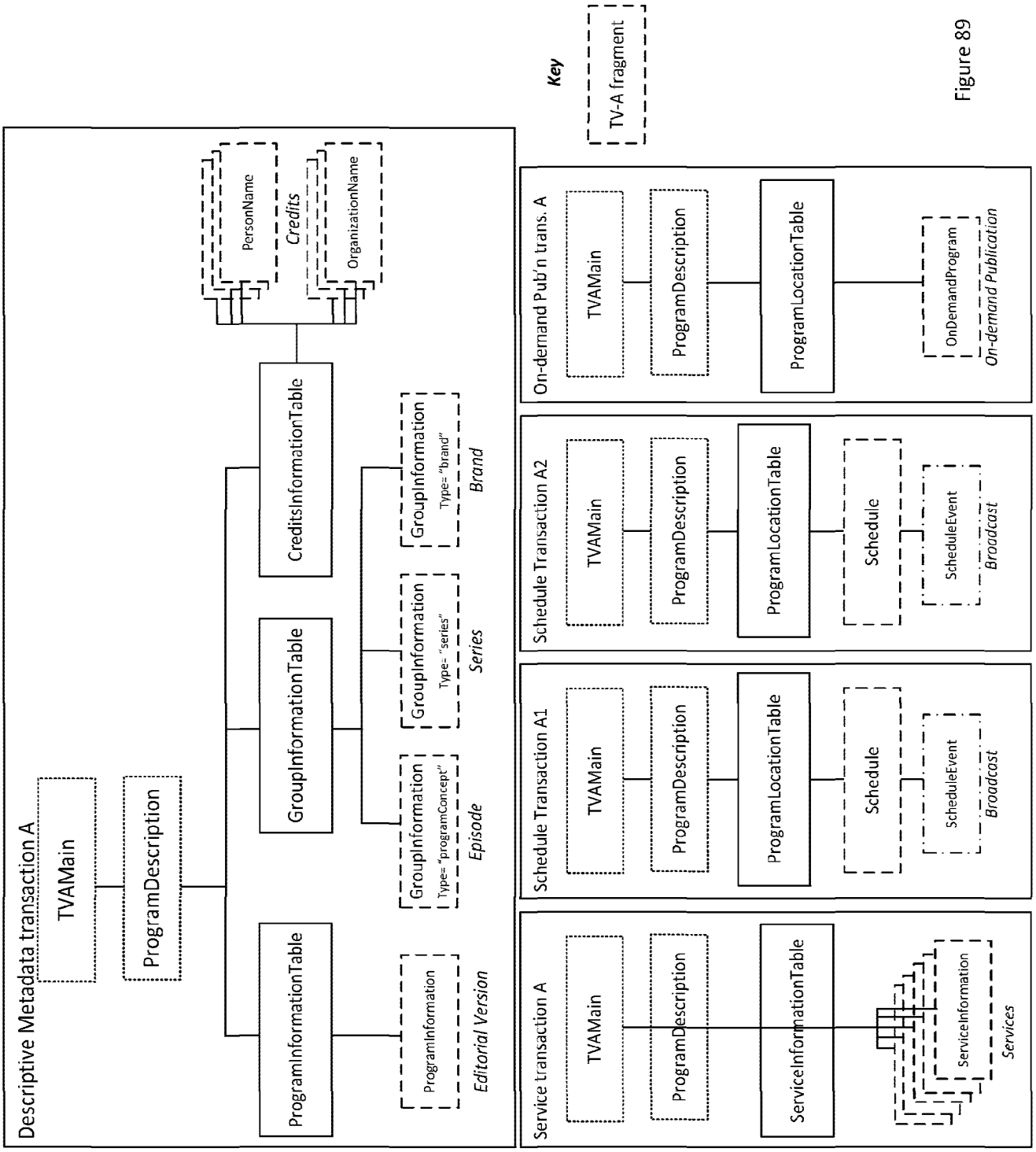


Figure 89

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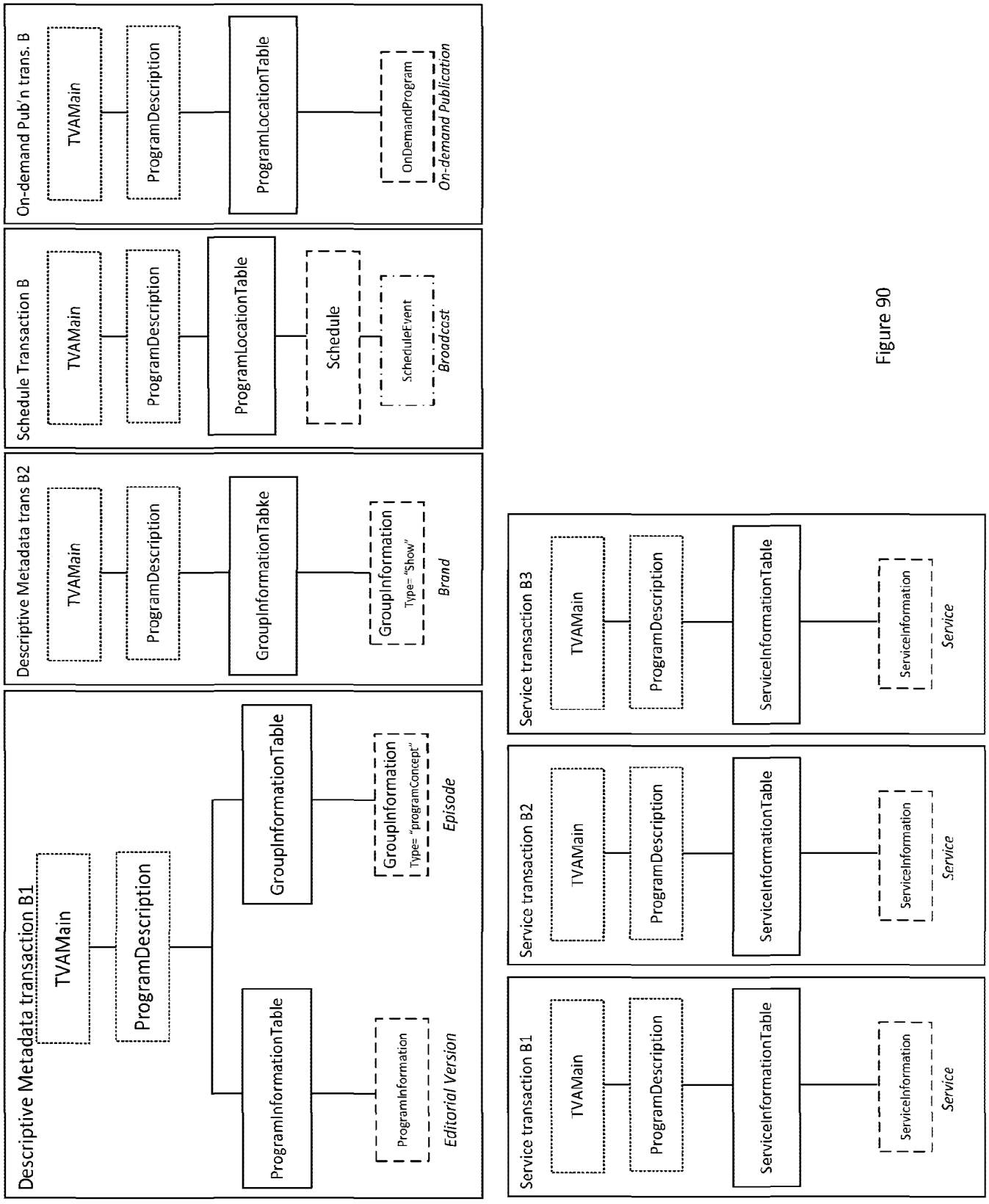


Figure 90

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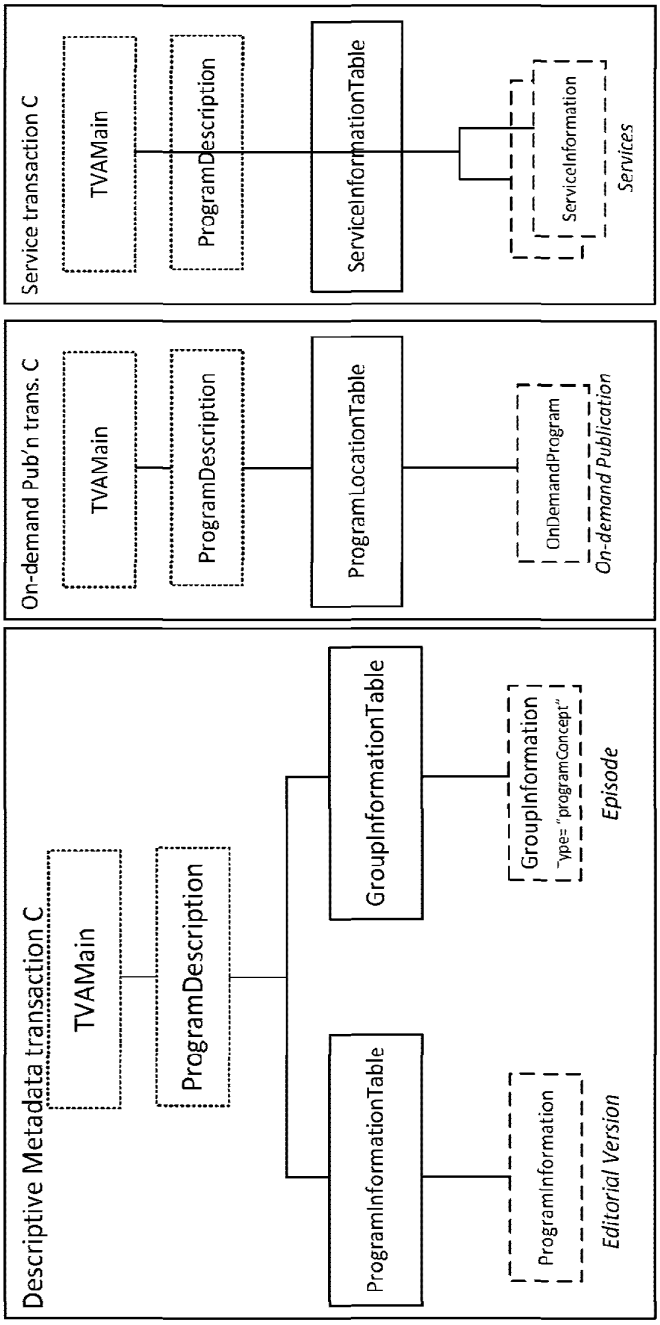


Figure 91

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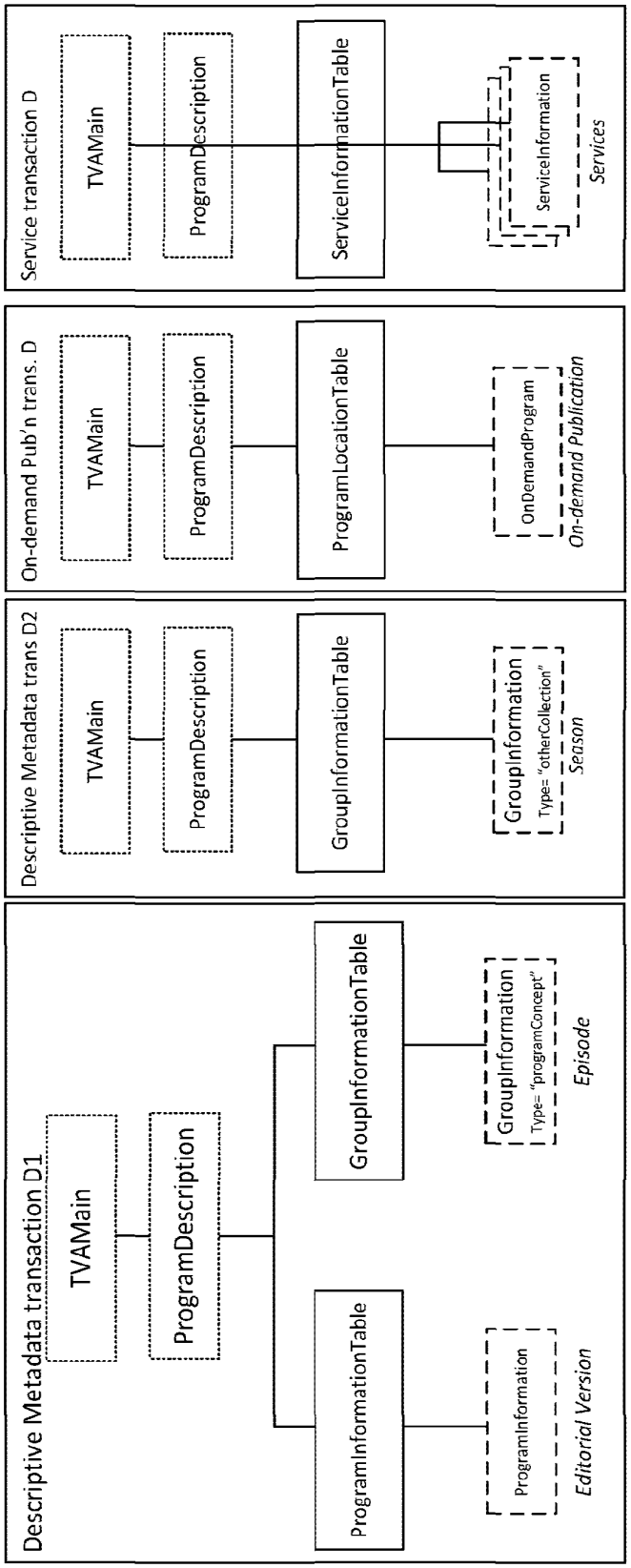


Figure 92

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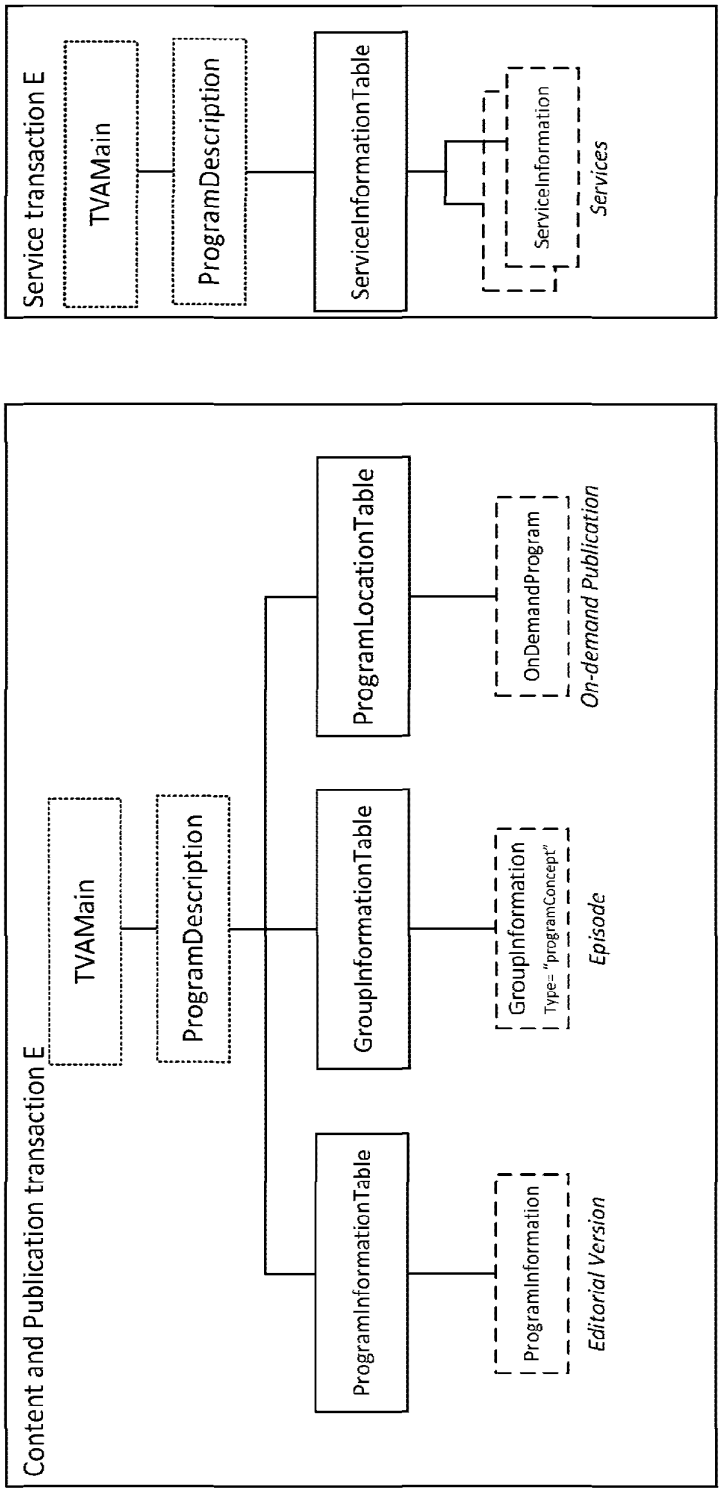


Figure 93

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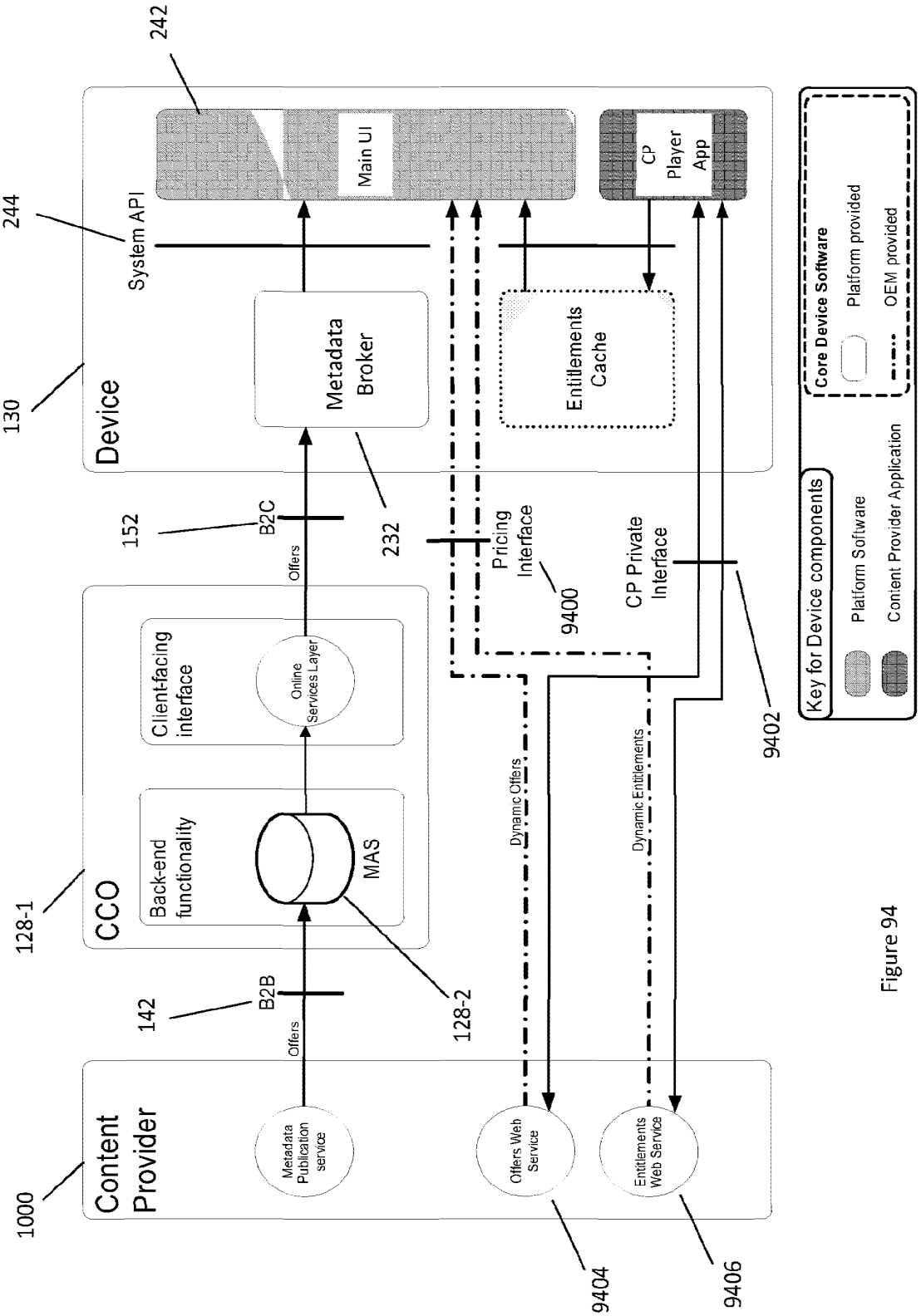


Figure 94

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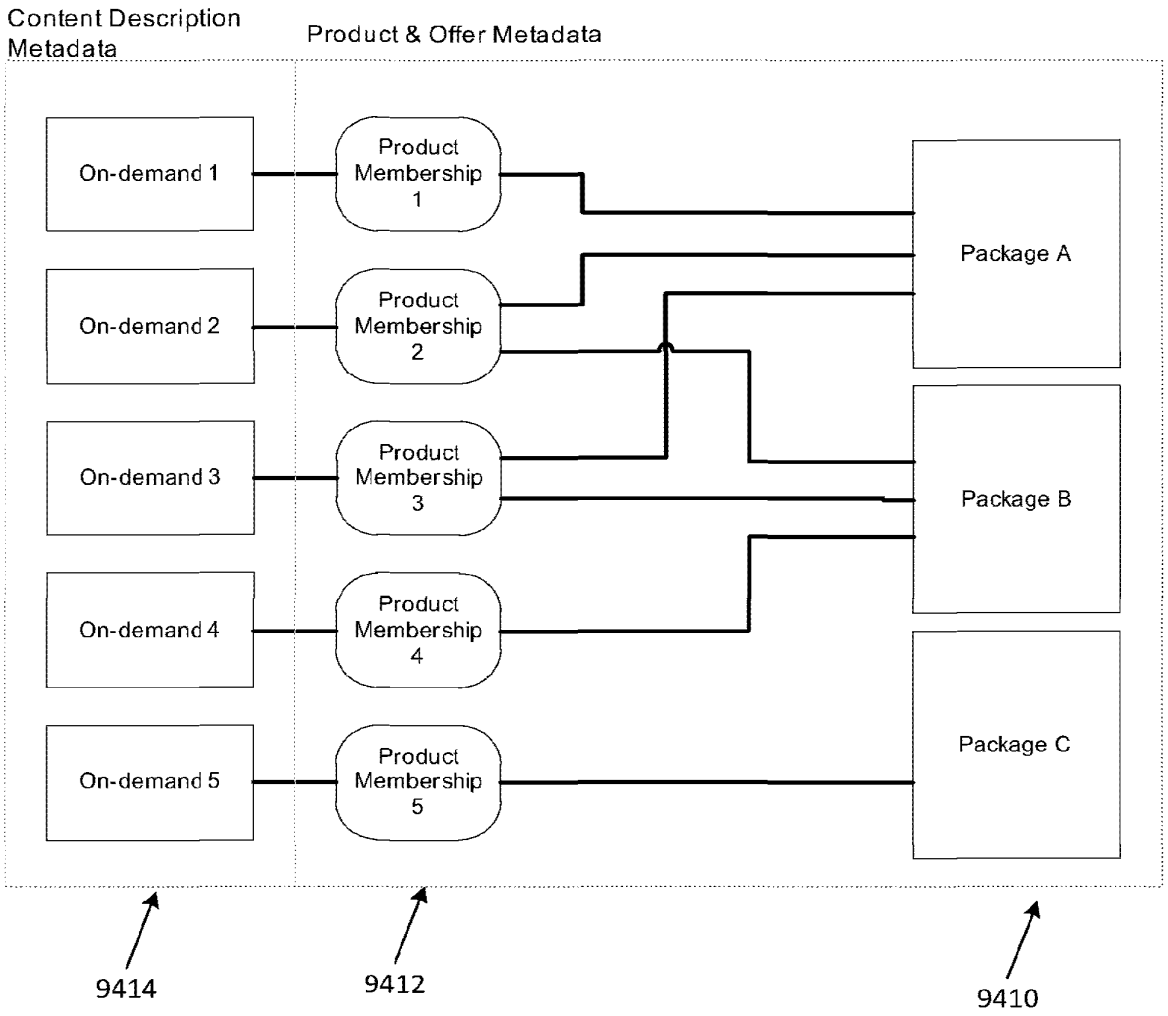


Figure 95

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(71) Applicant *(for all designated States except US)*: **ROVI TECHNOLOGIES CORPORATION** [US/US]; 2830 De La Cruz Boulevard, Santa Clara, California 95050 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **DODSON, Chad** [US/US]; 2177 Watercress Place, San Ramon, California 94582 (US). **POZENEL, James** [US/US]; 1950 Coronada Street, Ann Arbor, Michigan 48103 (US). **BROWN, Donald Scott** [US/US]; 12036 Country River Drive, Rives Junction, Michigan 49277 (US). **STROTH, Jennifer** [US/US]; 2370 Cherrystone Drive, San Jose, California 95128 (US). **JORDAN, David** [US/US]; 575 Pierce Street, Apt. 505, San Francisco, California 94117 (US). **BARR, Jeffrey** [US/US]; 297 Tradewinds Drive #101, San Jose, California 95123 (US). **TRENZ, Daniel Wright** [US/US]; 1706 South Boulevard, Ann Arbor, Michigan 48104 (US).

(74) Agents: **GUILIANO, Joseph M.** et al.; Ropes & Gray LLP, 1211 Avenue of the Americas, New York, New York 10036-8704 (US).

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[Continued on next page]

(54) Title: SYSTEMS AND METHODS FOR MIXED-MEDIA CONTENT GUIDANCE

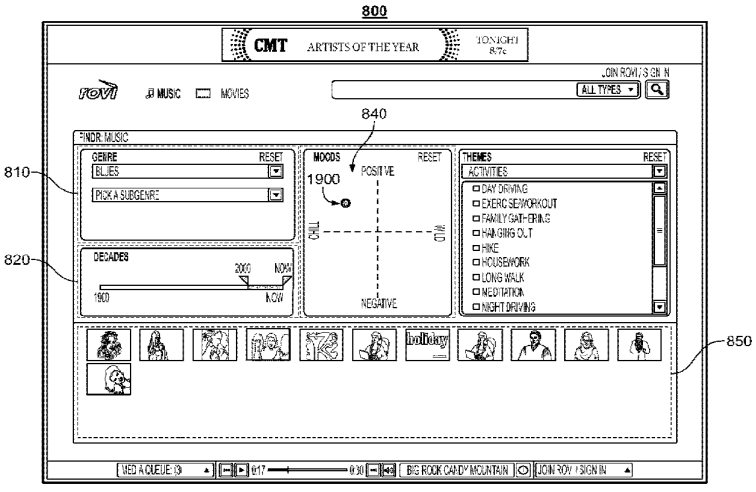


FIG. 19

(57) Abstract: Systems and methods for mixed-media content guidance are provided. One or more interactive tools are provided for searching and/or filtering media content (e.g., music content, movie content, etc.). In some embodiments, these interactive tools may include a two-dimensional selection region, where the two-dimensional selection region is divided into a plurality of sub-regions and defines an intersection between a first criterion and a second criterion. In response to receiving a user selection of a sub-region from the two-dimensional selection region, a subset of a plurality of media identifiers may be determined. At least a portion of the subset of media identifiers may be selected for presentation to the user.

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SYSTEMS AND METHODS FOR MIXED-MEDIA CONTENT GUIDANCE

Cross-Reference to Related Application

[0001] This application claims the benefit under 35 U.S.C. § 119(e) of U.S. Provisional Patent Application No. 61/429,803, filed January 5, 2011, which is hereby incorporated by reference herein in its entirety.

Background of the Invention

[0002] With society awash in an ever-increasing quantity of media content, and as such media content becomes ever more widely available, advanced media guidance application support is becoming increasingly important. For example, with the overwhelming volume of media content available to the average user, it is often difficult for users to decide what media content to consume. At the same time, a convergence of media types and systems is driving the need for media guidance applications to manage and exploit the relationships between different kinds of media content.

Summary of the Invention

[0003] In view of the foregoing, systems and methods for managing and providing content in a mixed-media environment using an interactive media guidance application are provided. For example, the media guidance application may be provided as an on-line application (e.g., provided on a website) that presents users with information associated with movies, television, music, compositions, actors, artists, other entertainment-related content, or a combination thereof. In particular, the interactive media guidance application may provide a user with guidance for selecting content of various content types, such as movies, television programs, and music.

[0004] In some embodiments, interactive tools may be provided that allow the user to search and/or filter content based on different criteria. Content may be filtered by a category and/or a subcategory (e.g., a genre, a subgenre, or any other suitable category of interest), a rating (e.g., PG-13, PG, R, etc.), a time period (e.g., 1980s, 1990s, etc.), a demographic (e.g., toddlers), a theme (e.g., activity), a mood (e.g., positive, negative, chill, wild, etc.), and/or any other suitable criterion. For example, an interactive tool may be provided that allows users to search and/or filter content based on the user's mood. In response to receiving an indication of mood from the user, the control circuitry may search for a television show, music, or a movie with metadata describing one or more moods (e.g., sober, wild, melancholy, ecstatic, etc.) matching the indicated mood.

[0005] One of the interactive tools may include a two-dimensional selection region, where the two-

dimensional selection region is divided into a plurality of sub-regions and defines an intersection between a first criterion and a second criterion. For example, the two-dimensional selection region may define the intersection between two different moods. In another example, the two-dimensional selection region may define the intersection between a mood (e.g., having the bounds positive and negative) and a genre (e.g., having the bounds drama and comedy).

[0006] It should be noted that, in some embodiments, multiple two-dimensional selection regions may be provided. For example, a first two-dimensional selection region that defines the intersection between two sets of moods (e.g., a vertical axis with a "positive" upper bound and a "negative" lower bound and a horizontal axis with a "wild" upper bound and a "chill" lower bound) and a second two-dimensional selection region that defines the intersection between two sets of genres (e.g., a vertical axis with a "light" upper bound and a "heavy" lower bound and a horizontal axis with a "romance" upper bound and a "comedy" lower28857355_1 bound). In response to selecting a sub-region from each two-dimensional selection region, control circuitry may determine one or more media identifiers and their corresponding content for presentation to the user for selection, retrieval, and/or playback.

[0007] In some embodiments, the media guidance application may allow the user to select one or more criterion for placement in the two-dimensional selection region. For example, the control circuitry may transmit a query to a database or any other suitable source to determine criterion available for

placement in the two-dimensional selection region. In response to receiving the available criterion, the control circuitry may populate a prompt that is provided to the user for selecting one or more criterion. In response to selecting criteria, the control circuitry may provide a two-dimensional selection region that is divided into a plurality of sub-regions and that defines an intersection between the selected criteria.

[0008] In some embodiments, the media guidance application may use metadata associated with media content to assist the user in making a selection. For example, the interactive media guidance application may include techniques for managing and exploiting the relationships between different kinds of media content, such as between movies, television, and music. In a more particular example, metadata associated with the media content may be cross-referenced and linked in order to provide users with relevant information spanning the array of media content types.

Brief Description of the Drawings

[0009] The above and other objects and advantages of the invention will be apparent upon consideration of the following detailed description, taken in conjunction with the accompanying drawings, in which like reference characters refer to like parts throughout, and in which:

[0010] FIGS. 1 and 2 show illustrative display screens that may be used to provide media guidance application listings in accordance with some embodiments of the invention;

[0011] FIG. 3 shows an illustrative user equipment device in accordance with some embodiments of the invention;

[0012] FIG. 4 shows a simplified diagram of an interactive media system in accordance with some embodiments of the invention;

[0013] FIG. 5 is a diagram of an illustrative cross-platform interactive media system in accordance with some embodiments of the invention;

[0014] FIGS. 6 and 7 show illustrative display screens of a media guidance application that may be used to provide guidance for various types of media in accordance with some embodiments of the invention;

[0015] FIGS. 8-13 show illustrative display screens of a media guidance application that may be used to provide criteria for search and/or filtering media content (e.g., music content) in accordance with some embodiments of the invention;

[0016] FIG. 14 shows illustrative portions of display screen that may be used to provide a preview audio clip in response to selecting a particular portion of a media identifier in accordance with some embodiments of the invention;

[0017] FIGS. 15 and 16 show an illustrative display screen of a media guidance application that may be used to access information and other media content associated with a particular album, song, or other audio content in accordance with some embodiments of the invention;

[0018] FIG. 17 shows an illustrative display screen of a media guidance application with an overlay containing information related to a currently queued or

playing song in accordance with some embodiments of the invention;

[0019] FIG. 18 shows an illustrative display screen of a media guidance application that may be used to provide information and other media content associated with a particular song in accordance with some embodiments of the invention;

[0020] FIGS. 19-21 show an illustrative display screen of a media guidance application that may be used to search and/or filter music or other audio content using a two-dimensional selection region (for two sets of moods) in accordance with some embodiments of the invention;

[0021] FIGS. 22-27 show illustrative display screens of a media guidance application that may be used to provide criteria for search and/or filtering media content (e.g., movie content and/or video content) in accordance with some embodiments of the invention;

[0022] FIGS. 28 and 29 show an illustrative display screen of a media guidance application that may be used to access information and other media content associated with a particular movie or other video content in accordance with some embodiments of the invention;

[0023] FIG. 30 shows an illustrative display screen of a media guidance application with an overlay containing a trailer or video clip related to a particular movie or other video content in accordance with some embodiments of the invention;

[0024] FIGS. 31-34 show an illustrative display screen of a media guidance application that may be used to access information and/or a media clips related to media content associated with a particular movie (or

other video content) in accordance with some embodiments of the invention;

[0025] FIG. 35 shows an illustrative display screen of a media guidance application that may be used to access additional information (e.g., synopsis and cast information) associated with a particular movie or other media content in accordance with some embodiments of the invention;

[0026] FIGS. 36-39 show an illustrative display screen of a media guidance application that may be used to access information and/or media content associated with a person (e.g., an actor, an artist, or a performer) including a filmography snapshot portion in accordance with some embodiments of the invention;

[0027] FIGS. 40-43 show illustrative display screens of a media guidance application that includes a persistent media queue and allows a user to access music and/or video clips, or other information, related to media content displayed in a cycling advertorial in accordance with some embodiments of the invention;

[0028] FIGS. 44-47 show illustrative display screens of a media guidance application include a persistent media queue that manages one or more lists of music content and/or video content in accordance with some embodiments of the invention;

[0029] FIG. 48 shows an illustrative display screen of a media guidance application depicting a recommendation feature in accordance with some embodiments of the invention;

[0030] FIG. 49 illustrates a flow diagram for selecting media content in response to receiving user-selected criteria from at least a two-dimensional

selection region in accordance with some embodiments of the invention; and

[0031] FIG. 50 shows an illustrative example of a file in Extensible Markup Language (XML) for retrieving media identifiers used to generate selection displays in accordance with some embodiments of the invention.

Detailed Description of Embodiments

[0032] This invention generally relates to systems and methods for managing and providing content in a mixed-media environment using an interactive media guidance application. In particular, systems and methods are provided for searching and/or filtering content of various content types, such as movies, television programs, and music, with a two-dimensional selection region, where the two-dimensional selection region is divided into a plurality of sub-regions and defines an intersection between a first criterion and a second criterion.

[0033] The amount of content available to users in any given content delivery system can be substantial. Consequently, many users desire a form of media guidance through an interface that allows users to efficiently navigate content selections and easily identify content that they may desire. An application that provides such guidance is referred to herein as an interactive media guidance application or, sometimes, a media guidance application or a guidance application.

[0034] Interactive media guidance applications may take various forms depending on the content for which they provide guidance. One typical type of media guidance application is an interactive television program guide. Interactive television program guides

(sometimes referred to as electronic program guides) are well-known guidance applications that, among other things, allow users to navigate among and locate many types of content. As referred to herein, the term "content" should be understood to mean an electronically consumable user asset, such as television programming, as well as pay-per-view programs, on-demand programs (as in video-on-demand (VOD) systems), Internet content (e.g., streaming content, downloadable content, Webcasts, etc.), video clips, audio, content information, pictures, rotating images, documents, playlists, websites, articles, books, electronic books, blogs, advertisements, chat sessions, social media, applications, games, and/or any other media or multimedia and/or combination of the same. Guidance applications also allow users to navigate among and locate content. As referred to herein, the term "multimedia" should be understood to mean content that utilizes at least two different content forms described above, for example, text, audio, images, video, or interactivity content forms. Content may be recorded, played, displayed or accessed by user equipment devices, but can also be part of a live performance.

[0035] With the advent of the Internet, mobile computing, and high-speed wireless networks, users are accessing media on user equipment devices on which they traditionally did not. As referred to herein, the phrase "user equipment device," "user equipment," "user device," "electronic device," "electronic equipment," "media equipment device," or "media device" should be understood to mean any device for accessing the content described above, such as a television, a Smart TV, a

set-top box, an integrated receiver decoder (IRD) for handling satellite television, a digital storage device, a digital media receiver (DMR), a digital media adapter (DMA), a streaming media device, a DVD player, a DVD recorder, a connected DVD, a local media server, a BLU-RAY player, a BLU-RAY recorder, a personal computer (PC), a laptop computer, a tablet computer, a WebTV box, a personal computer television (PC/TV), a PC media server, a PC media center, a hand-held computer, a stationary telephone, a personal digital assistant (PDA), a mobile telephone, a portable video player, a portable music player, a portable gaming machine, a smart phone, or any other television equipment, computing equipment, or wireless device, and/or combination of the same. In some embodiments, the user equipment device may have a front facing screen and a rear facing screen, multiple front screens, or multiple angled screens. In some embodiments, the user equipment device may have a front facing camera and/or a rear facing camera. On these user equipment devices, users may be able to navigate among and locate the same content available through a television. Consequently, media guidance may be available on these devices, as well. The guidance provided may be for content available only through a television, for content available only through one or more of other types of user equipment devices, or for content available both through a television and one or more of the other types of user equipment devices. The media guidance applications may be provided as on-line applications (i.e., provided on a web-site), or as stand-alone applications or clients on user equipment devices. Various devices and platforms that may implement media

guidance applications are described in more detail below.

[0036] One of the functions of the media guidance application is to provide media guidance data to users. As referred to herein, the phrase, "media guidance data" or "guidance data" should be understood to mean any data related to content, such as media listings, media-related information (e.g., broadcast times, broadcast channels, titles, descriptions, ratings information (e.g., parental control ratings, critic's ratings, etc.), genre or category information, actor information, logo data for broadcasters' or providers' logos, etc.), media format (e.g., standard definition, high definition, 3D, etc.), advertisement information (e.g., text, images, media clips, etc.), on-demand information, blogs, websites, and any other type of guidance data that is helpful for a user to navigate among and locate desired content selections.

[0037] FIGS. 1-2 show illustrative display screens that may be used to provide media guidance data. The display screens shown in FIGS. 1-2 and 6-48 may be implemented on any suitable user equipment device or platform. While the displays of FIGS. 1-2 and 6-48 are illustrated as full screen displays, they may also be fully or partially overlaid over content being displayed. A user may indicate a desire to access content information by selecting a selectable option provided in a display screen (e.g., a menu option, a listings option, an icon, a hyperlink, etc.) or pressing a dedicated button (e.g., a GUIDE button) on a remote control or other user input interface or device. In response to the user's indication, the media guidance application may provide a display screen with

media guidance data organized in one of several ways, such as by time and channel in a grid, by time, by channel, by source, by content type, by category (e.g., movies, sports, news, children, or other categories of programming), or other predefined, user-defined, or other organization criteria. The organization of the media guidance data is determined by guidance application data. As referred to herein, the phrase, "guidance application data" should be understood to mean data used in operating the guidance application, such as program information, guidance application settings, user preferences, or user profile information.

[0038] FIG. 1 shows illustrative grid program listings display 100 arranged by time and channel that also enables access to different types of content in a single display. Display 100 may include grid 102 with: (1) a column of channel/content type identifiers 104, where each channel/content type identifier (which is a cell in the column) identifies a different channel or content type available; and (2) a row of time identifiers 106, where each time identifier (which is a cell in the row) identifies a time block of programming. Grid 102 also includes cells of program listings, such as program listing 108, where each listing provides the title of the program provided on the listing's associated channel and time. With a user input device, a user can select program listings by moving highlight region 110. Information relating to the program listing selected by highlight region 110 may be provided in program information region 112. Region 112 may include, for example, the program title, the program description, the time the program is

provided (if applicable), the channel the program is on (if applicable), the program's rating, and other desired information.

[0039] In addition to providing access to linear programming (e.g., content that is scheduled to be transmitted to a plurality of user equipment devices at a predetermined time and is provided according to a schedule), the media guidance application also provides access to non-linear programming (e.g., content accessible to a user equipment device at any time and is not provided according to a schedule). Non-linear programming may include content from different content sources including on-demand content (e.g., VOD), Internet content (e.g., streaming media, downloadable media, etc.), locally stored content (e.g., content stored on any user equipment device described above or other storage device), or other time-independent content. On-demand content may include movies or any other content provided by a particular content provider (e.g., HBO On Demand providing "The Sopranos" and "Curb Your Enthusiasm"). HBO ON DEMAND is a service mark owned by Time Warner Company L.P. et al. and THE SOPRANOS and CURB YOUR ENTHUSIASM are trademarks owned by the Home Box Office, Inc. Internet content may include web events, such as a chat session or Webcast, or content available on-demand as streaming content or downloadable content through an Internet web site or other Internet access (e.g. FTP).

[0040] Grid 102 may provide media guidance data for non-linear programming including on-demand listing 114, recorded content listing 116, and Internet content listing 118. A display combining media guidance data for content from different types of content sources is

sometimes referred to as a "mixed-media" display. Various permutations of the types of media guidance data that may be displayed that are different than display 100 may be based on user selection or guidance application definition (e.g., a display of only recorded and broadcast listings, only on-demand and broadcast listings, etc.). As illustrated, listings 114, 116, and 118 are shown as spanning the entire time block displayed in grid 102 to indicate that selection of these listings may provide access to a display dedicated to on-demand listings, recorded listings, or Internet listings, respectively. In some embodiments, listings for these content types may be included directly in grid 102. Additional media guidance data may be displayed in response to the user selecting one of the navigational icons 120. (Pressing an arrow key on a user input device may affect the display in a similar manner as selecting navigational icons 120.)

[0041] Display 100 may also include video region 122, advertisement 124, and options region 126. Video region 122 may allow the user to view and/or preview programs that are currently available, will be available, or were available to the user. The content of video region 122 may correspond to, or be independent from, one of the listings displayed in grid 102. Grid displays including a video region are sometimes referred to as picture-in-guide (PIG) displays. PIG displays and their functionalities are described in greater detail in Satterfield et al. U.S. Patent No. 6,564,378, issued May 13, 2003 and Yuen et al. U.S. Patent No. 6,239,794, issued May 29, 2001, which are hereby incorporated by reference herein in their entireties. PIG displays may be included in

other media guidance application display screens of the embodiments described herein.

[0042] Advertisement 124 may provide an advertisement for content that, depending on a viewer's access rights (e.g., for subscription programming), is currently available for viewing, will be available for viewing in the future, or may never become available for viewing, and may correspond to or be unrelated to one or more of the content listings in grid 102. Advertisement 124 may also be for products or services related or unrelated to the content displayed in grid 102. Advertisement 124 may be selectable and provide further information about content, provide information about a product or a service, enable purchasing of content, a product, or a service, provide content relating to the advertisement, etc. Advertisement 124 may be targeted based on a user's profile/preferences, monitored user activity, the type of display provided, or on other suitable targeted advertisement bases.

[0043] While advertisement 124 is shown as rectangular or banner shaped, advertisements may be provided in any suitable size, shape, and location in a guidance application display. For example, advertisement 124 may be provided as a rectangular shape that is horizontally adjacent to grid 102. This is sometimes referred to as a panel advertisement. In addition, advertisements may be overlaid over content or a guidance application display or embedded within a display. Advertisements may also include text, images, rotating images, video clips, or other types of content described above. Advertisements may be stored in a user equipment device having a guidance application, in a database connected to the user equipment, in a remote

location (including streaming media servers), or on other storage means, or a combination of these locations. Providing advertisements in a media guidance application is discussed in greater detail in, for example, Knudson et al., U.S. Patent Application Publication No. 2003/0110499, filed January 17, 2003; Ward, III et al. U.S. Patent No. 6,756,997, issued June 29, 2004; and Schein et al. U.S. Patent No. 6,388,714, issued May 14, 2002, which are hereby incorporated by reference herein in their entireties. It will be appreciated that advertisements may be included in other media guidance application display screens of the embodiments described herein.

[0044] Options region 126 may allow the user to access different types of content, media guidance application displays, and/or media guidance application features. Options region 126 may be part of display 100 (and other display screens described herein), or may be invoked by a user by selecting an on-screen option or pressing a dedicated or assignable button on a user input device. The selectable options within options region 126 may concern features related to program listings in grid 102 or may include options available from a main menu display. Features related to program listings may include searching for other air times or ways of receiving a program, recording a program, enabling series recording of a program, setting program and/or channel as a favorite, purchasing a program, or other features. Options available from a main menu display may include search options, VOD options, parental control options, Internet options, cloud-based options, device synchronization options, second screen device options,

options to access various types of media guidance data displays, options to subscribe to a premium service, options to edit a user's profile, options to access a browse overlay, or other options.

[0045] The media guidance application may be personalized based on a user's preferences. A personalized media guidance application allows a user to customize displays and features to create a personalized "experience" with the media guidance application. This personalized experience may be created by allowing a user to input these customizations and/or by the media guidance application monitoring user activity to determine various user preferences. Users may access their personalized guidance application by logging in or otherwise identifying themselves to the guidance application. Customization of the media guidance application may be made in accordance with a user profile. The customizations may include varying presentation schemes (e.g., color scheme of displays, font size of text, etc.), aspects of content listings displayed (e.g., only HDTV or only 3D programming, user-specified broadcast channels based on favorite channel selections, re-ordering the display of channels, recommended content, etc.), desired recording features (e.g., recording or series recordings for particular users, recording quality, etc.), parental control settings, customized presentation of Internet content (e.g., presentation of social media content, e-mail, electronically delivered articles, etc.) and other desired customizations.

[0046] For example, as described above, the media guidance application may select one or more criteria

for searching and/or filtering media content based on a user profile, user history, previously recorded content, previously ordered content, parental control settings, etc.

[0047] The media guidance application may allow a user to provide user profile information or may automatically compile user profile information. The media guidance application may, for example, monitor the content the user accesses and/or other interactions the user may have with the guidance application. Additionally, the media guidance application may obtain all or part of other user profiles that are related to a particular user (e.g., from other web sites on the Internet the user accesses, such as www.allrovi.com, from other media guidance applications the user accesses, from other interactive applications the user accesses, from another user equipment device of the user, etc.), and/or obtain information about the user from other sources that the media guidance application may access. As a result, a user can be provided with a unified guidance application experience across the user's different user equipment devices. This type of user experience is described in greater detail below in connection with FIG. 5. Additional personalized media guidance application features are described in greater detail in Ellis et al., U.S. Patent Application Publication No. 2005/0251827, filed July 11, 2005, Boyer et al., U.S. Patent No. 7,165,098, issued January 16, 2007, and Ellis et al., U.S. Patent Application Publication No. 2002/0174430, filed February 21, 2002, which are hereby incorporated by reference herein in their entireties.

[0048] Another display arrangement for providing media guidance is shown in FIG. 2. Video mosaic display 200 includes selectable options 202 for content information organized based on content type, genre, and/or other organization criteria. In display 200, television listings option 204 is selected, thus providing listings 206, 208, 210, and 212 as broadcast program listings. In display 200, the listings may provide graphical images including cover art, still images from the content, video clip previews, live video from the content, or other types of content that indicate to a user the content being described by the media guidance data in the listing. Each of the graphical listings may also be accompanied by text to provide further information about the content associated with the listing. For example, listing 208 may include more than one portion, including media portion 214 and text portion 216. Media portion 214 and/or text portion 216 may be selectable to view content in full-screen or to view information related to the content displayed in media portion 214 (e.g., to view listings for the channel that the video is displayed on).

[0049] The listings in display 200 are of different sizes (i.e., listing 206 is larger than listings 208, 210, and 212), but if desired, all the listings may be the same size. Listings may be of different sizes or graphically accentuated to indicate degrees of interest to the user or to emphasize certain content, as desired by the content provider or based on user preferences. Various systems and methods for graphically accentuating content listings are discussed in, for example, Yates, U.S. Patent Application Publication No.

2010/0153885, filed December 29, 2005, which is hereby incorporated by reference herein in its entirety.

[0050] Users may access content and the media guidance application (and its display screens described above and below) from one or more of their user equipment devices. FIG. 3 shows a generalized embodiment of illustrative user equipment device 300. More specific implementations of user equipment devices are discussed below in connection with FIG. 5. User equipment device 300 may receive content and data via input/output (hereinafter "I/O") path 302. I/O path 302 may provide content (e.g., broadcast programming, on-demand programming, Internet content, content available over a local area network (LAN) or wide area network (WAN), and/or other content) and data to control circuitry 304, which includes processing circuitry 306 and storage 308. Control circuitry 304 may be used to send and receive commands, requests, and other suitable data using I/O path 302. I/O path 302 may connect control circuitry 304 (and specifically processing circuitry 306) to one or more communications paths (described below). I/O functions may be provided by one or more of these communications paths, but are shown as a single path in FIG. 3 to avoid overcomplicating the drawing.

[0051] Control circuitry 304 may be based on any suitable processing circuitry such as processing circuitry 306. As referred to herein, processing circuitry should be understood to mean circuitry based on one or more microprocessors, microcontrollers, digital signal processors, programmable logic devices, field-programmable gate arrays (FPGAs), application-specific integrated circuits (ASICs), etc., and may

include a multi-core processor (e.g., dual-core, quad-core, hexa-core, or any suitable number of cores) or supercomputer. In some embodiments, processing circuitry may be distributed across multiple separate processors or processing units, for example, multiple of the same type of processing units (e.g., two Intel Core i7 processors) or multiple different processors (e.g., an Intel Core i5 processor and an Intel Core i7 processor). In some embodiments, control circuitry 304 executes instructions for a media guidance application stored in memory (i.e., storage 308).

[0052] In client-server based embodiments, control circuitry 304 may include communications circuitry suitable for communicating with a guidance application server or other networks or servers. The instructions for carrying out the above mentioned functionality may be stored on the guidance application server. Communications circuitry may include a cable modem, an integrated services digital network (ISDN) modem, a digital subscriber line (DSL) modem, a telephone modem, Ethernet card, or a wireless modem for communications with other equipment, or any other suitable communications circuitry. Such communications may involve the Internet or any other suitable communications networks or paths (which is described in more detail in connection with FIG. 5). In addition, communications circuitry may include circuitry that enables peer-to-peer communication of user equipment devices, or communication of user equipment devices in locations remote from each other (described in more detail below).

[0053] Memory may be an electronic storage device provided as storage 308 that is part of control

circuitry 304. As referred to herein, the phrase "electronic storage device" or "storage device" should be understood to mean any device for storing electronic data, computer software, or firmware, such as random-access memory, read-only memory, hard drives, optical drives, digital video disc (DVD) recorders, compact disc (CD) recorders, BLU-RAY disc (BD) recorders, BLU-RAY 3D disc recorders, digital video recorders (DVR, sometimes called a personal video recorder, or PVR), solid state devices, quantum storage devices, gaming consoles, gaming media, or any other suitable fixed or removable storage devices, and/or any combination of the same. Storage 308 may be used to store various types of content described herein as well as media guidance information, described above, and guidance application data, described above. Nonvolatile memory may also be used (e.g., to launch a boot-up routine and other instructions). Cloud-based storage, described in relation to FIG. 5, may be used to supplement storage 308 or instead of storage 308.

[0054] Control circuitry 304 may include video generating circuitry and tuning circuitry, such as one or more analog tuners, one or more MPEG-2 decoders or other digital decoding circuitry, high-definition tuners, or any other suitable tuning or video circuits or combinations of such circuits. Encoding circuitry (e.g., for converting over-the-air, analog, or digital signals to MPEG signals for storage) may also be provided. Control circuitry 304 may also include scaler circuitry for upconverting and downconverting content into the preferred output format of the user equipment 300. Circuitry 304 may also include digital-to-analog converter circuitry and analog-to-digital

converter circuitry for converting between digital and analog signals. The tuning and encoding circuitry may be used by the user equipment device to receive and to display, to play, or to record content. The tuning and encoding circuitry may also be used to receive guidance data. The circuitry described herein, including for example, the tuning, video generating, encoding, decoding, encrypting, decrypting, scaler, and analog/digital circuitry, may be implemented using software running on one or more general purpose or specialized processors. Multiple tuners may be provided to handle simultaneous tuning functions (e.g., watch and record functions, picture-in-picture (PIP) functions, multiple-tuner recording, etc.). If storage 308 is provided as a separate device from user equipment 300, the tuning and encoding circuitry (including multiple tuners) may be associated with storage 308.

[0055] A user may send instructions to control circuitry 304 using user input interface 310. User input interface 310 may be any suitable user interface, such as a remote control, mouse, trackball, keypad, keyboard, touch screen, touchpad, stylus input, joystick, voice recognition interface, or other user input interfaces. Display 312 may be provided as a stand-alone device or integrated with other elements of user equipment device 300. Display 312 may be one or more of a monitor, a television, a liquid crystal display (LCD) for a mobile device, or any other suitable equipment for displaying visual images. In some embodiments, display 312 may be HDTV-capable. In some embodiments, display 312 may be a 3D display, and the interactive media guidance application and any

suitable content may be displayed in 3D. A video card or graphics card may generate the output to the display 312. The video card may offer various functions such as accelerated rendering of 3D scenes and 2D graphics, MPEG-2/MPEG-4 decoding, TV output, or the ability to connect multiple monitors. The video card may be any processing circuitry described above in relation to control circuitry 304. The video card may be integrated with the control circuitry 304. Speakers 314 may be provided as integrated with other elements of user equipment device 300 or may be stand-alone units. The audio component of videos and other content displayed on display 312 may be played through speakers 314. In some embodiments, the audio may be distributed to a receiver (not shown), which processes and outputs the audio via speakers 314.

[0056] In some embodiments, control circuitry 304 may be configured to receive instructions from user input interface 310. For example, control circuitry 304 may cause media guidance application listings to be presented by selecting a selectable option in a display screen (e.g., a listings option) or pressing a dedicated button (e.g., a GUIDE button) on a remote control or other user input interface 310.

[0057] In some embodiments, control circuitry 304 may be configured to receive one or more user selections of criteria using user input interface 310 to search and/or filter media content. For example, control circuitry 304 may present the user with a two-dimensional selection region that defines an intersection between a first criterion and a second criterion, where the first criterion and the second criterion are associated with a plurality of media

identifiers. The two-dimensional selection region may also be divided into a plurality of sub-regions, where the user selection indicates at least one of the sub-regions. In response to receiving the user selection, control circuitry 304 may determine a subset of media identifiers that correspond to the selected sub-region. For example, control circuitry 304 may transmit a query to a database or any other suitable source for media content having metadata that meets the user-selected criteria derived from the selected sub-region. Control circuitry 304 may then present at least a portion of the subset of media identifiers to the user. For each media identifier, control circuitry 304 may provide the user with various options, such as playing a preview of the media content, retrieving and/or downloading the media content, accessing information relating to the media content, accessing supplemental media content related to the media content, recording the media content, setting a reminder for the media content, etc.

[0058] The guidance application may be implemented using any suitable architecture. For example, it may be a stand-alone application wholly implemented on user equipment device 300. In such an approach, instructions of the application are stored locally, and data for use by the application is downloaded on a periodic basis (e.g., from an out-of-band feed, from an Internet resource, or using another suitable approach). In some embodiments, the media guidance application is a client-server based application. Data for use by a thick or thin client implemented on user equipment device 300 is retrieved on-demand by issuing requests to a server remote to the user equipment device 300. In one example of a client-server based guidance

application, control circuitry 304 runs a web browser that interprets web pages provided by a remote server. For example, in some embodiments in which the media guidance application is implemented as an on-line application, such as a web site or other Internet-based application, the illustrative display screens of FIGS. 6-48 described herein, may be displayed to the user through a web browser implemented using control circuitry 304. As another example, the display screens of FIGS. 6-48 may be displayed on display 312. User indications and interaction with the display screens of FIGS. 6-48 may be received with interface 310 and processed by circuitry 306.

[0059] In some embodiments, the media guidance application is downloaded and interpreted or otherwise run by an interpreter or virtual machine (run by control circuitry 304). In some embodiments, the guidance application may be encoded in the ETV Binary Interchange Format (EBIF), received by control circuitry 304 as part of a suitable feed, and interpreted by a user agent running on control circuitry 304. For example, the guidance application may be an EBIF application. In some embodiments, the guidance application may be defined by a series of JAVA-based files that are received and run by a local virtual machine or other suitable middleware executed by control circuitry 304. In some of such embodiments (e.g., those employing MPEG-2 or other digital media encoding schemes), the guidance application may be, for example, encoded and transmitted in an MPEG-2 object carousel with the MPEG audio and video packets of a program.

[0060] FIG. 4 shows a simplified diagram of an interactive media system in accordance with some embodiments of the invention. User equipment device 400 is a more detailed, yet still simplified, view of user equipment device 300 of FIG. 3. In addition to the features and functionalities described herein in connection with FIGS. 6-48, user equipment device 400 may include any of the components, features, and functionalities described above in connection with FIG. 3. Control circuitry 414 of user equipment device 400 may include processing circuitry 404, schedule information data store 408, advertising data store 410, and media data store 412. Data stores 408, 410, and 412 may each be one or more relational databases or any other suitable storage mechanisms. Although data stores 408, 410, and 412 are shown as separate data stores, one or more of these data stores may instead be combined into a single storage system. Although only data stores 408, 410, and 412 are shown in FIG. 43, it will be understood that there may be any suitable number of data stores.

[0061] Schedule information data store 408 may store media guidance data for a media guidance application. Schedule information data store 408 may store media-related information (e.g., broadcast times, broadcast channels, server/storage location, media titles, media descriptions, ratings information (e.g., parental control ratings, critic's ratings, etc.), genre or category information, actor information, logo data for broadcasters' or providers' logos, etc.), media format, on-demand information, or any other suitable information. The schedule information included in schedule information data store 408 may be used by the

media guidance application to provide media content information (e.g., as shown in the display screens of FIGS. 6-48) on display 406, or to provide any other suitable media guidance display.

[0062] Advertising data store 410 may store advertising content for display in a media guidance application. Advertising data store 410 may store advertising content in various forms, including text, graphics, images, video clips, content of any other suitable type, or references to remotely stored content. Advertising data store 410 may also store links or identifiers to advertising content in other data stores. In some embodiments, advertising data store 410 may store indexes for advertising content in other local data stores (e.g., data store 408 or 412), or may store identifiers to remote storage systems, such as URLs to advertisements provided by web servers. Data store 410 may also store identifying information about each advertisement or advertisement element (e.g., associated advertiser, type of promotional, length of promotion, a television show, product, or service the advertisement is promoting, etc.), or may store indexes to locations in other local or remote storage systems where this information may be found.

[0063] Media database 412 may store media content or information related to media content accessible through a media guidance application. For example, the media content and/or media related information displayed in the display screens and overlays of FIGS. 6-48 may be stored and/or downloaded to media database 412. Upon display to the user, media database 412 may be accessed to retrieve the requested information or media content.

[0064] Processing circuitry 404, which may have any of the features and functionalities of processing circuitry 306 (FIG. 3), may access any of the information included in data stores 408, 410 and 412. Processing circuitry 404 may use this information to select, prepare, and display information on display 406. In particular, processing circuitry 404 may use information obtained from these data stores to provide a media guidance application with advertisements to a user of user equipment 400. For example, processing circuitry 404 may use this information to display the display screens of FIGS. 6-48. Processing circuitry 404 may also use the information included in data stores 408, 410, and 412 to select, prepare, and output audio to speakers 314 of FIG. 3. In addition, processing circuitry 404 may update information in data stores 408, 410 and 412 with data received from, for example, communications link 402. Communications link 402 may have any of the features and functionalities of communications links 508, 510, and 512 of FIG. 5, discussed in greater detail below. In some embodiments, processing circuitry 404 may update schedule information in data store 408 with new or updated information, may add, remove, or change any advertising content in data store 410, and may add, remove, or change media content or information associated with media content in data store 412 or any other suitable data store. Processing circuitry 404 may additionally update any of the associations between these data stores.

[0065] User equipment device 300 of FIG. 3 and user equipment device 400 of FIG. 4 can be implemented in system 500 of FIG. 5 as user television equipment 502,

user computer equipment 504, wireless user communications device 506, or any other type of user equipment suitable for accessing content, such as a non-portable gaming machine. For simplicity, these devices may be referred to herein collectively as user equipment or user equipment devices, and may be substantially similar to user equipment devices described above. User equipment devices, on which a media guidance application may be implemented, may function as a standalone device or may be part of a network of devices. Various network configurations of devices may be implemented and are discussed in more detail below.

[0066] A user equipment device utilizing at least some of the system features described above in connection with FIG. 3 or FIG. 4 may not be classified solely as user television equipment 502, user computer equipment 504, or a wireless user communications device 506. For example, user television equipment 502 may, like some user computer equipment 504, be Internet-enabled allowing for access to Internet content, while user computer equipment 504 may, like some television equipment 502, include a tuner allowing for access to television programming. The media guidance application may have the same layout on various different types of user equipment or may be tailored to the display capabilities of the user equipment. For example, on user computer equipment 504, the guidance application may be provided as a web site accessed by a web browser. In another example, the guidance application may be scaled down for wireless user communications devices 506.

[0067] In system 500, there is typically more than one of each type of user equipment device but only one of each is shown in FIG. 5 to avoid overcomplicating the drawing. In addition, each user may utilize more than one type of user equipment device and also more than one of each type of user equipment device.

[0068] In some embodiments, a user equipment device (e.g., user television equipment 502, user computer equipment 504, wireless user communications device 506) may be referred to as a "second screen device." For example, a second screen device may supplement content presented on a first user equipment device. The content presented on the second screen device may be any suitable content that supplements the content presented on the first device. In some embodiments, the second screen device provides an interface for adjusting settings and display preferences of the first device. In some embodiments, the second screen device is configured for interacting with other second screen devices or for interacting with a social network. The second screen device can be located in the same room as the first device, a different room from the first device but in the same house or building, or in a different building from the first device.

[0069] The user may also set various settings to maintain consistent media guidance application settings across in-home devices and remote devices. Settings include those described herein, as well as channel and program favorites, programming preferences that the guidance application utilizes to make programming recommendations, display preferences, and other desirable guidance settings. For example, if a user sets a channel as a favorite on, for example, the web

site www.allrovi.com on their personal computer at their office, the same channel would appear as a favorite on the user's in-home devices (e.g., user television equipment and user computer equipment) as well as the user's mobile devices, if desired. Therefore, changes made on one user equipment device can change the guidance experience on another user equipment device, regardless of whether they are the same or a different type of user equipment device. In addition, the changes made may be based on settings input by a user, as well as user activity monitored by the guidance application.

[0070] The user equipment devices may be coupled to communications network 514. Namely, user television equipment 502, user computer equipment 504, and wireless user communications device 506 are coupled to communications network 514 via communications paths 508, 510, and 512, respectively. Communications network 514 may be one or more networks including the Internet, a mobile phone network, mobile voice or data network (e.g., a 4G or LTE network), cable network, public switched telephone network, or other types of communications network or combinations of communications networks. Paths 508, 510, and 512 may separately or together include one or more communications paths, such as, a satellite path, a fiber-optic path, a cable path, a path that supports Internet communications (e.g., IPTV), free-space connections (e.g., for broadcast or other wireless signals), or any other suitable wired or wireless communications path or combination of such paths. Path 512 is drawn with dotted lines to indicate that in the exemplary embodiment shown in FIG. 5 it is a

wireless path and paths 508 and 510 are drawn as solid lines to indicate they are wired paths (although these paths may be wireless paths, if desired). Communications with the user equipment devices may be provided by one or more of these communications paths, but are shown as a single path in FIG. 5 to avoid overcomplicating the drawing.

[0071] Although communications paths are not drawn between user equipment devices, these devices may communicate directly with each other via communication paths, such as those described above in connection with paths 508, 510, and 512, as well other short-range point-to-point communication paths, such as USB cables, IEEE 1394 cables, wireless paths (e.g., Bluetooth, infrared, IEEE 802-11x, etc.), or other short-range communication via wired or wireless paths. BLUETOOTH is a certification mark owned by Bluetooth SIG, INC. The user equipment devices may also communicate with each other directly through an indirect path via communications network 514.

[0072] System 500 includes content source 516 and media guidance data source 518 coupled to communications network 514 via communication paths 520 and 522, respectively. Paths 520 and 522 may include any of the communication paths described above in connection with paths 508, 510, and 512. Communications with the content source 516 and media guidance data source 518 may be exchanged over one or more communications paths, but are shown as a single path in FIG. 5 to avoid overcomplicating the drawing. In addition, there may be more than one of each of content source 516 and media guidance data source 518, but only one of each is shown in FIG. 5 to avoid

overcomplicating the drawing. (The different types of each of these sources are discussed below.) If desired, content source 516 and media guidance data source 518 may be integrated as one source device. Although communications between sources 516 and 518 with user equipment devices 502, 504, and 506 are shown as through communications network 514, in some embodiments, sources 516 and 518 may communicate directly with user equipment devices 502, 504, and 506 via communication paths (not shown) such as those described above in connection with paths 508, 510, and 512.

[0073] Content source 516 may include one or more types of content distribution equipment including a television distribution facility, cable system headend, satellite distribution facility, programming sources (e.g., television broadcasters, such as NBC, ABC, HBO, etc.), intermediate distribution facilities and/or servers, Internet providers, on-demand media servers, and other content providers. NBC is a trademark owned by the National Broadcasting Company, Inc., ABC is a trademark owned by the ABC, INC., and HBO is a trademark owned by the Home Box Office, Inc. Content source 416 may be the originator of content (e.g., a television broadcaster, a Webcast provider, etc.) or may not be the originator of content (e.g., an on-demand content provider, an Internet provider of content of broadcast programs for downloading, etc.). Content source 416 may include cable sources, satellite providers, on-demand providers, Internet providers, over-the-top content providers, or other providers of content. Content source 516 may also include a remote media server used to store different types of content

(including video content selected by a user), in a location remote from any of the user equipment devices. Systems and methods for remote storage of content, and providing remotely stored content to user equipment are discussed in greater detail in connection with Ellis et al., U.S. Patent No. 7,761,892, issued July 20, 2010, which is hereby incorporated by reference herein in its entirety.

[0074] Media guidance data source 518 may provide media guidance data, such as the media guidance data described above. Media guidance application data may be provided to the user equipment devices using any suitable approach. In some embodiments, the guidance application may be a stand-alone interactive television program guide that receives program guide data via a data feed (e.g., a continuous feed or trickle feed). Program schedule data and other guidance data may be provided to the user equipment on a television channel sideband, using an in-band digital signal, using an out-of-band digital signal, or by any other suitable data transmission technique. Program schedule data and other media guidance data may be provided to user equipment on multiple analog or digital television channels.

[0075] In some embodiments, guidance data from media guidance data source 518 may be provided to users' equipment using a client-server approach. For example, a user equipment device may pull media guidance data from a server, or a server may push media guidance data to a user equipment device. In some embodiments, a guidance application client residing on the user's equipment may initiate sessions with source 518 to obtain guidance data when needed, e.g., when the

guidance data is out of date or when the user equipment device receives a request from the user to receive data. Media guidance may be provided to the user equipment with any suitable frequency (e.g., continuously, daily, a user-specified period of time, a system-specified period of time, in response to a request from user equipment, etc.). Media guidance data source 518 may provide user equipment devices 502, 504, and 506 the media guidance application itself or software updates for the media guidance application.

[0076] Media guidance applications may be, for example, stand-alone applications implemented on user equipment devices. For example, the media guidance application may be implemented as software or a set of executable instructions which may be stored in storage 308, and executed by control circuitry 304 of a user equipment device 300. In some embodiments, media guidance applications may be client-server applications where only a client application resides on the user equipment device, and server application resides on a remote server. For example, media guidance applications may be implemented partially as a client application on control circuitry 304 of user equipment device 300 and partially on a remote server as a server application (e.g., media guidance data source 518) running on control circuitry of the remote server. When executed by control circuitry of the remote server (such as media guidance data source 518), the media guidance application may instruct the control circuitry to generate the guidance application displays and transmit the generated displays to the user equipment devices. The server application may instruct the control circuitry of the media guidance data source 518

to transmit data for storage on the user equipment. The client application may instruct control circuitry of the receiving user equipment to generate the guidance application displays.

[0077] Content and/or media guidance data delivered to user equipment devices 502, 504, and 506 may be over-the-top (OTT) content. OTT content delivery allows Internet-enabled user devices, including any user equipment device described above, to receive content that is transferred over the Internet, including any content described above, in addition to content received over cable or satellite connections. OTT content is delivered via an Internet connection provided by an Internet service provider (ISP), but a third party distributes the content. The ISP may not be responsible for the viewing abilities, copyrights, or redistribution of the content, and may only transfer IP packets provided by the OTT content provider. Examples of OTT content providers include YOUTUBE, NETFLIX, and HULU, which provide audio and video via IP packets. Youtube is a trademark owned by Google Inc., Netflix is a trademark owned by Netflix Inc., and Hulu is a trademark owned by Hulu, LLC. OTT content providers may additionally or alternatively provide media guidance data described above. In addition to content and/or media guidance data, providers of OTT content can distribute media guidance applications (e.g., web-based applications or cloud-based applications), or the content can be displayed by media guidance applications stored on the user equipment device.

[0078] Media guidance system 500 is intended to illustrate a number of approaches, or network

configurations, by which user equipment devices and sources of content and guidance data may communicate with each other for the purpose of accessing content and providing media guidance. The embodiments described herein may be applied in any one or a subset of these approaches, or in a system employing other approaches for delivering content and providing media guidance. The following four approaches provide specific illustrations of the generalized example of FIG. 5.

[0079] In one approach, user equipment devices may communicate with each other within a home network. User equipment devices can communicate with each other directly via short-range point-to-point communication schemes describe above, via indirect paths through a hub or other similar device provided on a home network, or via communications network 514. Each of the multiple individuals in a single home may operate different user equipment devices on the home network. As a result, it may be desirable for various media guidance information or settings to be communicated between the different user equipment devices. For example, it may be desirable for users to maintain consistent media guidance application settings on different user equipment devices within a home network, as described in greater detail in Ellis et al., U.S. Patent Application No. 11/179,410, filed July 11, 2005. Different types of user equipment devices in a home network may also communicate with each other to transmit content. For example, a user may transmit content from user computer equipment to a portable video player or portable music player.

[0080] In a second approach, users may have multiple types of user equipment by which they access content and obtain media guidance. For example, some users may have home networks that are accessed by in-home and mobile devices. Users may control in-home devices via a media guidance application implemented on a remote device. For example, users may access an online media guidance application on a website via a personal computer at their office, or a mobile device such as a PDA or web-enabled mobile telephone. The user may set various settings (e.g., recordings, reminders, or other settings) on the online guidance application to control the user's in-home equipment. The online guide may control the user's equipment directly, or by communicating with a media guidance application on the user's in-home equipment. Various systems and methods for user equipment devices communicating, where the user equipment devices are in locations remote from each other, is discussed in, for example, Ellis et al., U.S. Patent No. 8,046,801, issued October 25, 2011, which is hereby incorporated by reference herein in its entirety.

[0081] In a third approach, users of user equipment devices inside and outside a home can use their media guidance application to communicate directly with content source 516 to access content. Specifically, within a home, users of user television equipment 502 and user computer equipment 504 may access the media guidance application to navigate among and locate desirable content. Users may also access the media guidance application outside of the home using wireless user communications devices 506 to navigate among and locate desirable content.

[0082] In a fourth approach, user equipment devices may operate in a cloud computing environment to access cloud services. In a cloud computing environment, various types of computing services for content sharing, storage or distribution (e.g., video sharing sites or social networking sites) are provided by a collection of network-accessible computing and storage resources, referred to as "the cloud." For example, the cloud can include a collection of server computing devices, which may be located centrally or at distributed locations, that provide cloud-based services to various types of users and devices connected via a network such as the Internet via communications network 514. These cloud resources may include one or more content sources 516 and one or more media guidance data sources 518. In addition or in the alternative, the remote computing sites may include other user equipment devices, such as user television equipment 502, user computer equipment 504, and wireless user communications device 506. For example, the other user equipment devices may provide access to a stored copy of a video or a streamed video. In such embodiments, user equipment devices may operate in a peer-to-peer manner without communicating with a central server.

[0083] The cloud provides access to services, such as content storage, content sharing, or social networking services, among other examples, as well as access to any content described above, for user equipment devices. Services can be provided in the cloud through cloud computing service providers, or through other providers of online services. For example, the cloud-based services can include a content

storage service, a content sharing site, a social networking site, or other services via which user-sourced content is distributed for viewing by others on connected devices. These cloud-based services may allow a user equipment device to store content to the cloud and to receive content from the cloud rather than storing content locally and accessing locally-stored content.

[0084] A user may use various content capture devices, such as camcorders, digital cameras with video mode, audio recorders, mobile phones, and handheld computing devices, to record content. The user can upload content to a content storage service on the cloud either directly, for example, from user computer equipment 504 or wireless user communications device 506 having content capture feature. Alternatively, the user can first transfer the content to a user equipment device, such as user computer equipment 504. The user equipment device storing the content uploads the content to the cloud using a data transmission service on communications network 514. In some embodiments, the user equipment device itself is a cloud resource, and other user equipment devices can access the content directly from the user equipment device on which the user stored the content.

[0085] Cloud resources may be accessed by a user equipment device using, for example, a web browser, a media guidance application, a desktop application, a mobile application, and/or any combination of access applications or the same. The user equipment device may be a cloud client that relies on cloud computing for application delivery, or the user equipment device may have some functionality without access to cloud

resources. For example, some applications running on the user equipment device may be cloud applications, i.e., applications delivered as a service over the Internet, while other applications may be stored and run on the user equipment device. In some embodiments, a user device may receive content from multiple cloud resources simultaneously. For example, a user device can stream audio from one cloud resource while downloading content from a second cloud resource. Or, a user device can download content from multiple cloud resources for more efficient downloading. In some embodiments, user equipment devices can use cloud resources for processing operations such as the processing operations performed by processing circuitry described in relation to FIG. 3.

[0086] In some embodiments, control circuitry 304 may receive a request from the user for media guidance for selecting content of various content types, such as movies, television programs, and music. In response to receiving the request, control circuitry 304 may provide the user with a media guidance application (e.g., by accessing a website, initiating an application, etc.). The media guidance application may be provided as an on-line application (e.g., provided on a website) that presents users with information associated with movies, television, music, compositions, actors, artists, other entertainment-related content, or a combination thereof.

[0087] FIGS. 6-48 show illustrative display screens that may be used to provide media guidance in accordance with some embodiments of the invention. The display screens shown in FIGS. 6-48 may be implemented on any suitable device or platform. As referred to

herein, platform refers to any system that may support the operation of an interactive media guidance application.

[0088] It should be noted that, while some of the displays depicted in FIGS. 6-48 are illustrated as full screen displays, they may also be fully or partially overlaid over media content being displayed. For example, while the display screens of FIGS. 6-48 may be implemented as one or more pages of a website, it should also be understood that they may be implemented within an application running on a television, a Smart TV, a set-top box, an integrated receiver decoder (IRD) for handling satellite television, a digital storage device, a digital media receiver, a digital media adapter, a streaming media device, a DVD player, a DVD recorder, a connected DVD, a local media server, a BLU-RAY player, a BLU-RAY recorder, a personal computer, a laptop computer, a tablet computer, a WebTV box, a personal computer television, a PC media server, a PC media center, a hand-held computer, a stationary telephone, a personal digital assistant, a mobile telephone, a portable video player, a portable music player, a portable gaming machine, a smart phone, or any other television equipment, computing equipment, or wireless device, and/or combination of the same.

[0089] Turning to FIGS. 6 and 7, FIGS. 6 and 7 show illustrative display screens of a media guidance application that may be used to provide a user with guidance for various types of media content in accordance with some embodiments of the invention. As shown in FIG. 6, control circuitry 304 may cause a guidance display 600 to be divided into a plurality of regions, where each region provides a different

mechanism for accessing media content. In particular, guidance display 600 includes a first region 610 that provides a general searching tool 612, a second region 620 that provides an advertorial, and a third region 630 that provides access to specific media content and access to a content selection tool 640.

[0090] It should be noted that, although guidance display 600 of FIG. 6, guidance display 700 of FIG. 7, and other display screens described herein are generally described as containing three regions, this is merely illustrative. For example, control circuitry 304 may provide a guidance display that includes any suitable number of regions (e.g., a region for each media type). Moreover, each region of the guidance display may or may not provide a different mechanism for accessing media content. For example, control circuitry 304 may provide two regions, where one region provides access to content selection tool 640 for filtering movie assets and another region provides access to content selection tool 640 for filtering music assets.

[0091] Although not shown, it should be noted that guidance display 600 of FIG. 6, guidance display 700 of FIG. 7, and other display screens described herein may contain one or more advertisements (e.g., for media content, products, or services related or unrelated to other content displayed on the display screen).

[0092] In some embodiments, first region 610 may include general searching tool 612. Control circuitry 304 may provide general searching tool 612 to, for example, allow a user to search for people (e.g., actors, actresses, artists, etc.), albums, movies, songs, compositions, television shows, and/or any other

media content or entertainment information. As shown, control circuitry 304 may provide general searching tool 612 using a single text box or input element. This input element is thus capable of handling input related to various kinds of media or media-related information. As described further below, the search results may be context-sensitive, providing the user with the most relevant information and/or dividing different results by media type. For example, in response to receiving search terms in the input element of general searching tool 612, control circuitry 304 may search through metadata or other media guidance data for media content or information with metadata matching one or more of the search terms.

[0093] It should be noted that the input element of general searching tool 612 combines media content search capability with entertainment information search capability. As such, a single input element is provided that can return media content or information about media content as well as entertainment information related to, for example, an entertainer. In some embodiments, the search capability of general searching tool 612 contains context-sensitive functionality to recognize the type of information or content requested by the user.

[0094] It should also be noted that, in some embodiments, the input element of general searching tool 612 may be combined with other searching and/or filtering tools described herein. For example, in response to receiving one or more search terms in general searching tool 612, control circuitry 304 may provide the user with additional searching and/or filtering tools while limiting the search results to

the one or more received search terms. In a more particular example, in response to the user entering the phrase "The Simpsons" in the input element of general searching tool 612, control circuitry 304 may limit the media content presented in a search results region by media content relating to "The Simpsons" and assist the user to select "The Simpsons"-related media content for consumption (e.g., music tracks played on "The Simpsons, downloadable episodes of "The Simpsons," past or upcoming movies for "The Simpsons," or information on actors or actresses that make guest appearances on "The Simpsons").

[0095] Alternatively, as also shown in general searching tool 612 within first region 610, general searching tool 612 may allow the user to limit the search results to media content or information of a particular type. For example, by selecting the drop down box labeled "all types" in general searching tool, the user may specify the type of search desired. In response, control circuitry 304 may search for the desired type of content, such as movie content, music content, video content, all content, etc. In a more particular example, the user may specify that the search is for one or more of people, albums, movies, songs, compositions, television shows, or any other suitable media content or entertainment information.

[0096] In some embodiments, general searching tool 612 may include a browse option that allows the user to browse different categories of media content or related information. It should be noted that, although the general searching tool 612 in FIGS. 6 and 7 provide browse options for music content and movie content, any

suitable number of browse options may be displayed for any number of categories.

[0097] In some embodiments, second region 620 may include an advertorial. As referred to herein, an advertorial is a combination of an advertisement and related editorial information. For example, an advertorial may present information pertaining to a person, a movie, a television show, an album, a song, a composition, or any other media content or related information. In some embodiments, the advertorial may be interactive. For example, the advertorial may provide the user with access to a video clip or preview (e.g., a movie trailer), an audio clip (e.g., a clip of a music track), and/or information related to the media content, person, or information being promoted (e.g., reviews, synopsis, cast information, etc.), or the media content itself. In another example, the advertorial may present and provide access to media content related to the media content being promoted. It should be noted that the advertorial may be the featured content on the display screen as opposed to an advertisement that is often displayed alongside, but secondary to, featured content. In providing one or more advertorials, the user may not be able to discern whether the media content featured in the advertorial is being promoted by an advertiser.

[0098] In some embodiments, the advertorial may cycle through a plurality of advertorials such that a different advertorial is displayed after a predetermined amount of time (e.g., every five seconds). After control circuitry 304 has displayed a sequence of advertorials, the rotation sequence may return to the first advertorial in the sequence. As

shown in FIG. 6, the advertorial is promoting the actor "Jeff Bridges" and provides access to a trailer for the movie "Tron Legacy." The advertorial also provides access to media content and information related to or featuring Jeff Bridges. As shown, a trailer or a video clip for the movie "True Grit," a review for the album "Be Here Soon," and information corresponding to a filmography of the actor are provided within the advertorial. Turning to FIG. 7, the first advertorial promoting the actor "Jeff Bridges" in second region 620 from FIG. 6 may cycle to a second advertorial promoting the music artist "Usher" in second region 720. Similar to the advertorial of FIG. 6, the advertorial within second region 720 provides an audio clip from a music album that may be played directly from the advertorial as well as access to media content and information related to or featuring the music artist "Usher" (e.g., a related music video, a review of an album, and discography information).

[0099] In some embodiments, control circuitry 304 may allow the user to control which advertorial in a sequence of advertorials is displayed. For example, control circuitry 304 may provide selectable advertorial sequence indicators within second region 620 or 720 (e.g., located below the advertorial) that allow the user to select which advertorial is displayed.

[0100] In some embodiments, third region 630 of FIG. 6 or third region 730 of FIG. 7 may provide the user with access to trending media content. Trending media content may include, for example, movies, music, or other media content currently of interest to other users (e.g., other website users, most downloaded by

users in a given period of time, etc.). Trending media content may be a selection of media content receiving the most selections compared to other media content that is available. For example, media content may be designated as trending media content based on traffic and visitor behavior and, in some embodiments, may be updated in real-time. As shown in FIGS. 6 and 7, the music album "Best Night of My Life" by Jaime Foxx is an example of a trending music album in third region 630 and the movie "Please Give" is an example of a trending movie in third region 730.

[0101] It should be noted that any suitable approach for determining the popularity or trending of media content may be used to select media content for display in the trending region. For example, the media content displayed in the trending region of region 630 or 730 may be media content of particular interest to a user, e.g., based on the user's profile or usage history.

[0102] As with the advertorial, control circuitry 304 may cycle or alternate with time the content displayed in the trending region of region 630 or 730. For example, control circuitry 304 may cause trending movies to be displayed, followed by trending albums, followed by additional trending movies, followed by additional trending albums, etc. In some embodiments, control circuitry 304 may allow the user to customize the content displayed in the trending region. Moreover, in some embodiments, the trending region may contain active media identifiers (e.g., highlighted thumbnails) and inactive media identifiers (e.g., thumbnails that are greyed out or not highlighted). As the content cycles through region 630 or 730 for given periods of time, the row of inactive media identifiers

may replace the row of active media identifiers in the top row (as shown) and other inactive media identifiers may replace the previous row of inactive media identifiers.

[0103] In some embodiments, third region 630 of FIG. 6 or third region 730 of FIG. 7 may provide the user with access to content selection tool 640. Content selection tools 640 may provide the user with access to tools for finding music or movies (or other media content) based on user-defined criteria. For example, as shown in third region 630 of FIG. 6 and third region 730 of FIG. 7, content selection tool 640, which is indicated by "findR," assists the user in selecting content for consumption from the guidance display. In a more particular example, control circuitry 304 may configure content selection tool 640 to include a music selection option 642 that provides the user with guidance for selecting music content, a movie selection option 644 that provides the user with guidance for selecting movie content, and a content selection option 646 that provides the user with guidance for selecting any suitable content (e.g., both music content and movie content). Content selection tool 640 is sometimes referred to herein as the "findR" tool. The findR tool is described in further detail below.

[0104] In response to receiving an indication that the user has selected a content selection tool, such as music selection option 642, control circuitry 304 may generate a display screen of a music selection tool for providing the user with guidance for selecting music content. FIGS. 8-13 show an illustrative display screen of a media guidance application that may be used

to search and/or filter music or other audio content in accordance with some embodiments of the invention.

[0105] Turning to FIG. 8, initial display screen 800 may provide the user with various criteria. For example, as shown in FIG. 8, display screen 800 may include a category and/or subcategory filters 810, a decades filter 820, a themes filter 830, and a two-dimensional selection region 840. In particular, the user may instruct control circuitry 304 to filter the content that appears in a content results region 850 by genre (e.g., blues, classical, holiday, rock, rap, etc.), and, in some embodiments, a subgenre (e.g., acoustic blues, country blues, folk blues, modern blues, blues gospel, etc.) using category and/or subcategory filters 810. The user may also instruct control circuitry 304 to filter the content that appears in content results region 850 by selecting a time period (e.g., restricting the content to decade during which the content was released) using decades filter 820, a theme (e.g., an activity, such as exercising) using themes filter 830, and/or a mood (e.g., positive, negative, wild, chill, etc.) using two-dimensional selection region 840. In response to receiving one or more user-selected criteria, control circuitry 304 may filter content to provide search results associated with metadata that match the user-selected criteria. Content selection tool 640 or the findR tool provides a flexible and sensitive selection feature that allows users to find content, such as music content or movie content, that suits a particular and, in some cases, momentary taste.

[0106] In some embodiments, category and/or subcategory filters 810 may allow the user to instruct

control circuitry 304 to filter content by genre, subgenre, or any other suitable category of interest. FIG. 9 shows an example of the various genres that may be selected by the user with category filter 810. In particular, category filter 810 in FIG. 9 includes music genres, such as blues, classical, country, easy listening, jazz, etc. In response to receiving a user-selected genre (e.g., blues) to search and/or filter music content, control circuitry 304 performs a search through content for metadata matching the user-selected genre and, as shown in FIG. 10, a plurality of media identifiers are displayed in search results region 850. Each of the media identifiers, which are displayed as thumbnails containing cover art in search results region 850, corresponds to media content (e.g., a music album, an audio track, a movie, a television program, video clips, games, etc.).

[0107] Turning to FIG. 11, control circuitry 304 may allow the user to continue to enter criteria for searching and/or filtering content in search results region 850. In FIG. 11, control circuitry 304 has activated a subcategory or subgenre filter in response to receiving a user selection for the category or genre filter shown in FIG. 9. In particular, in response to receiving a user selection for the category filter in region 810, control circuitry 304 may transmit a query to a database for subcategory information associated with the selected category. Upon receiving the subcategory information, control circuitry 304 may populate a drop-down list in region 810 for selection by the user. For example, as shown in FIG. 11, in response to the user selecting "Blues" in the category filter of FIG. 9, control circuitry 304 may provide the

user with a drop-down list in region 810 of corresponding subcategories. The subcategories or subgenres associated with the blues music category may include, for example, blues gospel, contemporary blues, country blues, and harmonica blues.

[0108] In response to receiving a subcategory or subgenre from the user in region 810, control circuitry 304 may refine the content provided in search results region 850. For example, control circuitry 304 may search through the metadata associated with the media content in search results region 850 to find media content that matches the updated criteria. In a more particular example, the media content provided in search results region 850 of FIG. 12 has metadata that matches the selected genre "blues" and the selected subgenre "country blues."

[0109] Additionally, FIGS. 12 and 13 shows that other filters may be used to further refine the content provided in search results region 850. As shown in FIG. 12, the time period of the music content may be defined by the user (e.g., 1950-1990) in decades filter 820. As the decades time period is modified by the user, control circuitry 304 may dynamically update the media content provided in search results region 850 to show only those albums matching the desired criteria, which includes the desired time period. As also shown in FIG. 12, the user may select a theme to filter the media content provided in search results region 850. A theme may be any contextual or environmental variable, such as an activity the user is doing, an emotion the user is feeling, or the weather at the user's location. In a more particular example, FIG. 12 shows that themes may be organized into categories, such as activities,

empowerment, feelings, life events, party, places, time of day, and weather/seasons. For example, in response to receiving a user selection for theme filter 830, control circuitry 304 may transmit a query to a database for subcategory information associated with the selected theme. Upon receiving the subcategory information, control circuitry 304 may populate a drop-down list in region 830 for selection by the user. For example, as shown in FIG. 13, in response to the user selecting the theme "feelings" in theme filter 830 of FIG. 12, control circuitry 304 may provide the user with a drop-down list in region 830 of corresponding subcategories. The subcategories or subgenres associated with the "feelings" theme may include, for example, "feeling blue," "heartache," and "in love."

[0110] In response to receiving one or more subcategories from the user in region 830, control circuitry 304 may refine the content provided in search results region 850. For example, in response to determining that the user has selected subcategory "exercise" under the theme "activity," control circuitry 304 may update the content provided in search results region 850 such that albums, songs, and other music content matches the user-selected criteria, such as relating to exercise.

[0111] It should be noted that, in some embodiments, metadata associated with the albums, songs, and other content may include information on which themes (e.g., activities) the content is suitable for categorization.

[0112] It should be noted that control circuitry 304 may provide additional criteria for searching and/or limiting search results. For example, control

circuitry 304 may include a rating filter (e.g., one star), a popularity or ranking filter, a demographics filter (e.g., toddler, high schooler, young adult, etc.), a film rating filter (e.g., PG-13, PG, R, etc.), etc.

[0113] In some embodiments, control circuitry 304 may allow the user to select one or more filters to provide in guidance display 800. For example, the user may request that theme filter 830 be replaced with a rating filter. In response, control circuitry 304 may retrieve from a database identifiers associated with the rating filter for population into display 800. In another example, control circuitry 304 may retrieve from a database a list of available filters for selection by the user. In response to receiving a selection of a filter from the user, control circuitry 304 may retrieve identifiers associated with the selected filter and present the retrieved filter and its associated identifiers in display 800.

[0114] Accordingly, the various search and filtering tools of content selection tool 640 may be used in combination to identify particular albums and/or songs the user desires (when searching for music content) or particular movies and movie-related content (when searching for movie content). For example, a genre and subgenre may be specified, a time period may be defined, and a number of emotions may be selected. The search results are thereby refined such that metadata associated with the content provided in the search results match the user-selected criteria.

[0115] In some embodiments, control circuitry 304 may connect the searching and filtering tools of content selection tool 640 with other portions of the

media guidance application. For example, in response to the user inputting the name of an artist, such as "Wolfgang Amadeus Mozart" into general searching tool 612 in first region 610 of FIG. 6, control circuitry 304 may provide the searching and filtering tools of content selection tool 640 to identify particular albums and/or songs relating to the artist "Wolfgang Amadeus Mozart." In this example, control circuitry 304 may allow the user input criteria (e.g., a sub-region from two-dimensional selection region, an activity, a particular mood, etc.) and use the user-selected criteria to filter music content relating to "Wolfgang Amadeus Mozart." In another example, in mixed-media cases where the user is searching for any media content (whether audio content or video content), control circuitry 304 may also provide the user with movie content (e.g., the movie "Amadeus"), video-related content (e.g., video content where music by "Wolfgang Amadeus Mozart" is played), etc.

[0116] In response to entering and/or selecting from various criteria, control circuitry 304 may perform a search through content for metadata matching the user-selected criteria and, as shown in FIG. 13, a plurality of selectable media identifiers are displayed in search results region 850. For example, in response to navigating to a particular media identifier (e.g., a selectable media identifier 860) from the plurality of selectable media identifiers in search results region 850, control circuitry 304 may provide the user with text information associated with the media asset, such as the album title and artist name (e.g., "Alone" by John Lee Hooker).

[0117] In some embodiments, control circuitry 304 may monitor the navigation by the user. For example, when control circuitry 304 determines that the cursor is placed over selectable media identifier 860, control circuitry 304 may highlight or activate selectable media identifier 860 (e.g., increase the brightness of the thumbnail image) and provide the user with text information associated with the media asset (e.g., the album title and artist name).

[0118] In some embodiments, control circuitry 304 may monitor the location with respect to a selectable media identifier. For example, control circuitry 304 may detect whether the location coordinates of a cursor are approaching the center of a selectable media identifier. As shown in FIG. 14, in response to determining that the cursor has been placed near the center of selectable media identifier 860, control circuitry 304 may activate a playback option 1400. Playback option 1400 may, for example, instruct control circuitry 304 to retrieve and/or play an audio clip, a full track from the music album, a sequence of audio clips starting at the first track of the music album, or any other suitable audio content via speakers 314.

[0119] In some embodiments, in response to selecting selectable media identifier 860, control circuitry 304 may provide the user with access to additional information about the media content associated with the media identifier. For example, as shown in an illustrative media information display 1500 of FIGS. 15-18, in response to the user receiving a plurality of media identifiers after using content selection tool 640 and selecting a selectable media identifier corresponding to the music album "O Brother, Where Art

Thou?", control circuitry 304 may provide the user with access to information and other media content associated with a particular album, song, or other audio content.

[0120] It should be noted that control circuitry 304 may cause media information display 1500 or any other suitable information display to be presented in response to, for example, selecting an album from trending media content section of third region 630 in FIG. 6, or inputting the album name or other identifying information into general searching tool 612 in first region 610 in FIG. 6.

[0121] Referring back to FIGS. 15-18, media information display 600 may include reviews of the album, rating information, credit information, award information, and other pertinent information. For example, as shown in FIG. 16, different releases of the album may be displayed together with relevant information, such as the year of release. In some embodiments, control circuitry 304 may retrieve metadata associated with the selected media content and present portions of the metadata in media information display 600. For example, as shown in FIG. 15, media information display 600 includes the styles (e.g., neo-traditional folk, traditional bluegrass, etc.), themes (e.g., empowering, reminiscing, etc.), and moods (e.g., bittersweet, reflective, rustic, etc.) associated with the media content.

[0122] It should be noted that control circuitry 304 may retrieve metadata associated with the selected media content for presentation in display 600. In some embodiments, control circuitry 304 may aggregate and/or assemble the metadata associated with each song on a

particular album for presentation in display 600. Additionally or alternatively, control circuitry 304 may transmit a query to other sources (e.g., media guidance data source 418, a social networking website, a music review website, etc.) to assemble the metadata for presentation in display 600.

[0123] As also shown in FIGS. 15-17, media information display 600 may also provide information on the album tracks (or songs). The tracks may be sampled by the user and/or added to a media queue. In some embodiments, control circuitry 304 may allow the user to select an individual track to access additional information related to the selected track. Additionally or alternatively, control circuitry 304 may allow the user to purchase and/or download the album or a particular track.

[0124] Turning to FIG. 17, control circuitry 304 may allow the user to add one or more pieces of media content (e.g., audio tracks) to a media queue 1700 for playback. Media queue 1700 may provide the user with media control tools for allowing a selected album or song to be played or queued for layer playing. As shown, media queue 1700 may play back a selected piece of media content while simultaneously displaying information related to a currently queued or playing song in overlay 1710. In particular, overlay 1710 may include information, such as the album title, song title, artist, genres, and styles. In some embodiments, overlay 1710 may be revealed or hidden as the user desires (e.g., user selection, user preferences, etc.). Alternatively, overlay 1710 may be minimized or hidden after being displayed for a predetermined period of time.

[0125] In response to selecting information from overlay 1710, control circuitry 304 may provide the user with information and other media content associated with a particular song (e.g., selected from the overlay of FIG. 17). For example, FIG. 18 shows that an illustrative media information display 1800 screen may list all albums on which the song appears, and may allow the user to play, queue, or sample the song on each album. This allows the user to quickly listen to different versions of the same song on different albums. Again, control circuitry 304 may provide a persistent media queue. Once a song, video, or other content is queued or playing, the media guidance application may allow the user to navigate to other display screens without interrupting the playing and/or without erasing the queue. Accordingly, the media queue and its control tools may persist throughout the media guidance application, allowing the user to play or add media content to the media queue as the user browses through the display screens of the media guidance application.

[0126] It should be noted that, in some embodiments, control circuitry 304 may cause any suitable action to be performed in response to selecting a media identifier (e.g., media identifier 860 of FIG. 13). For example, additionally or alternatively to accessing information relating to the content corresponding to the selected media identifier, control circuitry 304 may provide the user with the opportunity to preview the content, record the content, set a reminder to listen to or watch the content, etc.

[0127] Referring back to FIG. 8, content selection 640 may also include two-dimensional selection region

840 for searching and/or filtering media content provided in search results region 850. In response to selecting a portion within two-dimensional selection region 840, control circuitry 304 may search through media content with metadata matching or corresponding to the selected portion within two-dimensional selection region 840.

[0128] FIG. 19 shows an illustrative display screen 800 that may be used to search and/or filter music or other audio content based on criteria, such as moods, in accordance with some embodiments of the invention. In particular, along with the other filters and filtering tools described above, content selection tool 640 may limit the search results to those associated with one or more moods indicated by the user in two-dimensional selection region 840.

[0129] In some embodiments, two-dimensional selection region 840 may allow the user to graphically indicate which, and how much, of each mood to take into account when selecting media content. For example, two-dimensional selection region 840 may a vertical axis and a horizontal axis. The vertical axis and the horizontal axis may each have a lower bound or extreme and an upper bound or extreme. For example, as shown in FIG. 19, the vertical axis of two-dimensional selection region 840 allows the user to indicate a desire for "positive" music content (the upper bound) or "negative" music content and the horizontal axis of two-dimensional selection region 840 allows the user to indicate a desire for "wild" music content (the upper bound) or "chill" music content (the lower bound). The user may provide an indication of degree between two bounds for each of the moods. For example, as shown in

FIG. 19, the user has selected point 1900 in two-dimensional selection region, which may be used to select media content that is more towards a "positive" mood than a "negative" mood and more towards a "chill" mood than a "wild" mood.

[0130] In some embodiments, control circuitry 304 may cause the two-dimensional selection region to be divided into a plurality of sub-region. For example, as shown in a two-dimensional selection region 2010 of FIG. 20, control circuitry 304 divides two-dimensional selection region 2010 iinto a grid of evenly spaced, square cells. Alternatively, although the two-dimensional selection regions shown in FIG. 20 are shown as a grid that is divided into a plurality of square sub-regions, this is merely illustrative. For example, in some embodiments, control circuitry 304 may divide the two-dimensional selection region into a plurality of non-uniform regions (e.g., circular regions of varying diameter).

[0131] In some embodiments, the two-dimensional selection region may define an intersection between a first criterion and a second criterion. For example, as shown in FIG. 20, two-dimensional selection region 2010 defines an intersection between a first mood between "positive" and "negative" and a second mood between "wild" and "chill." It should be noted that the positive-negative and chill-wild sets of moods are exemplary only and that control circuitry 304 may provide any suitable criterion on the axes of two-dimensional selection region 2010. For example, a two-dimensional selection region may define the intersection between a mood, which has a "positive" mood upper bound and a "negative" mood lower bound, and

a parental guideline, which has a "mature audiences only" upper bound and a "kid friendly" lower bound.

[0132] In some embodiments, control circuitry 304 may allow the user to select and/or define criterion for placement on the two-dimensional selection region. For example, in some embodiments, control circuitry 304 may provide the user with a list populated with criterion information from database. The user may indicate criterion for placement on the two-dimensional selection region using the criteria list. In another example, in some embodiments, control circuitry 304 may provide the user with an opportunity to define or create criteria for customized two-dimensional selection regions. In response, control circuitry 304 may search through metadata for content that best matches the user-defined criteria.

[0133] Referring back to FIG. 20, as shown in two-dimensional selection region 2020, control circuitry 304 may receive a user selection 2030 of one of the cells in the grid. In this example, in response to receiving a user selection 2030 of a square sub-region from the grid in two-dimensional selection region 2020, control circuitry 304 may transmit a query to a database for media content with metadata matching user selection 2030. In a more particular example, control circuitry 304 may transmit a query to a database for media content using portions of information derived from user selection 2030 - e.g., find media content with corresponding metadata that is at least 82% wild and 18% chill on the chill-wild mood scale (where chill is 0% and wild is 100%) and that is at least 54% negative and 46% positive on the negative-positive mood scale.

[0134] Another illustrative example of receiving a user selection in a two-dimensional selection region is shown in FIG. 21. The extent of a mood may be indicated by selecting an area on or near an axis of the desired mood. For example, a user may set how wild or chill the music should be by selecting a location on the chill-wild axis. The closer to "chill" the user selects, the more chill the music, while the closer to "wild" the user selects, the more wild the music. Similarly, the user may indicate how positive or negative the music should be by selecting a point on the positive-negative axis. A combination of moods may be indicated by selecting a point within the two-dimensional space created by the intersecting axes. For example, a point 2110 selected by the user indicates that the music content should be both very positive and very chill. The center of the intersecting axes indicates that the music content should be neither very chill nor very wild, nor should it be very positive or very negative. On the other hand, a point 2120 selected by the user indicates that the music content should be both very positive and very wild.

[0135] In some embodiments, control circuitry 304 may provide the user with multiple two-dimensional selection regions in a guidance display. For example, control circuitry 304 may provide the user with a selectable list of available two-dimensional selection regions. In a more particular example, the user may be provided with a first two-dimensional selection region that defines an intersection between a first mood and a second mood, a second two-dimensional selection region that defines an intersection between a third mood and a

fourth mood, and a third two-dimensional selection region that defines an intersection between a rating and a theme. Control circuitry 304 may sequentially filter media content for presentation to the user in response to a user providing a user selection of a sub-region from each two-dimensional selection region. Alternatively, control circuitry 304 may collect and/or combine the user selections from the multiple two-dimensional selection regions and create a single query to the database - e.g., retrieve media content with corresponding metadata that is at least 82% wild and 18% chill for the chill-wild set of moods, at least 54% negative and 46% positive for the negative-positive set of moods, at least 80% bright and 20% dark for the bright-dark set of moods, at least 80% comedy and 20% romantic on the set of romantic-comedy themes, etc.

[0136] In some embodiments, control circuitry 304 may modify and/or update the two-dimensional selection region. For example, the criteria placed on the axes of the two-dimensional selection region may change based on other criteria selected by the user, user history information, user profile information, etc. In a more particular example, control circuitry 304 may determine that the user prefers "positive" music and, in response, may remove the positive-negative set of moods from the two-dimensional selection region and provide a different set of moods.

[0137] In response to retrieving music content matching the user-selected criteria (e.g., using the two-dimensional selection region), control circuitry 304 may present the user with a plurality of media identifiers associated with the retrieved media content in search results region. For example, control

circuitry 304 may provide an indicator that follows the cursor directed by the user as the user moves the cursor around the two-dimensional selection region defined by the mood axes (or other criteria axes). In response to receiving a mouse click on a particular point in the two-dimensional selection region, control circuitry 304 may display a point indicator of the user selection (e.g., points 2110 and 2120) and update the search results based on the user selection. In response to determining that the user has made another selection on another area, control circuitry 304 moves the point indicator to the new position and updates the search results accordingly.

[0138] In some embodiments, control circuitry 304 may dynamically update the media content and their media identifiers presented in search results region as the user moves through the two-dimensional selection region. For example, as shown in FIG. 19, in response to detecting that the cursor has navigated within two-dimensional selection 840 ("mood space"), control circuitry 304 may dynamically update the media content and their media identifiers presented in search results region 850.

[0139] In some embodiments, control circuitry 304 may provide a two-dimensional selection region that indicates where media content is available with shading, coloring, or other indicators. For example, an area within the lower right quadrant of the mood space in FIG. 21 may be shaded to indicate that wild and negative music is available. In another example, coloring and/or shading may indicate the amount of music available in any given area of the mood space. In a more particular example, the mood space may be

lightly shaded in certain areas to indicate the availability of relatively few songs, and may be heavily shaded in other areas to indicate the availability of a relatively large number of songs. Thus, control circuitry 304 provides a two-dimensional selection region that allows the user to quickly determine whether music content is available and how much music content is available for a desired mood or combination of moods.

[0140] It should be noted that, in some embodiments, control circuitry 304 may allow the user to provide multiple user selections within the two-dimensional selection region. For example, as shown in FIG. 21, in response to selection points 2110 and 2120, control circuitry 304 may retrieve search results that match the criteria associated with point 2110 and search results that match the criteria associated with point 2120.

[0141] Accordingly, the two-dimensional selection region provides an interactive and easy-to-use tool that allows the user to quickly and efficiently indicate one or more moods or any other suitable criteria, and the extent of such moods. User selections from the one or more two-dimensional selection regions is then used to search through metadata and other content information for music content to determine or filter through search results of music content matching the user-selected criteria.

[0142] Although FIGS. 8-21 generally describe embodiments directed towards searching and/or filtering music content, there are merely illustrative. The media guidance application may provide the user with guidance for searching and/or filtering any suitable

media content. For example, FIGS. 22-27 show illustrative media guidance display screens that may be used to search and/or filter movie content and/or other video content in accordance with some embodiments of the invention. In particular, FIGS. 22-27 illustrate the content selection tool or findR tool to search for movies, television shows, or other video content. As shown, the findR tool for searching or filtering video content may be similar to the findR tool for searching or filtering music content described above in connection with FIGS. 8-21.

[0143] Turning to FIG. 22, in addition to a category and/or subcategory filter 2210, a decades or time filter 2230, a two-dimensional region 2240 with an intersection between a bright-dark set of moods and a carefree-sober set of moods, control circuitry 304 may cause the content selection tool shown in display 2200 to include a rating filter 2220 and a demographics filter 2250. Rating filter 2220 may instruct control circuitry 304 to search and/or filter video content by rating (e.g., G, PG, PG-13, R, NC-17, NR, etc.). Demographics filter 2250 may instruct control circuitry 304 to search and/or filter video content by an age group (e.g., toddlers, preschoolers, elementary school kids, etc.).

[0144] In particular, FIG. 22 shows an illustrative initial screen of the content selection tool for searching and/or filtering video content. As shown, the user may search for video content by selecting from one or more of: a genre in category and/or subcategory filter 2210, a rating in rating filter 2220, a time period of the video in decades filter 2230 (e.g., the decade during which the video was released), a point or

intersections of moods in two-dimensional selection region 2240 (e.g., "bright" and/or "sober"), and/or a demographic category in demographic filter 2250 (e.g., "toddlers"). Additional criteria (not shown) may also be used to limit search results of video content. Using these search and/or filter tools in content selection tool, control circuitry 304 may retrieve movies, television shows, or other video content associated with metadata that match the user-selected criteria for presentation to the user.

[0145] It should be noted that two-dimensional selection region 2240 may be substantially similar to the two-dimensional selection region described above. As shown, the mood axes may be bright-dark and sober-carefree, but may also be any other suitable criteria. It should also be noted that, although two-dimensional selection region 2240 and the two-dimensional selection regions described above include two sets of mood axes, the criteria and its corresponding axes may change depending on the other criteria selected by the user (e.g., selected genre criteria), user history data (e.g., recorded programs), user profile data, etc. For example, control circuitry 304 may determine that the user indicated in a user profile or indicated by usage history that the user prefers light, happy music and/or films. Accordingly, control circuitry 304 may configure the two-dimensional selection region may be configured to provide "light" and "happy" axes. Thus, control circuitry 304 may allow the user to control the level of similarity of the media content being searched for to the media the user generally prefers.

[0146] FIG. 23 shows an illustrative example of the various genres that may be selected by the user with

category filter 2210. In particular, category filter 2210 in FIG. 23 includes movie genres, such as action, adventure comedy, comedy, crime, drama, etc. In response to receiving a user-selected genre (e.g., action) to search and/or filter video content, control circuitry 304 performs a search through video content for metadata matching the user-selected genre and a plurality of media identifiers are displayed in search results region 2260. Each of the media identifiers, which are displayed as thumbnails containing movie art in search results region 2260, corresponds to media content (e.g., a movie, a television program, video clips, games, etc.).

[0147] Turning to FIG. 24, control circuitry 304 has activated a subcategory or subgenre filter in response to receiving a user selection for the category or genre filter shown in FIG. 23. In particular, in response to receiving a user selection for the category filter in region 2210, control circuitry 304 may transmit a query to a database for subcategory information associated with the selected category. Upon receiving the subcategory information, control circuitry 304 may populate a drop-down list in region 2210 for selection by the user. For example, as shown in FIG. 24, in response to the user selecting "action" in the category filter of FIG. 23, control circuitry 304 may provide the user with a drop-down list in region 2210 of corresponding subcategories. The subcategories or subgenres associated with the action music category may include, for example, action comedy, action thriller, bounty hunters, car racing, etc.

[0148] In response to receiving a subcategory or subgenre from the user in region 2210, control

circuitry 304 may refine the content provided in search results region 2260. For example, control circuitry 304 may search through the metadata associated with the media content in search results region 260 to find media content that matches the updated criteria.

[0149] As shown in FIG. 25, the user may select a demographic group that instructs control circuitry 304 to filter the media content provided in search results region 2260. A demographic group may be any suitable age group, pop culture group, or special interest group. In response to receiving a user selection for demographic filter 2250, control circuitry 304 may transmit a query to a database for subcategory information associated with the selected demographic group. Upon receiving the subcategory information, control circuitry 304 may populate a drop-down list in region 2250 for selection by the user. For example, as shown in FIG. 25, in response to the user selecting the demographic group "age groups" in demographic filter 2250 of FIG. 25, control circuitry 304 may provide the user with a drop-down list in region 830 of corresponding subcategories as shown in FIG. 26. The subcategories or subgenres associated with the "age group" demographic group may include, for example, toddlers, preschoolers, elementary school kids, middle-schoolers, high-schoolers, college students, etc. As shown in FIG. 27, the user has selected the subcategories "college students," "twentysomethings," "thirtysomethings," "fortysomethings," and "fiftysomethings."

[0150] As also shown in FIG. 27, the user has selected the genre "action" and the subgenre "action thriller" in the category and/or subcategory filter,

the ratings "PG-13" and "R" in the rating filter, the time period between 2000 and now in the decades filter, a point in the two-dimensional selection region that is more sober than carefree and slightly brighter than darker in mood, and subcategories "college students," "twentysomethings," "thirtysomethings," "fortysomethings," and "fiftysomethings" in the demographics filter. Control circuitry 304 may use the user-selected criteria in combination to filter the video content provided in a search results region. As described above, video content may be associated with criteria through metadata (e.g., metadata descriptors).

[0151] In response to entering and/or selecting from various criteria, control circuitry 304 may performs a search through content for metadata matching the user-selected criteria and a plurality of selectable media identifiers are displayed in search results region 2260. For example, in response to navigating to a particular media identifier (e.g., a selectable media identifier of "The Pianist") from the plurality of selectable media identifiers in search results region 2260, control circuitry 304 may provide the user with text information associated with the media asset, such as the movie title (e.g., "The Pianist").

[0152] In some embodiments, control circuitry 304 may monitor the navigation by the user. For example, when control circuitry 304 determines that the cursor is placed over the selectable media identifier, control circuitry 304 may highlight or activate selectable media identifier (e.g., increase the brightness of the thumbnail image) and provide the user with text

information associated with the media asset (e.g., the movie title).

[0153] In some embodiments, control circuitry 304 may monitor the location with respect to a selectable media identifier. For example, control circuitry 304 may detect whether the location coordinates of a cursor are approaching the center of a selectable media identifier. In a more particular example, in response to determining that the cursor has been placed near the center of a selectable media identifier, control circuitry 304 may activate a playback option. Playback option may, for example, instruct control circuitry 304 to retrieve and/or play a video clip, a movie trailer, the actual video content associated with the media identifier, or any other suitable video content. In some embodiments, selecting a media identifier (e.g., video cover art) instructs control circuitry 304 to load a trailer or other relevant video clip, or the video content itself into a video queue, which may be accessed at any time to play the added video content.

[0154] In some embodiments, control circuitry 304 may provide supplemental media content. For example, selecting a selectable media identifier may instruct control circuitry 304 to load a video list with all available clips associated with the video content. In another example, if the video content is associated with a music album or one or more songs, selecting the video thumbnail may instruct control circuitry 304 to load sample audio clips into a media queue (e.g., media queue 1700 of FIG. 17). In this example, a user may also select a thumbnail to retrieve the album (or songs) or to access additional information relating to the album (or songs).

[0155] In some embodiments, in response to selecting a selectable media identifier for video content, control circuitry 304 may provide the user with access to additional information and other media content associated with a particular movie or other video content. For example, as shown in an illustrative media information display 2800 of FIGS. 28-39, in response to the user receiving a plurality of media identifiers after using content selection tool 640 and selecting a selectable media identifier corresponding to the movie "The Pianist," control circuitry 304 may provide the user with access to information and other media content associated with the movie content.

[0156] Media information display 2800 may include reviews of the movie, rating information, award information, and other pertinent information. In some embodiments, control circuitry 304 may retrieve metadata associated with the selected video content and present portions of the metadata in media information display 2800. For example, as shown in FIGS. 28 and 29, media information display 2800 includes the keywords (e.g., escape, Holocaust, occupation [military], and pianist), themes (e.g., crimes against humanity), and tones (e.g., poignant, austere, somber, cathartic, gloomy, and reflective) associated with the video content.

[0157] It should be noted that control circuitry 304 may retrieve metadata associated with the selected media content for presentation in display 2800. In some embodiments, control circuitry 304 may transmit a query to other sources (e.g., media guidance data source 418, a social networking website, a movie review

website, etc.) to assemble the metadata for presentation in display 2800.

[0158] FIG. 30 shows an illustrative display screen of a media guidance application with an overlay 3000 containing a trailer or other video clip related to a particular movie or other video content (e.g., selected from the display screen of FIGS. 28 and 29) in accordance with some embodiments of the invention. In particular, overlay 3000 may display a trailer or other video clip when the video cover art or other media identifier is selected. In some embodiments, the video clip played in overlay 3000 may be placed in a media queue 3005. Media queue 3005 may include media control options for controlling the playback of the video clip in overlay 3000. The video clip may be hidden and/or revealed as desired by the user. Overlay 3000 and media queue 3005 may also persist as the user browses through other display screens in the media guidance application, thereby providing the user with access to other display screens while the video clip continues to play.

[0159] FIGS. 31-34 show an illustrative display screen of a media guidance application that may be used to access information and/or a media clips related to media content associated with a particular movie (or other video content) in accordance with some embodiments of the invention. As shown in FIG. 31, video content (e.g., a trailer for the movie "Schindler's List") related to the media content of the display screen (e.g., the movie "The Pianist") may be accessed directly for playing or adding to the media queue. As shown in FIG. 32, control circuitry 304 may display the related video content within an overlay

3200, and may allow the user to control the playback of the related video content with the media control options provided by the media queue. As shown in FIG. 33, control circuitry 304 may retrieve information relating to the video clip being played and display the information in the overlay in second overlay 3300, which is placed over the video clip. Both overlays 3200 and 3300 may be hidden or revealed as desired, and the video clip may continue to play while the second overlay with information is displayed. For example, as shown in FIG. 34, the video clip in overlay 3200 may be hidden while the information overlay 3300 remains displayed.

[0160] FIG. 35 shows an illustrative display screen of a media guidance application that may be used to access additional information associated with a particular movie or other media content in accordance with some embodiments of the invention. As shown, display screen 2800 may include a synopsis of the movie content and cast information. As also shown, control circuitry 304 may allow the user to select a cast member or other supplemental content from display screen 2800 to retrieve information related to that cast member.

[0161] FIGS. 36-39 show an illustrative display screen 3600 of a media guidance application that may be used to access information and/or media content associated with a person (e.g., an actor, artist, or performer) in accordance with some embodiments of the invention. For example, as shown in FIG. 36, control circuitry 304 may cause a filmography snapshot portion 3610 to be displayed in display screen 3600. Filmography snapshot portion 3610 may indicate the

number of movies, television shows, and/or other appearances made by an actor each year. In the case of a musical artist, a corresponding discography snapshot may be displayed indicating the number of albums released per year. In cases where a single artist both acts and musically performs, a combined display may indicate the number of releases featuring the artist - whether a movie, television show, or album - in each year. As shown, each release (e.g., movie and/or album) may be indicated by a block. However, it should be noted that any other suitable indicator of any size, shape, and color may also be used.

[0162] Turning to FIG. 37, when the user scrolls over, or otherwise selects, a column of boxes (e.g., corresponding to the releases in a particular year) in filmography snapshot portion 3610, control circuitry 304 may cause an overlay 3700 to be displayed with a list of the releases. Thus, the media guidance application may allow a user to quickly browse through the years to view an artist's work and access a particular work by selecting it from the list displayed in the overlay.

[0163] In some embodiments, control circuitry 304 may allow the user to add the contents of a list to the video and/or music queue for later review.

[0164] Any other suitable information relating to the selected artist may be provided in media guidance display 3600. For example, FIG. 38 shows that media guidance display 3600 may include credit information relating to the selected artist. In another example, FIG. 39 shows that media guidance display 3600 may include award information relating to the selected artist. As discussed above, data displayed may be

cross-referenced and linked such that any reference to media content allows quick and easy access to that media content or a related media clip. For example, the user may select a movie for which an actor received an award to access a trailer of that movie.

[0165] As described above, the media information display described herein may also be displayed in response to, for example, selecting an album from trending media content section of third region 630 in FIG. 6, or inputting the album name or other identifying information into general searching tool 612 in first region 610 in FIG. 6.

[0166] FIGS. 40-42 show illustrative display screens of a media guidance application depicting a variety of techniques for accessing music and/or video clips, or other information related to media content displayed in a cycling advertorial in accordance with some embodiments of the invention. When a user selects to view a trailer from an advertorial in guidance display 4000, for example, control circuitry 304 may display the trailer in an overlay 4010 without leaving the display screen. FIG. 40, for example, shows overlay 4000 containing a trailer for the movie "True Grit" that relates to the actor "Jeff Bridge" promoted in an advertorial. Control circuitry 304 may allow the user to play the trailer or close overlay 4010 as the advertorial continues to cycle to the next advertorial.

[0167] As described above, overlays and/or media queue may be persistent throughout the guidance displays presented by the media guidance application. For example, FIG. 41 shows an illustrative display screen with an advertorial featuring the music artist "Shakira." The advertorial may feature the music

artist and their related works. For example, guidance display 4100 may provide the user with access to music content, video content, access to associated information, or any other suitable media content related to the music artist. In a more particular example, the user has selected to watch a music video for the song "Whenever, Wherever" by Shakira. As shown in FIG. 42, control circuitry 304 may display the video clip in an overlay 4200. In addition, control circuitry 304 may place the video content in a media queue, which provides media control options for controlling the playback of the video content. The user may then select to view a review of the album "She Wolf." As shown in FIG. 43, control circuitry 304 causes the video clip in overlay 4200 to continue to play even as the user browses to another display screen using the media guidance application. The user may navigate back or to other information through various other display screens in the media guidance application, yet the overlay persists until the user closes it or the video content finishes playing.

[0168] FIGS. 44-47 show illustrative display screens of a media guidance application depicting a media queue for managing one or more lists of music, video clips, or any other suitable content in accordance with some embodiments of the invention. When a video clip is selected by the user, control circuitry 304 may add the video clip to the media queue 4410 as shown in FIG. 44. Media queue 4410 may be displayed by selecting the "Media Queue" display element at the bottom of display screen 4400. In some embodiments, the media queue may be an overlay displayed over the content of display screen 4400. In addition, media queue 4410 may be

divided into at least two panels 4415 and 4420 - e.g., one for video clips (panel 4415) and one for music clips (panel 4420). Alternatively, media queue 4410 may include an aggregate list of any media content selected by the user. From within media queue 4410, a user may select a clip to play in an overlay, such as an overlay 4510 shown in FIG. 45. Media queue 4410 may also allow that user to delete an item from within the queue.

[0169] As shown in FIG. 46, media queue 4410 may also include music clips in panel 4420. The list may be populated by selecting clips from one or more display screens. In particular, control circuitry 304 may store user selections that are placed in media queue 4410 in memory. Music clips, like video clips, may be played and deleted. In some embodiments, media queue 4410 or any other portion of the media guidance application may provide the user with the opportunity to purchase one or more media clips, e.g., directly through media queue 4410.

[0170] In some embodiments, the media guidance application may provide the user with a user-configurable media queue. FIG. 47 provides an enlarged view of the media queue in accordance with some embodiments of the invention. As shown, clips may be played in any order and the user may rearrange the order of the items listed. In some embodiments, the media queue automatically plays through the listed content, moving from one item to the next in the queue until all clips have been played.

[0171] In some embodiments, referring back to FIG. 6, control circuitry 304 may provide the user with access to information directly from general searching

tool 612. For example, when a person's name is entered into the general searching tool 612, a biography of that person may appear in an overlay over the current display screen. As another example, a user may enter a song name into general searching tool 612 or any other suitable mechanism and may be able to play the song without navigating away from the current display screen. Thus, the user elements described herein may function to enable a user to find and access media information, but also, simultaneously, as media control elements allowing the user to play media clips as the user browses for entertainment information. Accordingly, a mixed-media, immersive experience is provided.

[0172] Furthermore, it should be noted that the media guidance application may provide the user with information in a mixed-media context. For example, as described above, an advertorial may highlight an artist's work in film, television, and/or music. Similarly, biographies and other information on individuals may highlight that individual's contribution to film, television, and/or music. Clips from each of these media types may be integrated and made available to the user. In addition, these clips may be accessed through the media queue, which is itself a mixed-media tool capable of handling both music and video assets.

[0173] FIG. 48 shows an illustrative display screen of a media guidance application depicting a recommendation feature in accordance with some embodiments of the invention. In particular, the user may set up a profile in which indications of the user's preferred media content is stored. As the user

indicates likes and dislikes, and, as the site learns more about the user, e.g., by tracking user actions and viewing history, control circuitry 304 may provide recommendations of media determined to be of interest to the user. Additionally or alternatively, control circuitry 304 may retrieve user profile information and user history information from user television equipment 502, user computer equipment 504, and/or wireless communications devices 506 for providing recommendations of media content.

[0174] In a more particular example, the media guidance application may provide the user with the opportunity to indicate whether the user likes a particular artist. In another example, the media guidance application may provide the user with the opportunity to rate media content. As the user continues to indicate preferences and/or uses the media guidance application, the user profile may continue to be updated and used as a basis for providing recommendations.

[0175] As shown in FIG. 48, control circuitry 304 may cause recommended media content to be presented to the user based on, for example, the user profile. In addition, new releases of media content may be recommended to the user based on the user profile. For example, a new album by an artist the user has indicated a strong liking for may be displayed prominently. In addition, as shown in FIG. 48, the display screen may display, pictorially, the media content or artists a user has indicated as favorites. Thus, a visual mash-up may be created with thumbnails or pictures of various media content and artists the user likes. Thus, the user is provided with a visual

representation of the user profile, and may edit it accordingly. It should be noted that, in some embodiments, active user selections or indications of likes and dislikes may be weighted more heavily than tracked user history when providing recommendations.

[0176] FIG. 49 illustrates a flow diagram 4900 for presenting an interactive media guidance application, where user-selected criteria is received and guidance for selecting media content is provided in accordance with some embodiments of the invention.

[0177] At step 4910, a plurality of media identifiers are stored. For example, control circuitry 304 may store media identifiers associated with media content. A media identifier may be, for example, a thumbnail of cover art shown in FIG. 13, a thumbnail of movie art, still images from the content, video clip previews, live video from the content, or any other suitable content that identifies the media content.

[0178] At step 4920, control circuitry 304 may determine whether an indication from the user has been received to access guidance display that allows the user to input criteria for searching and/or filtering media content. For example, control circuitry 304 may determine whether the user has navigated to a guidance display, such as the ones shown in FIGS. 8-14 and 19-27. In a more particular example, control circuitry 304 may receive an indication that the user has selected the findR button or a content selection tool option on a guidance display, such as the ones shown in FIGS. 6 and 7.

[0179] In response, control circuitry 304 may cause a two-dimensional selection region to be displayed at step 4930. As shown in FIGS. 8-14 and 19-27, the two-

dimensional selection region is divided into a plurality of sub-regions for selection by the user. The two-dimensional selection region also defines an intersection between a first criterion and a second criterion. For example, as shown in FIG. 20, control circuitry 304 causes a two-dimensional selection region in a grid form to be presented to the user. The two-dimensional selection region shown in FIG. 20 defines the intersection between the positive-negative set of moods and the wild-chill set of moods. In particular, a sub-region indicates a particular selection between a "positive" mood and a "negative" mood (e.g., the music should be significantly more positive than negative), a particular selection between a "wild" mood and a "chill" mood (e.g., the music should be more chill than wild), and/or any combination or interaction between both (e.g., the music should be positive, but chill).

[0180] It should be noted that, although the embodiments described herein generally refer to a first mood and a second mood in the two-dimensional selection region, this is merely illustrative. Any suitable criterion may be placed in the two-dimensional selection region. In some embodiments, control circuitry 304 may allow the user to select and/or define criterion for placement on the two-dimensional selection region. For example, in some embodiments, control circuitry 304 may provide the user with a list populated with criterion information from database. The user may indicate criterion for placement on the two-dimensional selection region using the criteria list.

[0181] In some embodiments, control circuitry 304 may provide multiple two-dimensional selection regions

for receiving user selections. For example, control circuitry 304 may provide a first two-dimensional selection region defining the intersection between a first set of moods and a second set of moods and a second two-dimensional selection region defining the intersection between a set of tones and a set of genres.

[0182] At step 4940, control circuitry 304 may receive a user selection of a sub-region from the plurality of sub-regions in the two-dimensional selection region. For example, using a user input device, the user may select one of the sub-region cells within the two-dimensional selection region. It should be noted that the two-dimensional selection region allows the user to indicate the extent of a mood or other criterion by selecting an area on or near an axis of the desired mood. For example, a user may set how wild or chill the music should be by selecting a location on the chill-wild axis.

[0183] In response to receiving a user selection of a sub-region from the two-dimensional selection region at step 4940, control circuitry 304 may derive information from the selected sub-region at step 4950. For example, control circuitry 304 may transmit a query to a database for media content using portions of information derived from user selection 2030 - e.g., find media content with corresponding metadata that is at least 82% on the chill-wild mood scale (where chill is 0%, wild is 100%, and 50% is neither chill nor wild) and that is at least 46% on the negative-positive mood scale (where negative is 0%, positive is 100%, and 50% is neither negative nor positive).

[0184] It should be noted that, upon receiving a user selection (e.g., a user selection of a sub-region or any other user-selected criteria), control circuitry 304 may query the database to search and/or filter search results. Alternatively, at step 4950, control circuitry 304 may combine or aggregate the user selection from the sub-region and/or other user-selected criteria for submission to the database or other data source.

[0185] Any suitable mechanism for retrieving media content and/or their associated media identifiers to be presented in the guidance display may be used. For example, in some embodiments, control circuitry 304 may transmit a query to storage for media content and media identifiers with metadata matching user-selected criteria. In response to receiving media content and media identifiers from storage (e.g., in an XML structure as illustrated in FIG. 13), control circuitry 304 may determine which media content and media identifiers to present.

[0186] In response, control circuitry 304 may determine a subset of the plurality of media identifiers corresponding to the user-selected criteria at step 4960. For example, control circuitry 304 may determine which pieces of media content have metadata matching the user-selected criteria.

[0187] At step 4970, control circuitry 304 may cause at least a portion of the subset of media identifiers to be presented. For example, as shown in FIG. 19, in response to receiving user-selected criteria, control circuitry 304 may retrieve and present a subset of media identifiers in a search results portion 850 of a guidance display 800.

[0188] Control circuitry 304 may monitor to detect whether the user has provided additional criteria or modified criteria for searching and/or filtering media content at step 4980. In response to receiving additional criteria or modified criteria, control circuitry 304 may dynamically update the media content and their media identifiers presented in a search results region. For example, as the user moves through the two-dimensional selection region, control circuitry 304 may dynamically update the media identifiers presented in the search results region.

[0189] Any suitable mechanism for updating media identifiers may be used. For example, in some embodiments, control circuitry 304 may transmit a query to local storage to filter the currently displayed media identifiers with additional criteria. In response to receiving updated media identifiers from storage (e.g., in an XML structure as illustrated in FIG. 50), control circuitry 304 may present the updated media identifiers to the user.

[0190] At step 4990, control circuitry 304 may determine whether the user has indicated to access the media asset or media content corresponding to the selected media identifier. For example, the user may use a user input device to select the presented media identifier. In response, control circuitry 304 may perform a corresponding action at step 5000. For example, control circuitry 304 may access the corresponding media content. In another example, control circuitry 304 may provide the user with a preview of the media content (e.g., an audio sample, a trailer, a video clip, etc.). Additionally or alternatively to presenting the content corresponding

to the selected media identifier, control circuitry 304 may provide the user with access to information, access to related media content, and/or provide the opportunity to set various settings, such as record the content, set a reminder to watch or listen to the content, etc. In some embodiments, control circuitry 304 may select the media identifier and instruct a second screen device (e.g., wireless user communications device 406) to playback the content, record the content, set a reminder to watch the content, etc.

[0191] Otherwise, if the user does not select one of the subset of media identifiers, control circuitry 304 may return back to step 4980 and continue to monitor to detect whether the user has provided additional criteria or modified criteria for searching and/or filtering media content.

[0192] It should be understood that the above steps of the flow diagram of FIG. 49 may be executed or performed in any order or sequence not limited to the order and sequence shown and described in the figure. Also, some of the above steps of the flow diagram of FIG. 49 may be executed or performed substantially simultaneously where appropriate or in parallel to reduce latency and processing times.

[0193] The above described embodiments of the present disclosure are presented for purposes of illustration and not of limitation, and the present disclosure is limited only by the claims which follow.

What is claimed is:

1. A method for providing guidance for selecting content, the method comprising:

storing a plurality of media identifiers;

causing a two-dimensional selection region to be presented to a user, wherein:

the two-dimensional selection region defines an intersection between a first criterion and a second criterion, the first criterion and the second criterion are associated with the plurality of media identifiers; and

the two-dimensional selection region is divided into a plurality of sub-regions;

receiving a user selection of a sub-region from the plurality of sub-regions within the two-dimensional selection region;

determining a subset of the plurality of media identifiers corresponding to the sub-region in response to receiving the user selection; and

causing at least a portion of the subset of the plurality of media identifiers to be presented to the user.

2. The method of claim 1, wherein each of the plurality of sub-regions defines a degree of the intersection between the first criterion and the second criterion, the method further comprising determining the subset of the plurality of media identifiers by determining the plurality of media identifiers that match the degree of the intersection between the first criterion and the second criterion.

3. The method of claim 1, further comprising:

receiving a plurality of criteria relating to the plurality of media identifiers from the user; and

filtering the plurality of media identifiers in response to receiving the plurality of criteria.

4. The method of claim 3, wherein the plurality of criteria includes one or more of: a mood, a genre, a subgenre, a rating, a time period, a demographic, and a theme.

5. The method of claim 3, further comprising selecting at least one of the first criterion and the second criterion based at least in part on the plurality of criteria received from the user.

6. The method of claim 1, further comprising selecting at least one of the first criterion and the second criterion based on profile information associated with the user.

7. The method of claim 1, further comprising selecting at least one of the first criterion and the second criterion based on usage history information associated with the user.

8. The method of claim 1, wherein each media identifier includes a media playback option, wherein selection of the media identifier causes

information relating to a corresponding media asset to be presented to the user and wherein selection of the media playback option causes a media clip associated with the corresponding media asset to be presented to the user.

9. The method of claim 1, wherein at least one of the plurality of sub-regions within the two-dimensional selection region is shaded to indicate availability of the plurality of media identifiers.

10. The method of claim 1, further comprising:

retrieving relational information associated with each of the plurality of media identifiers that describes a relationship between media assets of a first media type and media assets of a second media type, wherein a media identifier selected by the user corresponds to a media asset of the first media type; and

causing a second media asset of the second media type to be presented to the user in response to receiving the relational information.

11. A system for providing guidance for selecting content, the system comprising:

a storage device;

processing circuitry configured to:

store a plurality of media identifiers in the storage device;

cause a two-dimensional selection region to be presented to a user, wherein:

the two-dimensional selection region defines an intersection between a first

criterion and a second criterion, the first criterion and the second criterion are associated with the plurality of media identifiers; and

the two-dimensional selection region is divided into a plurality of sub-regions;

receive a user selection of a sub-region from the plurality of sub-regions within the two-dimensional selection region;

determine a subset of the plurality of media identifiers corresponding to the sub-region in response to receiving the user selection; and

cause at least a portion of the subset of the plurality of media identifiers to be presented to the user.

12. The system of claim 11, wherein each of the plurality of sub-regions defines a degree of the intersection between the first criterion and the second criterion and wherein the processing circuitry is further configured to determine the subset of the plurality of media identifiers by determining the plurality of media identifiers that match the degree of the intersection between the first criterion and the second criterion.

13. The system of claim 11, wherein the processing circuitry is further configured to:

receive a plurality of criteria relating to the plurality of media identifiers from the user; and

filter the plurality of media identifiers in response to receiving the plurality of criteria.

14. The system of claim 13, wherein the plurality of criteria includes one or more of: a mood, a genre, a subgenre, a rating, a time period, a demographic, and a theme.

15. The system of claim 13, wherein the processing circuitry is further configured to select at least one of the first criterion and the second criterion based at least in part on the plurality of criteria received from the user.

16. The system of claim 11, wherein the processing circuitry is further configured to select at least one of the first criterion and the second criterion based on profile information associated with the user.

17. The system of claim 11, wherein the processing circuitry is further configured to select at least one of the first criterion and the second criterion based on usage history information associated with the user.

18. The system of claim 11, wherein each media identifier includes a media playback option, wherein selection of the media identifier causes information relating to a corresponding media asset to be presented to the user and wherein selection of the media playback option causes a media clip associated with the corresponding media asset to be presented to the user.

19. The system of claim 11, wherein at least one of the plurality of sub-regions within the two-dimensional selection region is shaded to indicate availability of the plurality of media identifiers.

20. The system of claim 11, wherein the processing circuitry is further configured to:

retrieve, from the storage device, relational information associated with each of the plurality of media identifiers that describes a relationship between media assets of a first media type and media assets of a second media type, wherein a media identifier selected by the user corresponds to a media asset of the first media type; and

cause a second media asset of the second media type to be presented to the user in response to receiving the relational information.

21. An apparatus for providing guidance for selecting content, the apparatus comprising:

means for storing a plurality of media identifiers;

means for causing a two-dimensional selection region to be presented to a user, wherein:

the two-dimensional selection region defines an intersection between a first criterion and a second criterion, the first criterion and the second criterion are associated with the plurality of media identifiers; and

the two-dimensional selection region is divided into a plurality of sub-regions;

means for receiving a user selection of

a sub-region from the plurality of sub-regions within the two-dimensional selection region;

means for determining a subset of the plurality of media identifiers corresponding to the sub-region in response to receiving the user selection; and

means for causing at least a portion of the subset of the plurality of media identifiers to be presented to the user.

22. The apparatus of claim 21, wherein each of the plurality of sub-regions defines a degree of the intersection between the first criterion and the second criterion, the apparatus further comprising means for determining the subset of the plurality of media identifiers by determining the plurality of media identifiers that match the degree of the intersection between the first criterion and the second criterion.

23. The apparatus of claim 21, further comprising:

means for receiving a plurality of criteria relating to the plurality of media identifiers from the user; and

means for filtering the plurality of media identifiers in response to receiving the plurality of criteria.

24. The apparatus of claim 23, wherein the plurality of criteria includes one or more of: a mood, a genre, a subgenre, a rating, a time period, a demographic, and a theme.

25. The apparatus of claim 23, further comprising means for selecting at least one of the

first criterion and the second criterion based at least in part on the plurality of criteria received from the user.

26. The apparatus of claim 21, further comprising means for selecting at least one of the first criterion and the second criterion based on profile information associated with the user.

27. The apparatus of claim 21, further comprising means for selecting at least one of the first criterion and the second criterion based on usage history information associated with the user.

28. The apparatus of claim 21, wherein each media identifier includes a media playback option, wherein selection of the media identifier causes information relating to a corresponding media asset to be presented to the user and wherein selection of the media playback option causes a media clip associated with the corresponding media asset to be presented to the user.

29. The apparatus of claim 21, wherein at least one of the plurality of sub-regions within the two-dimensional selection region is shaded to indicate availability of the plurality of media identifiers.

30. The apparatus of claim 21, further comprising:

means for retrieving relational information associated with each of the plurality of media identifiers that describes a relationship between media assets of a first media type and media assets of a second media type, wherein a media identifier

selected by the user corresponds to a media asset of the first media type; and

means for causing a second media asset of the second media type to be presented to the user in response to receiving the relational information.

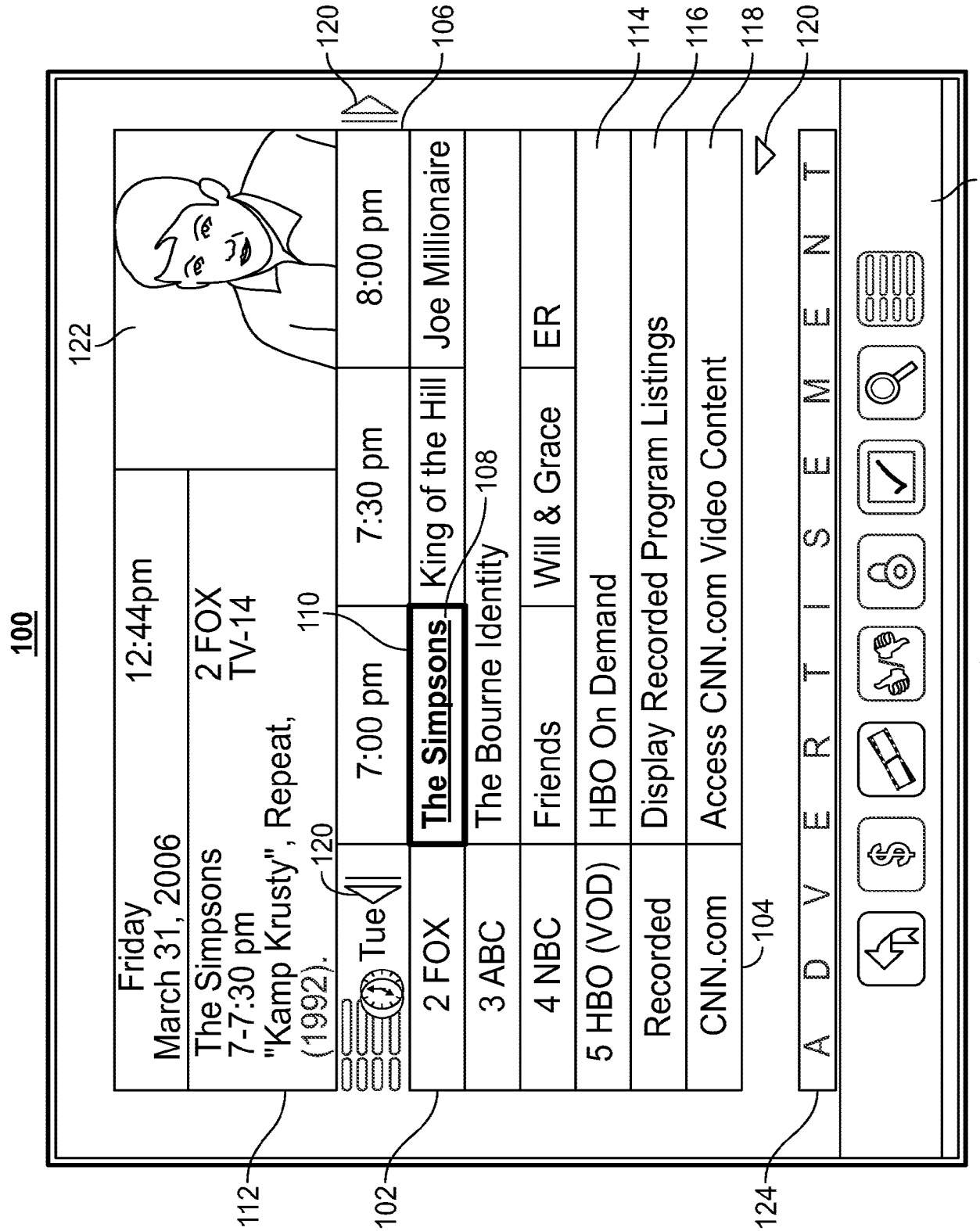

100
Friday
March 31, 2006
12:44pm
The Simpsons
7-7:30 pm
"Kamp Krusty", Repeat,
(1992).
2 FOX
TV-14
Tue
7:00 pm
7:30 pm
8:00 pm
2 FOX
The Simpsons
King of the Hill
Joe Millionaire
3 ABC
The Bourne Identity
4 NBC
Friends
Will & Grace
ER
5 HBO (VOD)
HBO On Demand
Recorded
Display Recorded Program Listings
CNN.com
Access CNN.com Video Content
A D V E R T I S E M E N T
102
104
106
108
110
112
114
116
118
120
122
124
126

FIG. 1

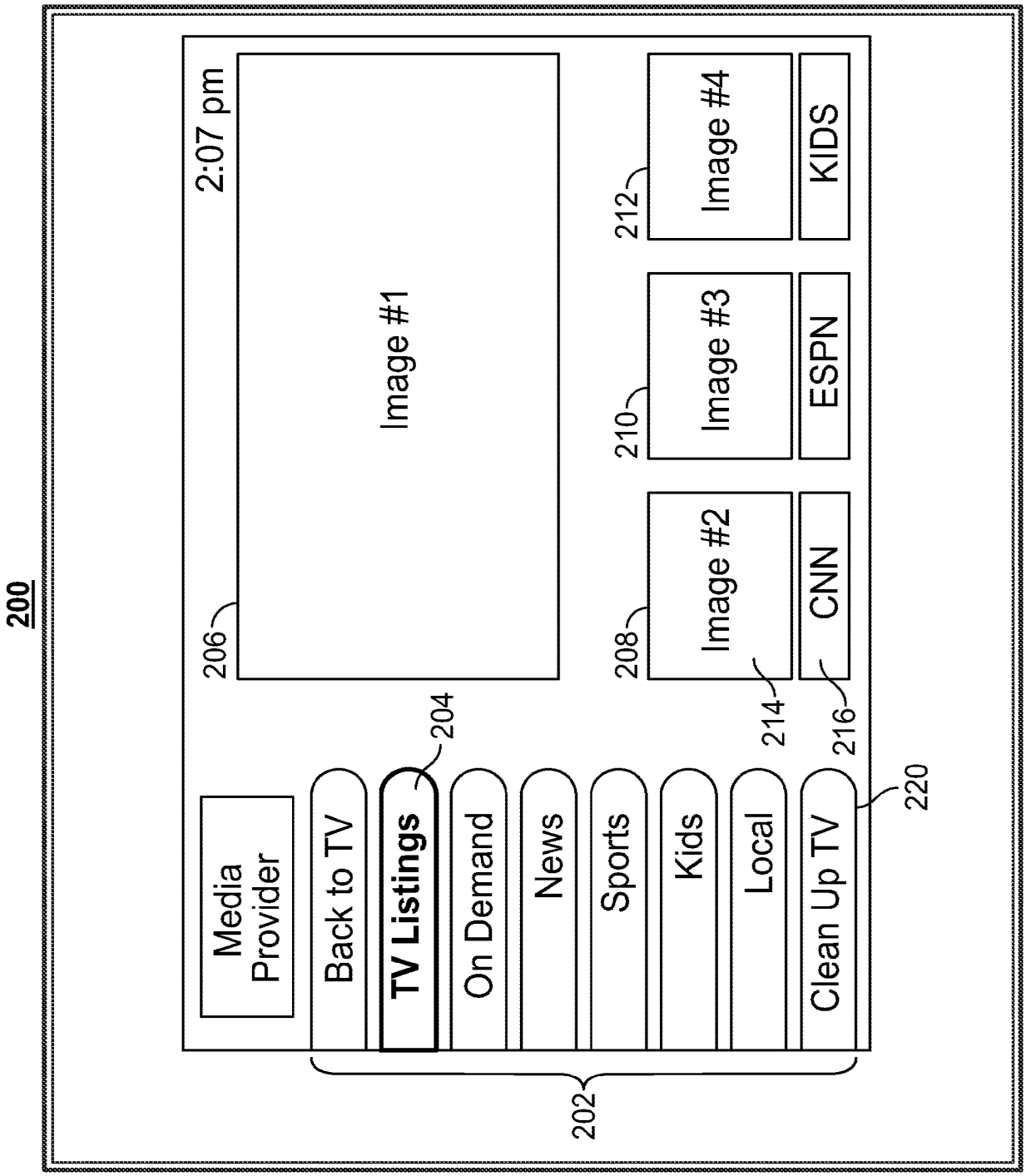

200
2:07 pm
Image #1
206
Image #2
208
Image #3
210
Image #4
212
CNN
214
ESPN
216
KIDS
Media Provider
Back to TV
TV Listings
204
On Demand
News
Sports
Kids
Local
Clean Up TV
220
202

FIG. 2

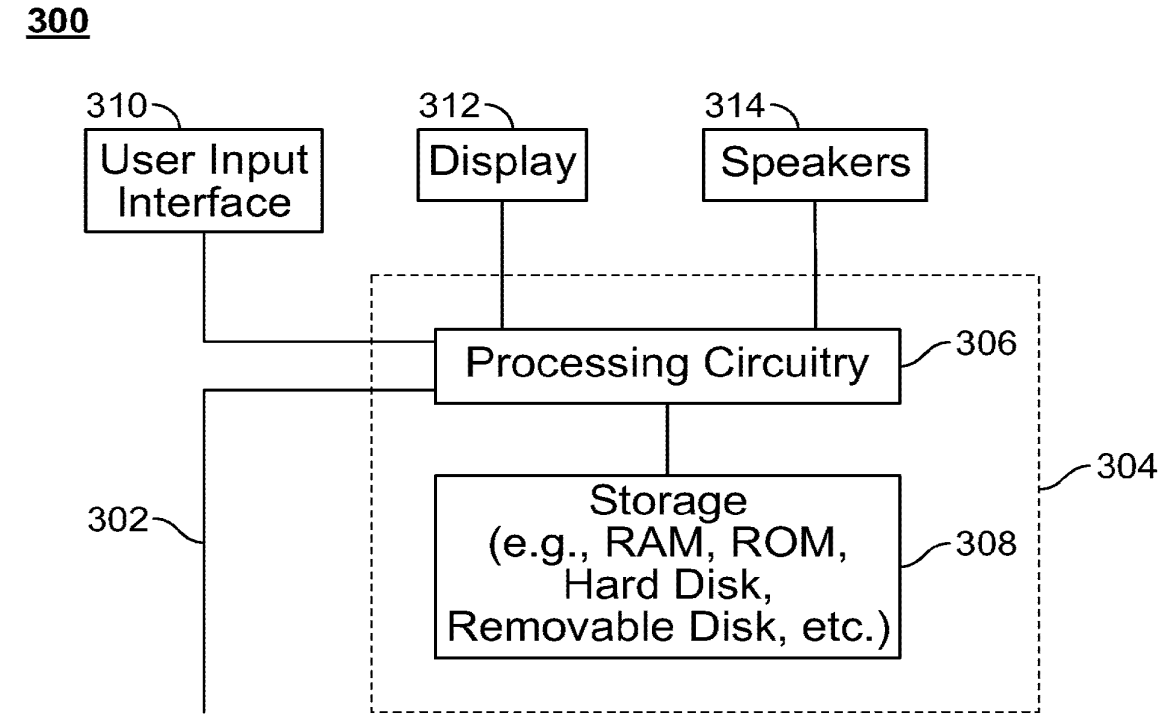

300
310
User Input Interface
312
Display
314
Speakers
Processing Circuitry
306
304
302
Storage (e.g., RAM, ROM, Hard Disk, Removable Disk, etc.)
308

FIG. 3

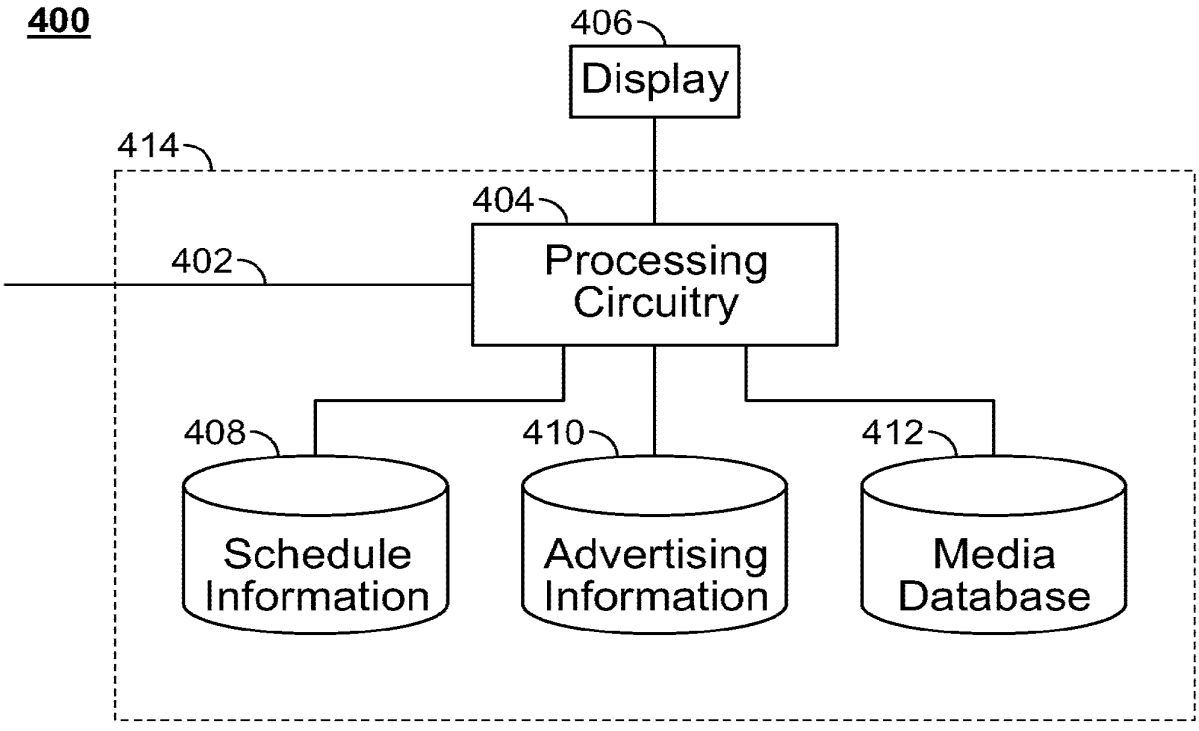

400
406
Display
414
404
402
Processing Circuitry
408
410
412
Schedule Information
Advertising Information
Media Database

FIG. 4

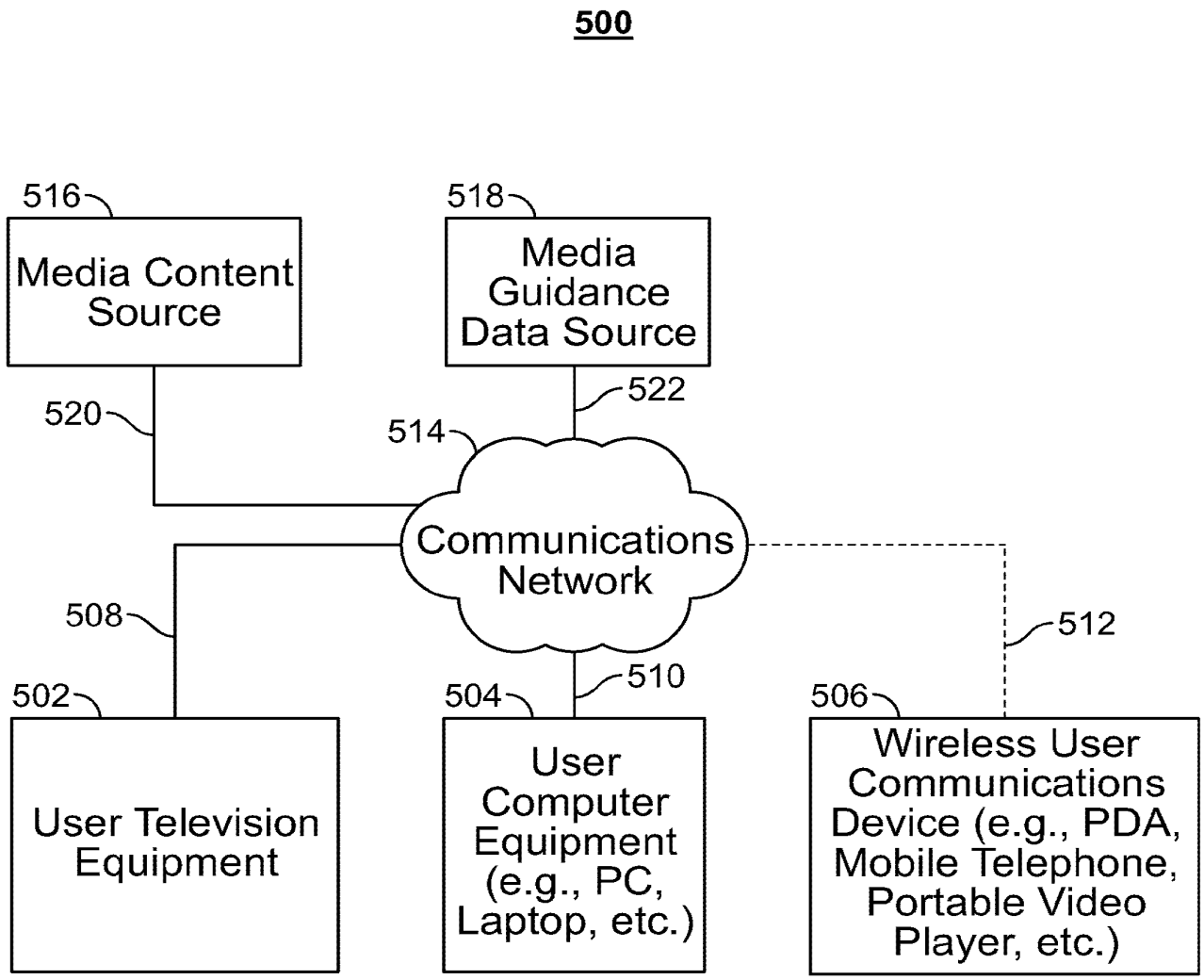

500
516
Media Content Source
518
Media Guidance Data Source
522
520
514
Communications Network
508
512
510
502
504
506
User Television Equipment
User Computer Equipment (e.g., PC, Laptop, etc.)
Wireless User Communications Device (e.g., PDA, Mobile Telephone, Portable Video Player, etc.)

FIG. 5

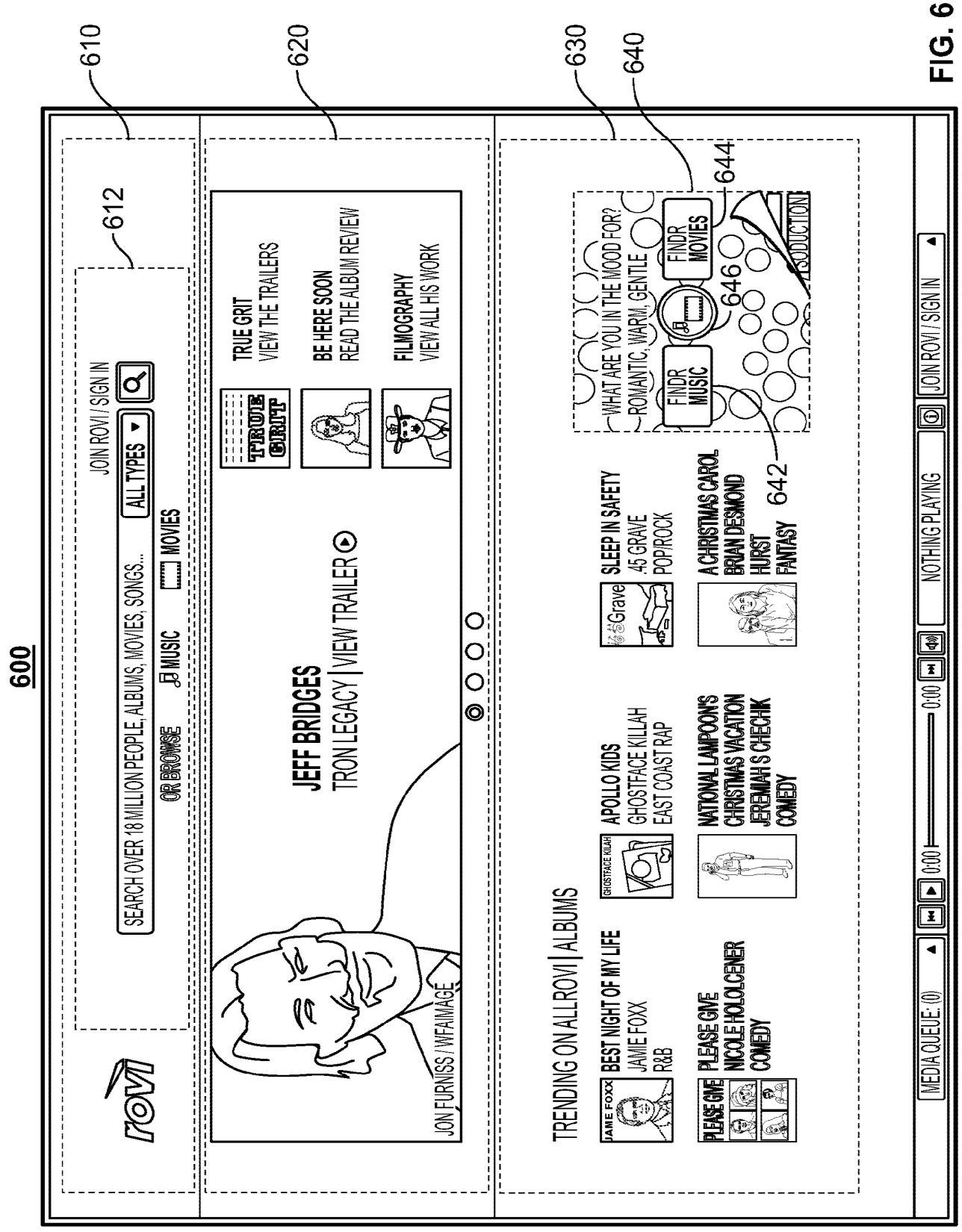

600
610
620
630
640
612
644
646
642
JOIN ROVI / SIGN IN
SEARCH OVER 18 MILLION PEOPLE, ALBUMS, MOVIES, SONGS...
ALL TYPES
OR BROWSE
MUSIC
MOVIES
TRUE GRIT
VIEW THE TRAILERS
BE HERE SOON
READ THE ALBUM REVIEW
FILMOGRAPHY
VIEW ALL HIS WORK
JEFF BRIDGES
TRON LEGACY | VIEW TRAILER
JON FURNISS / WFAIMAGE
WHAT ARE YOU IN THE MOOD FOR?
ROMANTIC, WARM, GENTLE
FINDR MUSIC
FINDR MOVIES
SLEEP IN SAFETY
.45 GRAVE
POP/ROCK
A CHRISTMAS CAROL
BRIAN DESMOND HURST
FANTASY
APOLLO KIDS
GHOSTFACE KILLAH
EAST COAST RAP
NATIONAL LAMPOON'S CHRISTMAS VACATION
JEREMIAH S CHECHIK
COMEDY
BEST NIGHT OF MY LIFE
JAMIE FOXX
R&B
PLEASE GIVE
NICOLE HOLOFCENER
COMEDY
TRENDING ON ALLROVI | ALBUMS
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 6

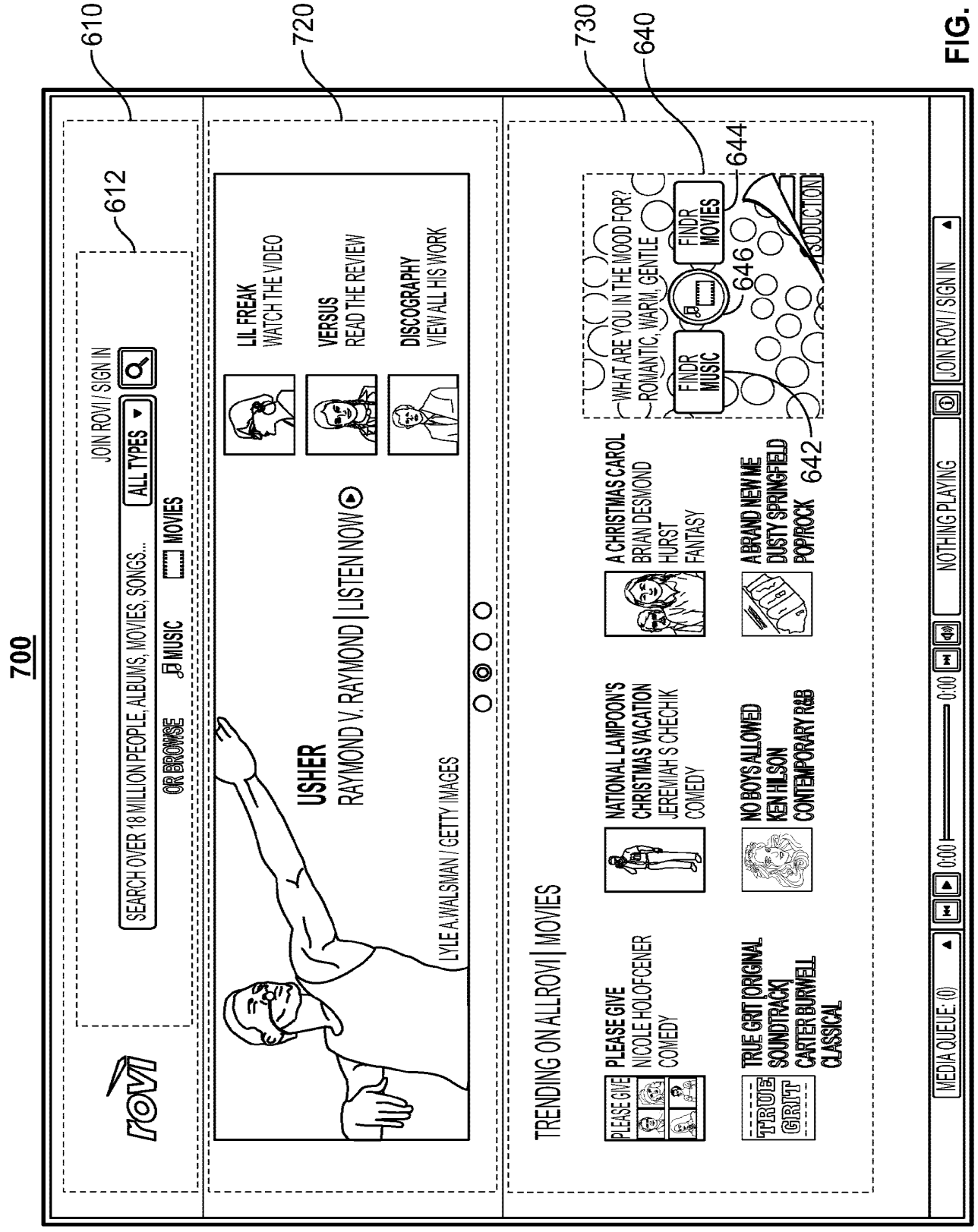

700
610
612
720
730
640
644
646
642
JOIN ROVI / SIGN IN
SEARCH OVER 18 MILLION PEOPLE, ALBUMS, MOVIES, SONGS...
ALL TYPES
OR BROWSE
MUSIC
MOVIES
LIL FREAK
WATCH THE VIDEO
VERSUS
READ THE REVIEW
DISCOGRAPHY
VIEW ALL HIS WORK
USHER
RAYMOND V. RAYMOND | LISTEN NOW
LYLE A.WALSMAN / GETTY IMAGES
WHAT ARE YOU IN THE MOOD FOR?
ROMANTIC, WARM, GENTLE
FINDR MUSIC
FINDR MOVIES
TRENDING ON ALL ROVI | MOVIES
PLEASE GIVE
NICOLE HOLOFCENER
COMEDY
NATIONAL LAMPOON'S CHRISTMAS VACATION
JEREMIAH S CHECHIK
COMEDY
A CHRISTMAS CAROL
BRIAN DESMOND HURST
FANTASY
TRUE GRIT (ORIGINAL SOUNDTRACK)
CARTER BURWELL
CLASSICAL
NO BOYS ALLOWED
KEN HILSON
CONTEMPORARY R&B
A BRAND NEW ME
DUSTY SPRINGFIELD
POP/ROCK
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 7

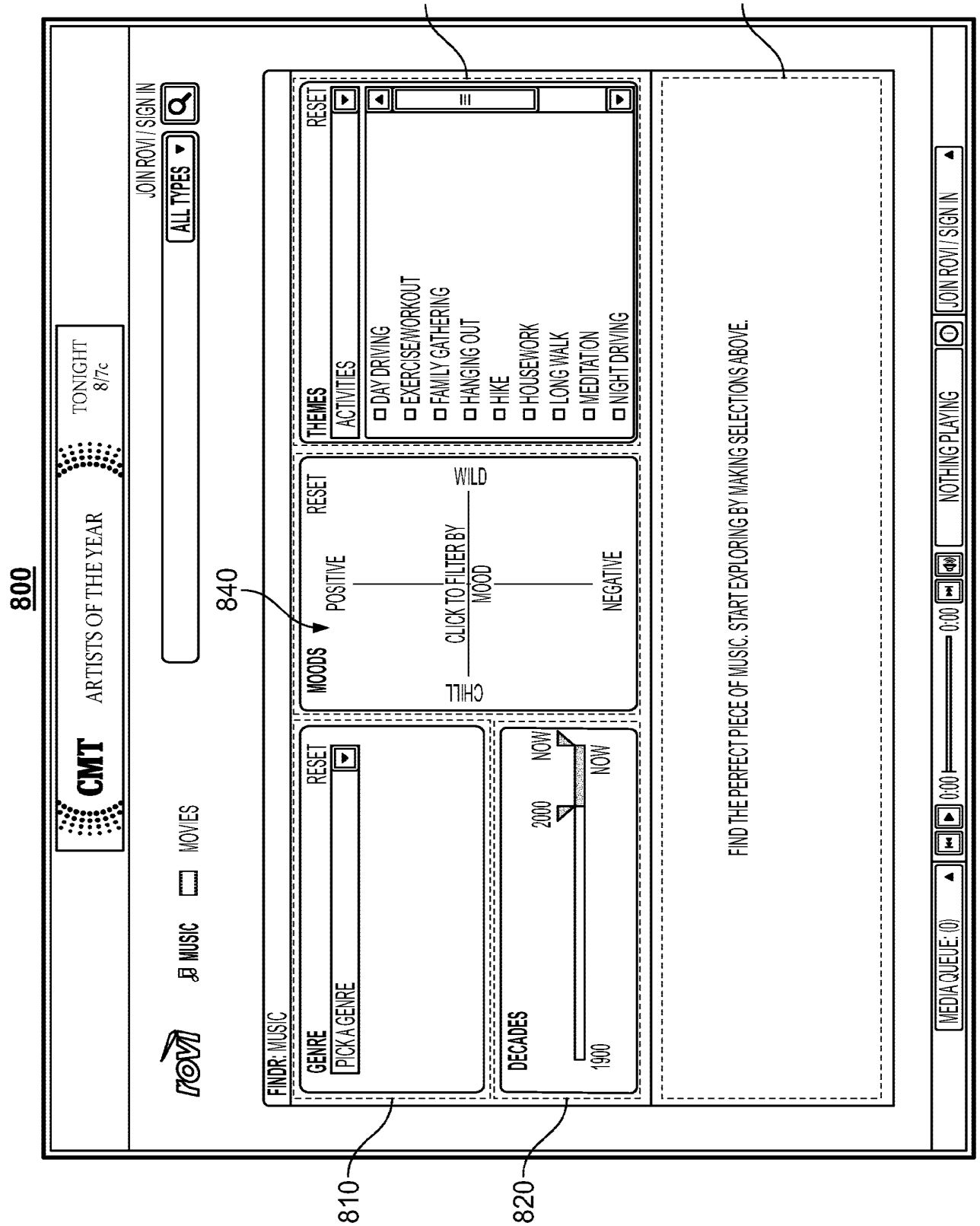

800
CMT
ARTISTS OF THE YEAR
TONIGHT 8/7c
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
rovi
840
830
850
FINDR: MUSIC
GENRE
RESET
PICK A GENRE
MOODS
RESET
POSITIVE
CLICK TO FILTER BY MOOD
WILD
CHILL
NEGATIVE
THEMES
RESET
ACTIVITIES
DAY DRIVING
EXERCISE/WORKOUT
FAMILY GATHERING
HANGING OUT
HIKE
HOUSEWORK
LONG WALK
MEDITATION
NIGHT DRIVING
DECADES
NOW
2000
1900
NOW
FIND THE PERFECT PIECE OF MUSIC. START EXPLORING BY MAKING SELECTIONS ABOVE.
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN
810
820

FIG. 8

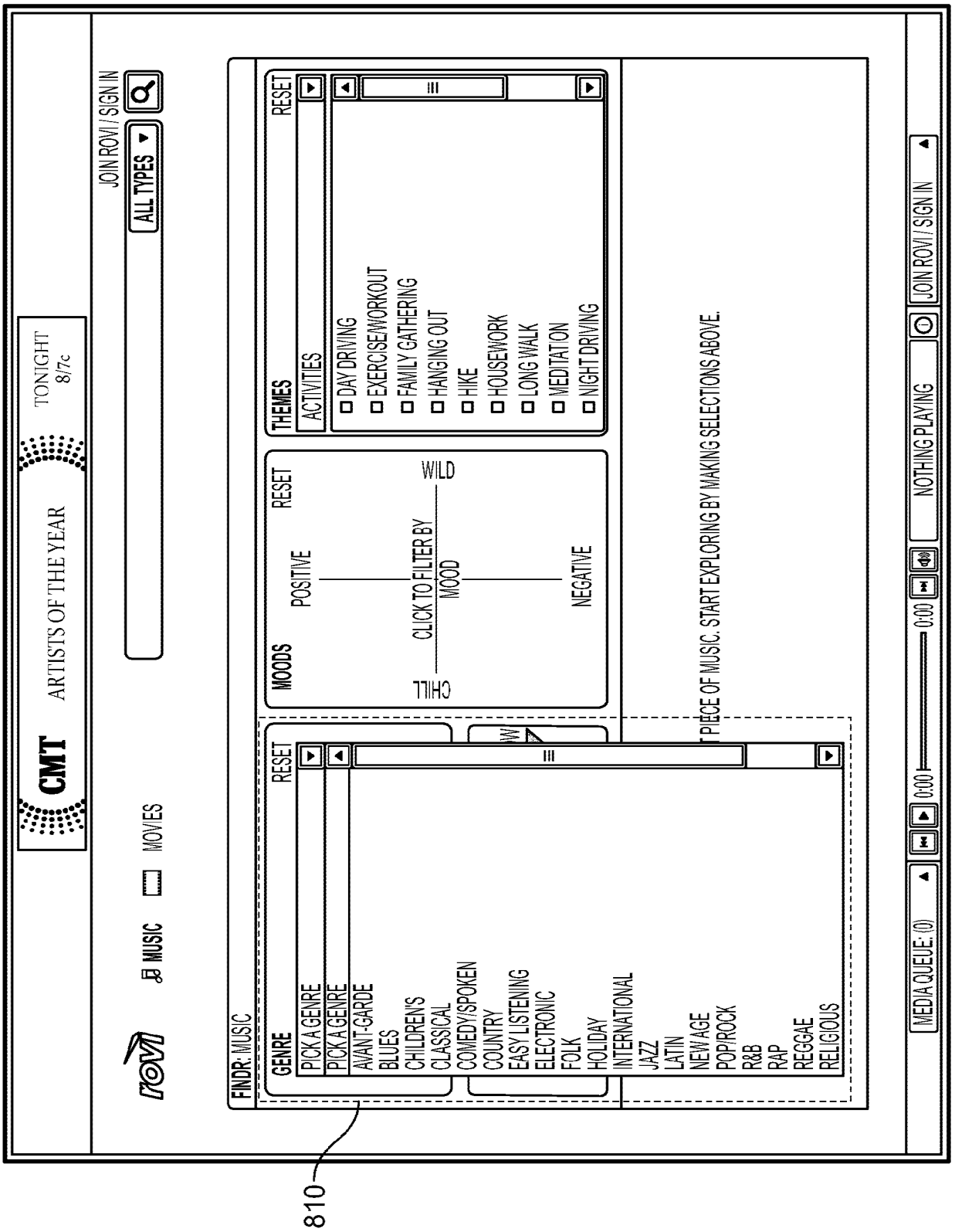

JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
CMT
ARTISTS OF THE YEAR
TONIGHT
8/7c
FINDR: MUSIC
GENRE
RESET
PICK A GENRE
PICK A GENRE
AVANT-GARDE
BLUES
CHILDREN'S
CLASSICAL
COMEDY/SPOKEN
COUNTRY
EASY LISTENING
ELECTRONIC
FOLK
HOLIDAY
INTERNATIONAL
JAZZ
LATIN
NEW AGE
POP/ROCK
R&B
RAP
REGGAE
RELIGIOUS
MOODS
RESET
POSITIVE
NEGATIVE
CHILL
WILD
CLICK TO FILTER BY MOOD
THEMES
RESET
ACTIVITIES
DAY DRIVING
EXERCISE/WORKOUT
FAMILY GATHERING
HANGING OUT
HIKE
HOUSEWORK
LONG WALK
MEDITATION
NIGHT DRIVING
PIECE OF MUSIC. START EXPLORING BY MAKING SELECTIONS ABOVE.
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN
810

FIG. 9

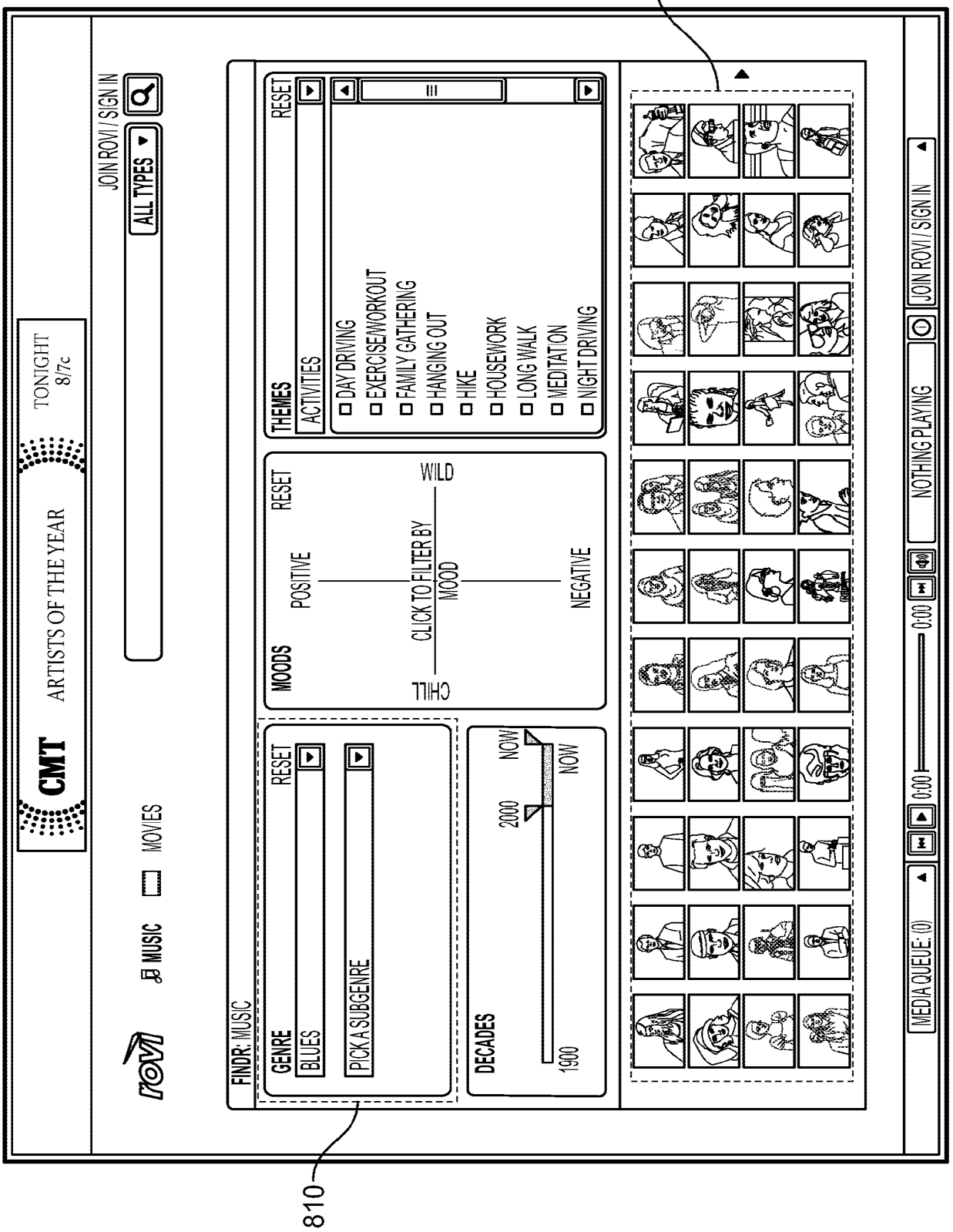

850
810
CMT
ARTISTS OF THE YEAR
TONIGHT 8/7c
JOIN ROVI / SIGN IN
ALL TYPES
rovi
MUSIC
MOVIES
FINDR: MUSIC
GENRE
RESET
BLUES
PICK A SUBGENRE
MOODS
RESET
POSITIVE
CLICK TO FILTER BY MOOD
WILD
CHILL
NEGATIVE
DECADES
2000
NOW
1900
THEMES
RESET
ACTIVITIES
DAY DRIVING
EXERCISE/WORKOUT
FAMILY GATHERING
HANGING OUT
HIKE
HOUSEWORK
LONG WALK
MEDITATION
NIGHT DRIVING
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 10

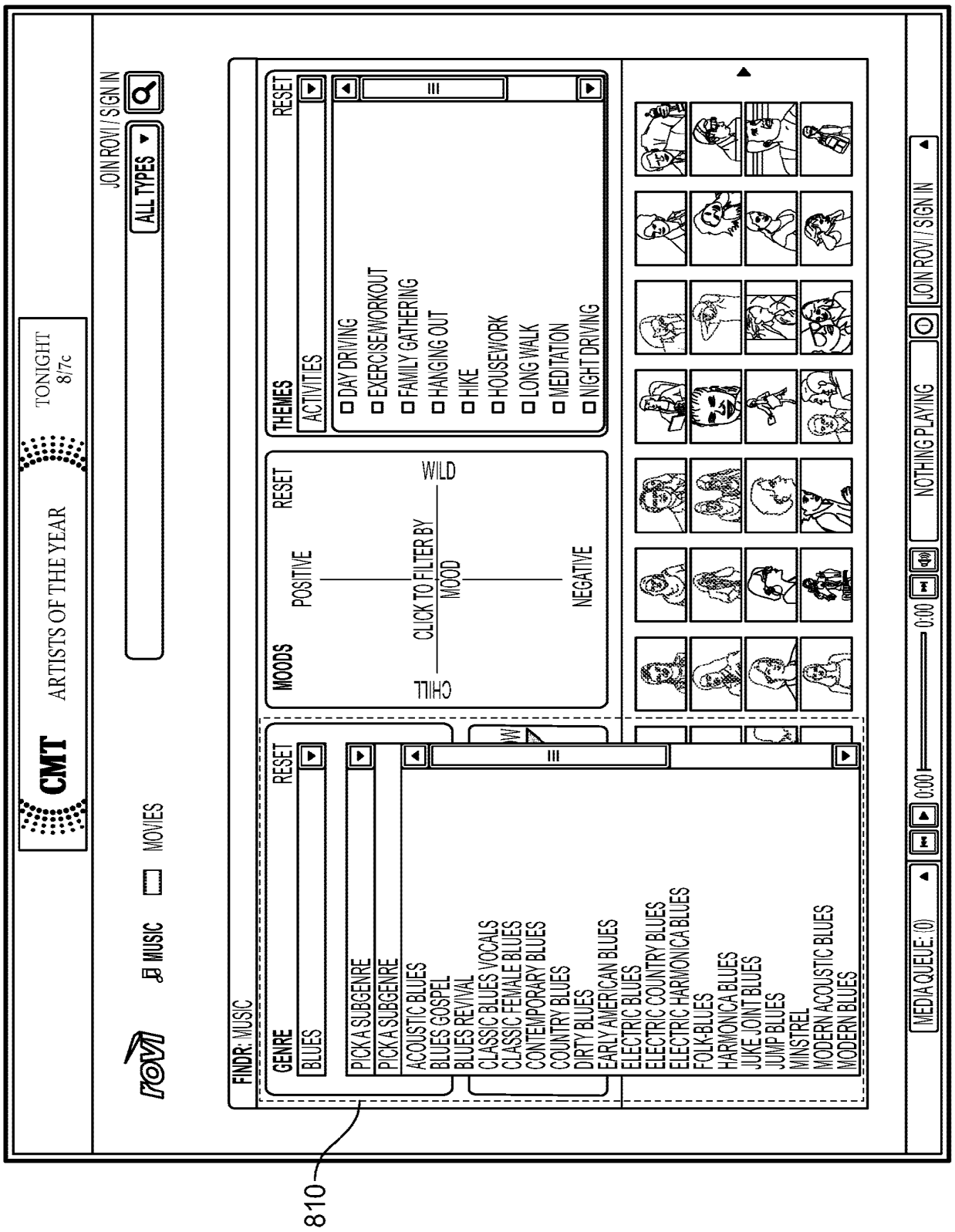

CMT
ARTISTS OF THE YEAR
TONIGHT 8/7c
JOIN ROVI / SIGN IN
ALL TYPES
rovi
MUSIC
MOVIES
FINDR: MUSIC
GENRE
RESET
BLUES
PICK A SUBGENRE
PICK A SUBGENRE
ACOUSTIC BLUES
BLUES GOSPEL
BLUES REVIVAL
CLASSIC BLUES VOCALS
CLASSIC FEMALE BLUES
CONTEMPORARY BLUES
COUNTRY BLUES
DIRTY BLUES
EARLY AMERICAN BLUES
ELECTRIC BLUES
ELECTRIC COUNTRY BLUES
ELECTRIC HARMONICA BLUES
FOLK-BLUES
HARMONICA BLUES
JUKE JOINT BLUES
JUMP BLUES
MINSTREL
MODERN ACOUSTIC BLUES
MODERN BLUES
MOODS
RESET
POSITIVE
NEGATIVE
WILD
CHILL
CLICK TO FILTER BY MOOD
THEMES
RESET
ACTIVITIES
DAY DRIVING
EXERCISE/WORKOUT
FAMILY GATHERING
HANGING OUT
HIKE
HOUSEWORK
LONG WALK
MEDITATION
NIGHT DRIVING
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN
810

FIG. 11

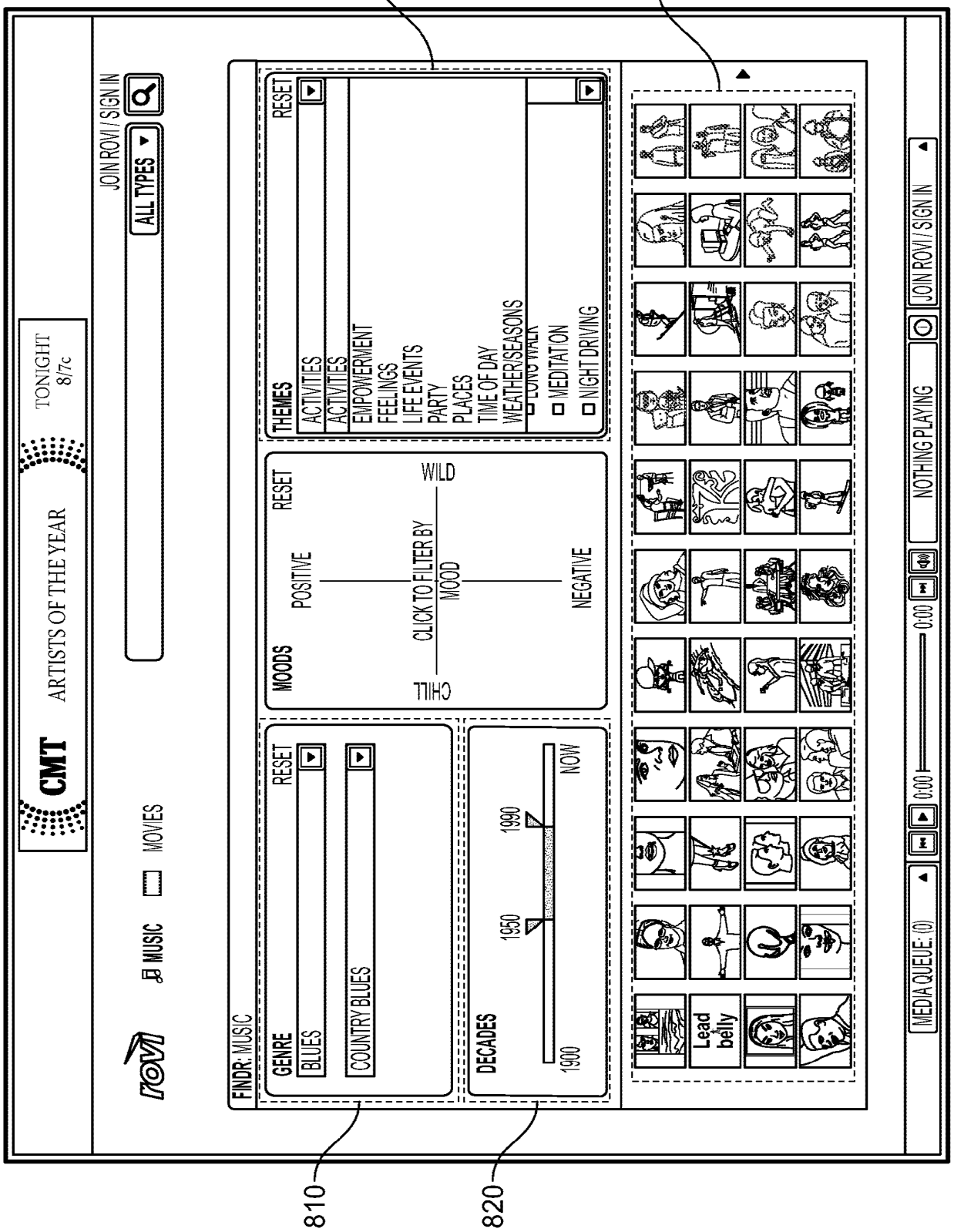

830
850
CMT
ARTISTS OF THE YEAR
TONIGHT 8/7c
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
FINDR: MUSIC
GENRE
RESET
BLUES
COUNTRY BLUES
MOODS
RESET
POSITIVE
NEGATIVE
WILD
CHILL
CLICK TO FILTER BY MOOD
THEMES
RESET
ACTIVITIES
ACTIVITIES
EMPOWERMENT
FEELINGS
LIFE EVENTS
PARTY
PLACES
TIME OF DAY
WEATHER/SEASONS
MEDITATION
NIGHT DRIVING
DECADES
1900
1950
1990
NOW
Lead belly
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN
810
820

FIG. 12

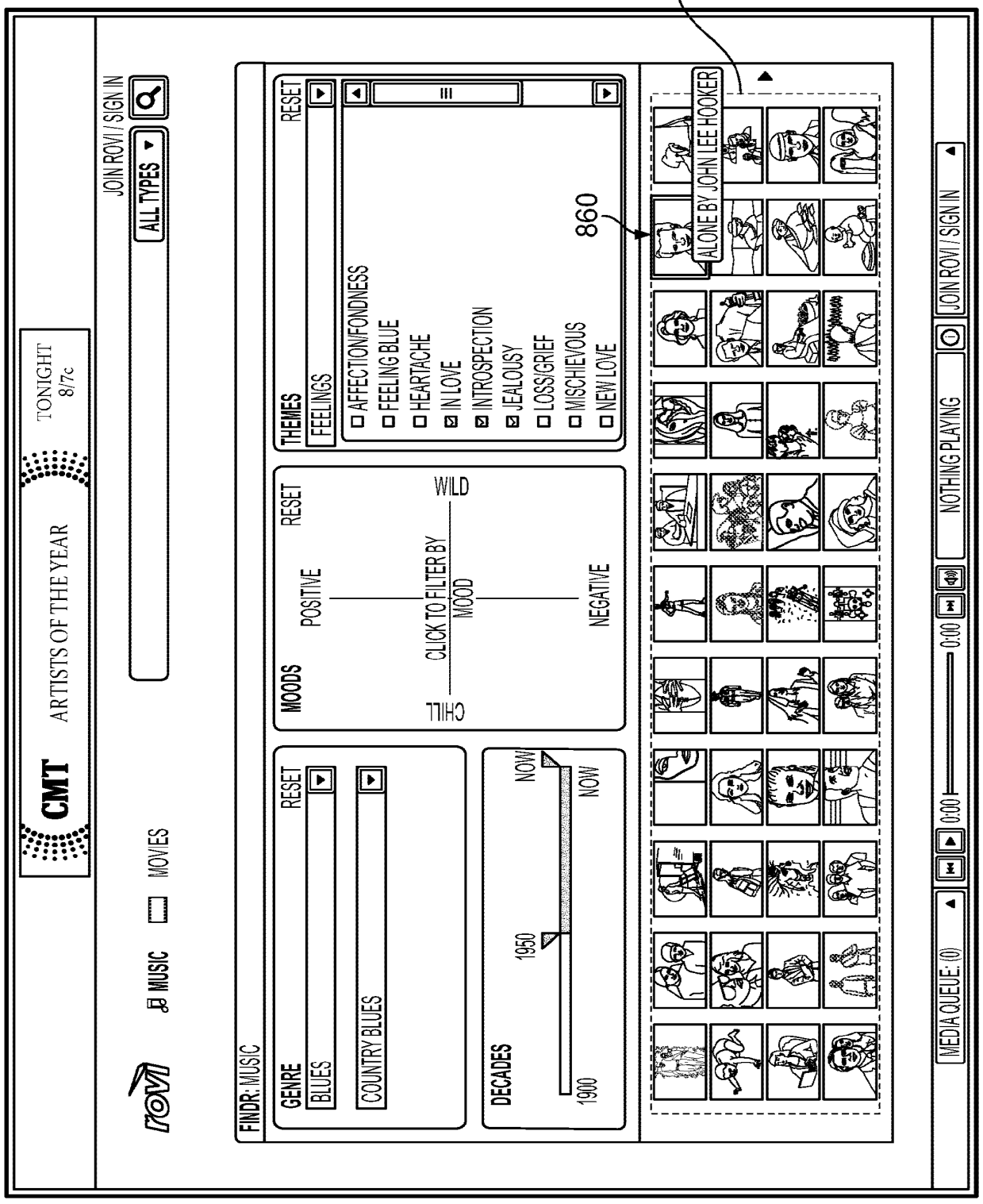

850
860
CMT
ARTISTS OF THE YEAR
TONIGHT
8/7c
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
FINDR: MUSIC
GENRE
RESET
BLUES
COUNTRY BLUES
MOODS
RESET
POSITIVE
NEGATIVE
CHILL
WILD
CLICK TO FILTER BY MOOD
DECADES
1900
1950
NOW
NOW
THEMES
RESET
FEELINGS
AFFECTION/FONDNESS
FEELING BLUE
HEARTACHE
IN LOVE
INTROSPECTION
JEALOUSY
LOSS/GRIEF
MISCHIEVOUS
NEW LOVE
ALONE BY JOHN LEE HOOKER
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 13

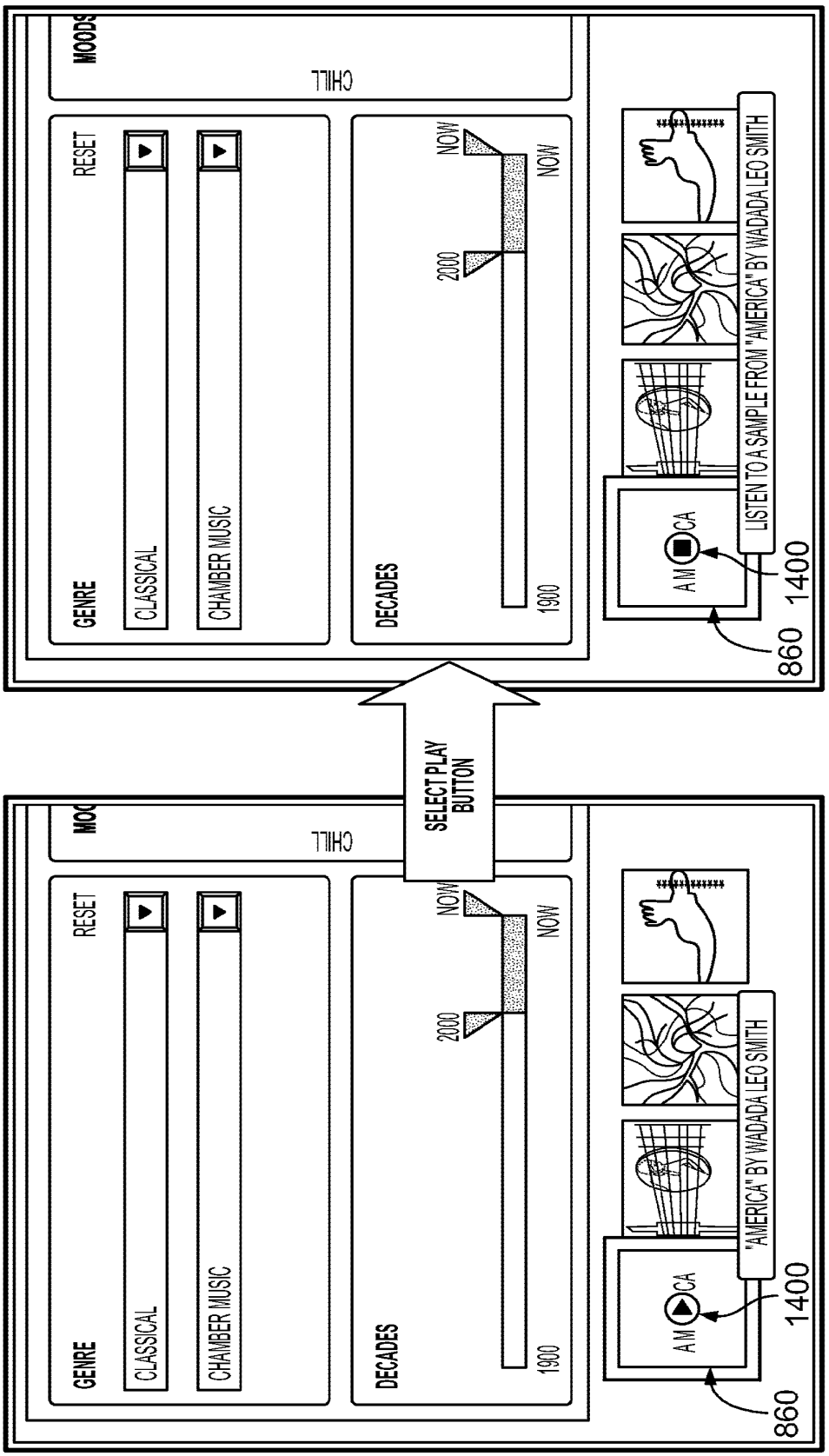

MOODS
CHILL
GENRE
RESET
CLASSICAL
CHAMBER MUSIC
DECADES
NOW
2000
1900
LISTEN TO A SAMPLE FROM "AMERICA" BY WADADA LEO SMITH
860
1400
SELECT PLAY BUTTON
"AMERICA" BY WADADA LEO SMITH

FIG. 14

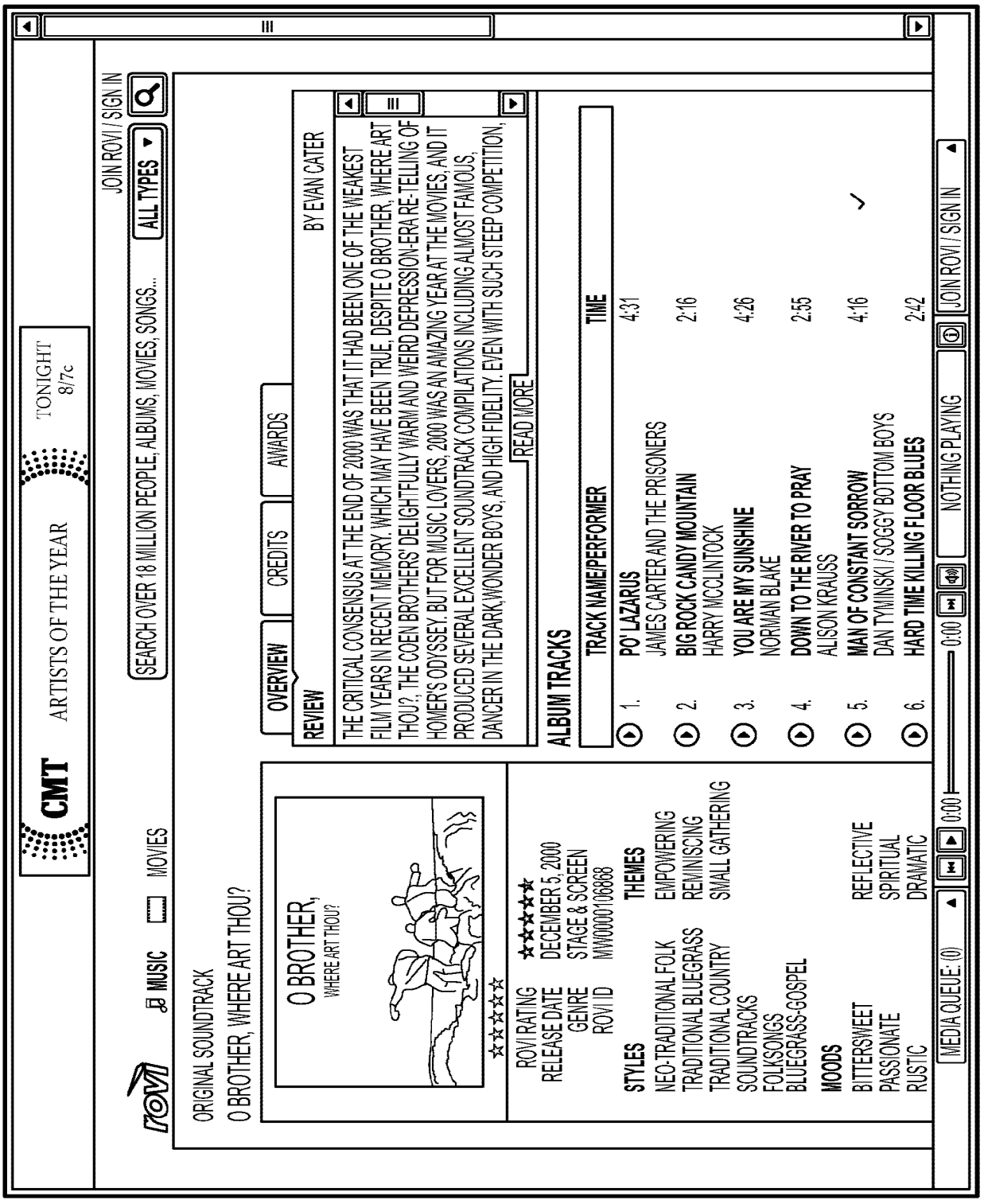

1500
CMT
ARTISTS OF THE YEAR
TONIGHT
8/7c
JOIN ROVI / SIGN IN
SEARCH OVER 18 MILLION PEOPLE, ALBUMS, MOVIES, SONGS...
ALL TYPES
MUSIC
MOVIES
ORIGINAL SOUNDTRACK
O BROTHER, WHERE ART THOU?
O BROTHER,
WHERE ART THOU?
ROVI RATING
RELEASE DATE
GENRE
ROVI ID
DECEMBER 5, 2000
STAGE & SCREEN
MW0000108668
STYLES
NEO-TRADITIONAL FOLK
TRADITIONAL BLUEGRASS
TRADITIONAL COUNTRY
SOUNDTRACKS
FOLKSONGS
BLUEGRASS-GOSPEL
MOODS
BITTERSWEET
PASSIONATE
RUSTIC
THEMES
EMPOWERING
REMINISCING
SMALL GATHERING
OVERVIEW
CREDITS
AWARDS
REVIEW
BY EVAN CATER
THE CRITICAL CONSENSUS AT THE END OF 2000 WAS THAT IT HAD BEEN ONE OF THE WEAKEST FILM YEARS IN RECENT MEMORY. WHICH MAY HAVE BEEN TRUE, DESPITE O BROTHER, WHERE ART THOU?, THE COEN BROTHERS' DELIGHTFULLY WARM AND WEIRD DEPRESSION-ERA RE-TELLING OF HOMER'S ODYSSEY. BUT FOR MUSIC LOVERS, 2000 WAS AN AMAZING YEAR AT THE MOVIES, AND IT PRODUCED SEVERAL EXCELLENT SOUNDTRACK COMPILATIONS INCLUDING ALMOST FAMOUS, DANCER IN THE DARK, WONDER BOYS, AND HIGH FIDELITY. EVEN WITH SUCH STEEP COMPETITION,
READ MORE
ALBUM TRACKS
TRACK NAME/PERFORMER
TIME
1. PO' LAZARUS
JAMES CARTER AND THE PRISONERS
4:31
2. BIG ROCK CANDY MOUNTAIN
HARRY MCCLINTOCK
2:16
3. YOU ARE MY SUNSHINE
NORMAN BLAKE
4:26
4. DOWN TO THE RIVER TO PRAY
ALISON KRAUSS
2:55
5. MAN OF CONSTANT SORROW
DAN TYMINSKI / SOGGY BOTTOM BOYS
4:16
6. HARD TIME KILLING FLOOR BLUES
2:42
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 15

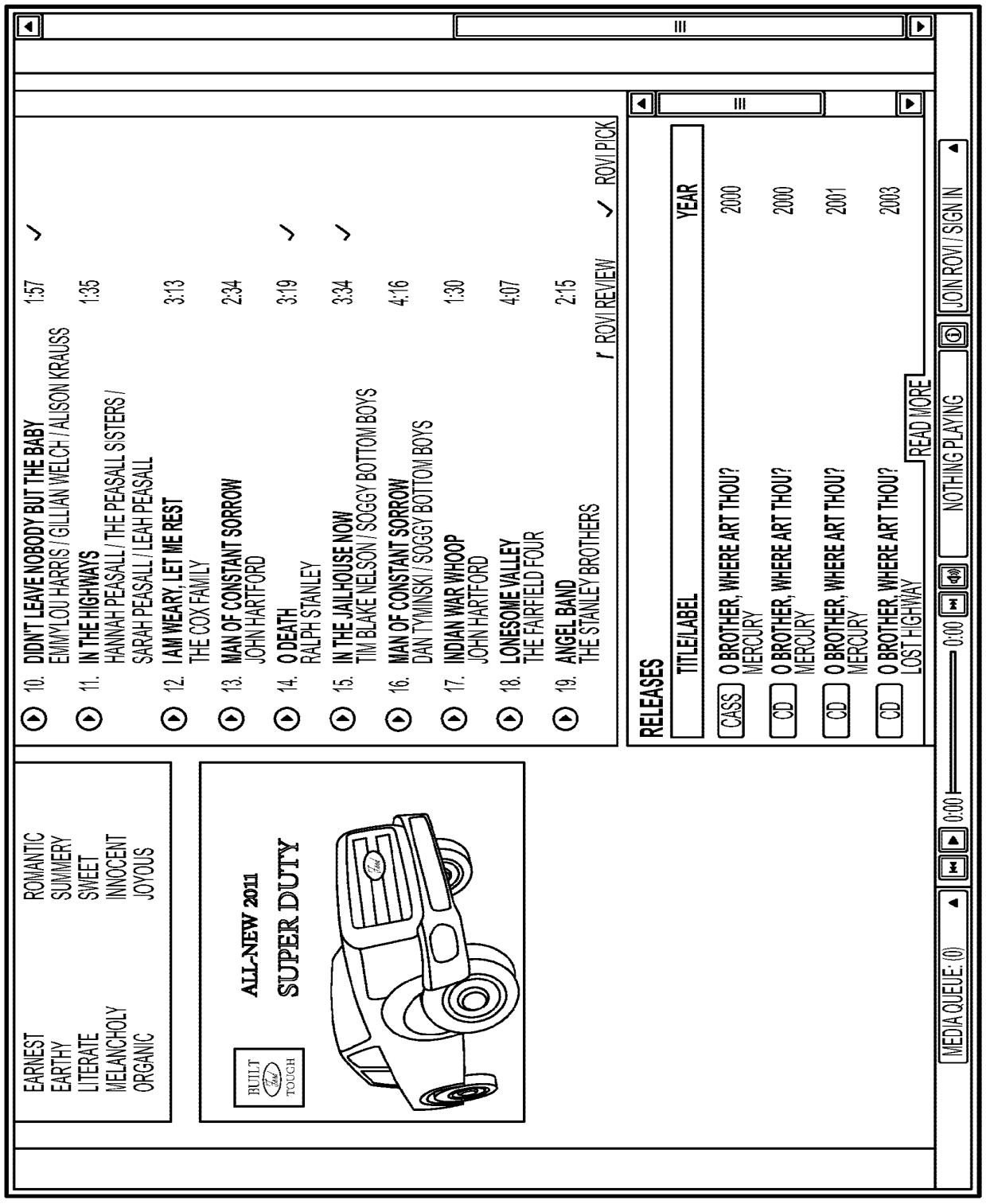

1500
EARNEST
EARTHY
LITERATE
MELANCHOLY
ORGANIC
ROMANTIC
SUMMERY
SWEET
INNOCENT
JOYOUS
BUILT FORD TOUGH
ALL-NEW 2011
SUPER DUTY
10. DIDN'T LEAVE NOBODY BUT THE BABY 1:57
EMMYLOU HARRIS / GILLIAN WELCH / ALISON KRAUSS
11. IN THE HIGHWAYS 1:35
HANNAH PEASALL / THE PEASALL SISTERS / SARAH PEASALL / LEAH PEASALL
12. I AM WEARY, LET ME REST 3:13
THE COX FAMILY
13. MAN OF CONSTANT SORROW 2:34
JOHN HARTFORD
14. O DEATH 3:19
RALPH STANLEY
15. IN THE JAILHOUSE NOW 3:34
TIM BLAKE NELSON / SOGGY BOTTOM BOYS
16. MAN OF CONSTANT SORROW 4:16
DAN TYMINSKI / SOGGY BOTTOM BOYS
17. INDIAN WAR WHOOP 1:30
JOHN HARTFORD
18. LONESOME VALLEY 4:07
THE FAIRFIELD FOUR
19. ANGEL BAND 2:15
THE STANLEY BROTHERS
ROVI REVIEW
ROVI PICK
RELEASES
TITLE/LABEL
YEAR
CASS O BROTHER, WHERE ART THOU? 2000
MERCURY
CD O BROTHER, WHERE ART THOU? 2000
MERCURY
CD O BROTHER, WHERE ART THOU? 2001
MERCURY
CD O BROTHER, WHERE ART THOU? 2003
LOST HIGHWAY
READ MORE
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 16

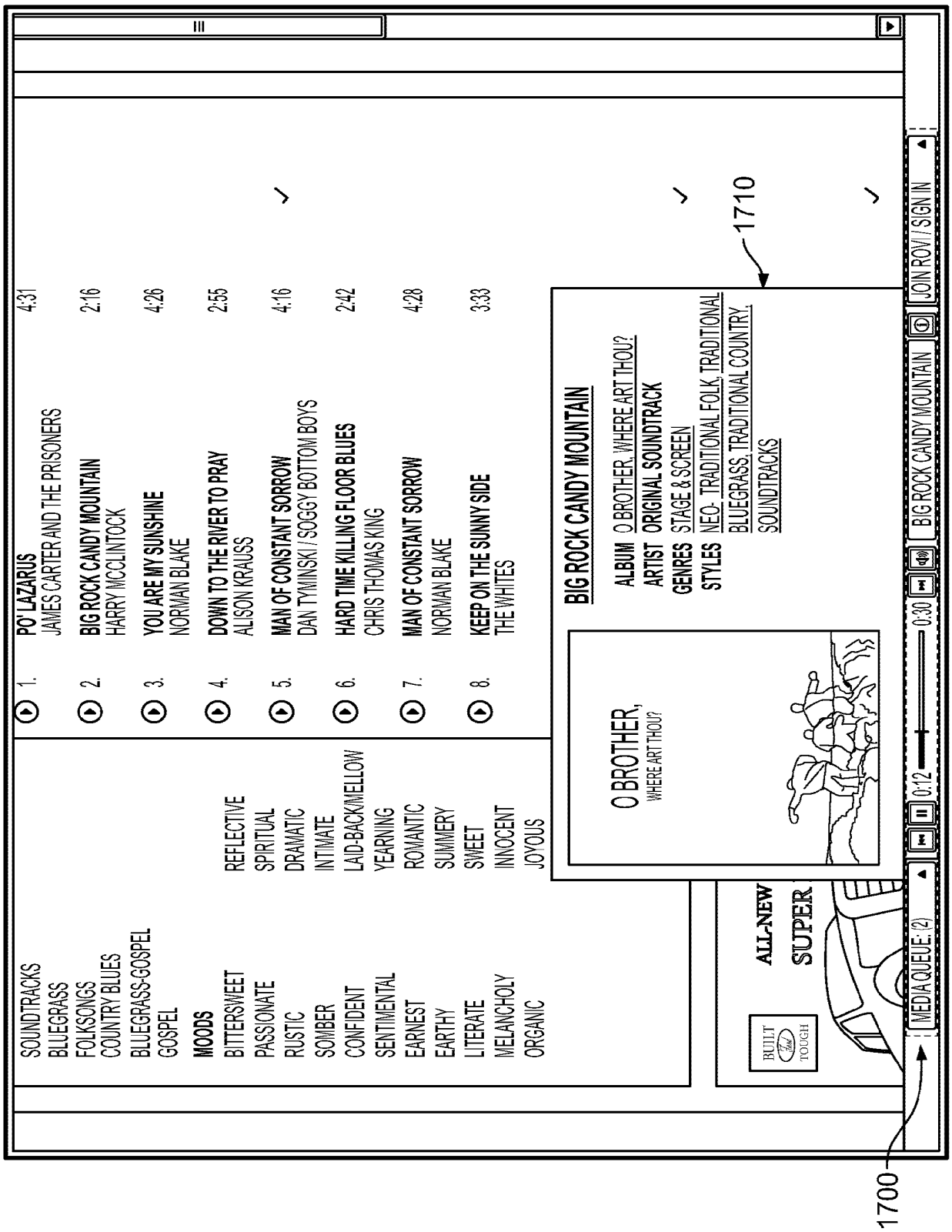

1700
1710
SOUNDTRACKS
BLUEGRASS
FOLKSONGS
COUNTRY BLUES
BLUEGRASS-GOSPEL
GOSPEL
MOODS
BITTERSWEET
PASSIONATE
RUSTIC
SOMBER
CONFIDENT
SENTIMENTAL
EARNEST
EARTHY
LITERATE
MELANCHOLY
ORGANIC
REFLECTIVE
SPIRITUAL
DRAMATIC
INTIMATE
LAID-BACK/MELLOW
YEARNING
ROMANTIC
SUMMERY
SWEET
INNOCENT
JOYOUS
1. PO' LAZARUS 4:31
JAMES CARTER AND THE PRISONERS
2. BIG ROCK CANDY MOUNTAIN 2:16
HARRY MCCLINTOCK
3. YOU ARE MY SUNSHINE 4:26
NORMAN BLAKE
4. DOWN TO THE RIVER TO PRAY 2:55
ALISON KRAUSS
5. MAN OF CONSTANT SORROW 4:16
DAN TYMINSKI / SOGGY BOTTOM BOYS
6. HARD TIME KILLING FLOOR BLUES 2:42
CHRIS THOMAS KING
7. MAN OF CONSTANT SORROW 4:28
NORMAN BLAKE
8. KEEP ON THE SUNNY SIDE 3:33
THE WHITES
O BROTHER,
WHERE ART THOU?
BIG ROCK CANDY MOUNTAIN
ALBUM O BROTHER, WHERE ART THOU?
ARTIST ORIGINAL SOUNDTRACK
GENRES STAGE & SCREEN
STYLES NEO- TRADITIONAL FOLK, TRADITIONAL BLUEGRASS, TRADITIONAL COUNTRY, SOUNDTRACKS
BUILT FORD TOUGH
ALL-NEW
SUPER
MEDIA QUEUE: (2)
0:12
0:30
BIG ROCK CANDY MOUNTAIN
JOIN ROVI / SIGN IN

FIG. 17

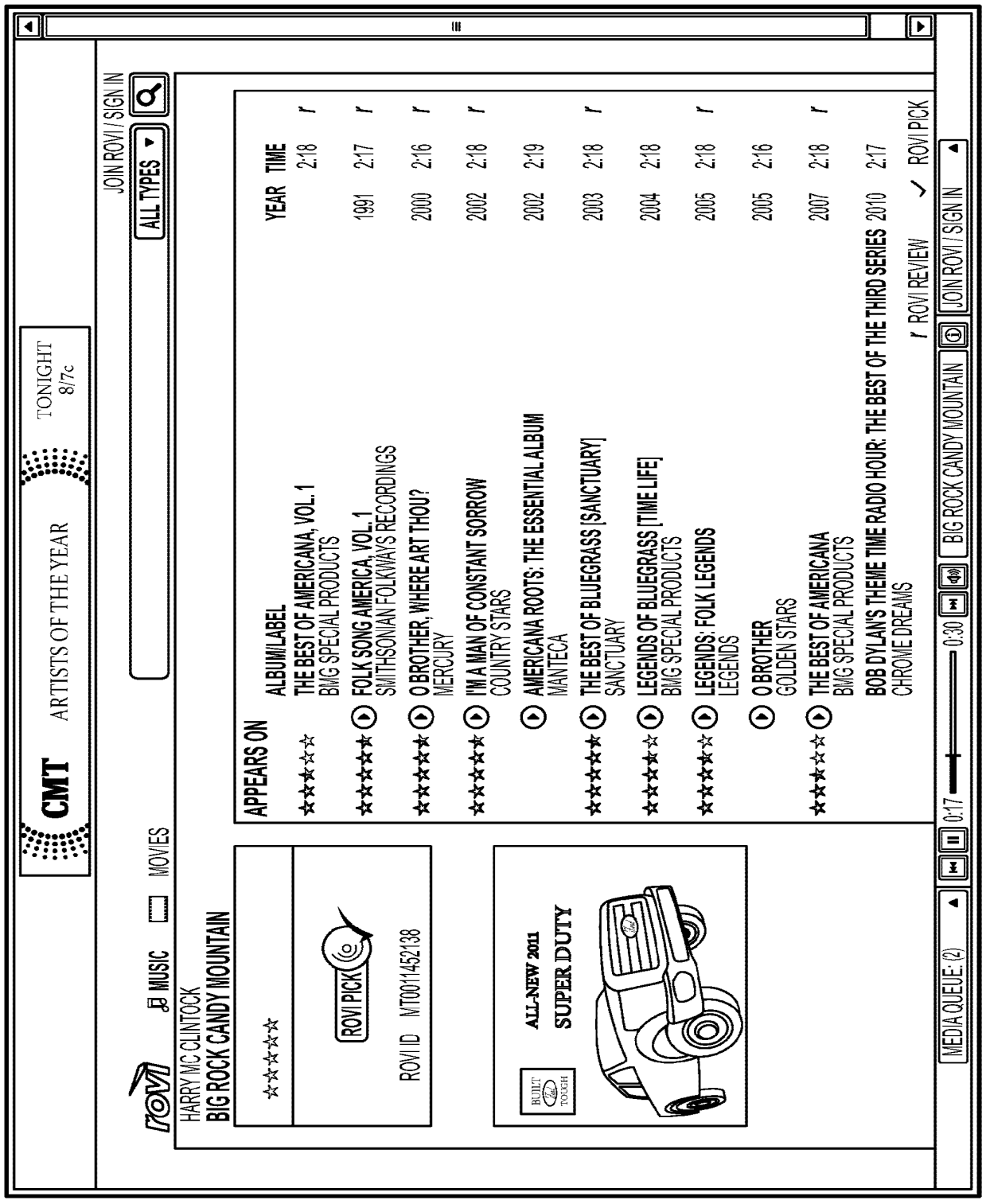

1800
CMT
ARTISTS OF THE YEAR
TONIGHT
8/7c
JOIN ROVI / SIGN IN
MUSIC
MOVIES
ALL TYPES
HARRY MC CLINTOCK
BIG ROCK CANDY MOUNTAIN
ROVI PICK
ROVI ID MT0011452138
APPEARS ON
ALBUM/LABEL
YEAR TIME
THE BEST OF AMERICANA, VOL. 1
BMG SPECIAL PRODUCTS
2:18
FOLK SONG AMERICA, VOL. 1
SMITHSONIAN FOLKWAYS RECORDINGS
1991 2:17
O BROTHER, WHERE ART THOU?
MERCURY
2000 2:16
I'M A MAN OF CONSTANT SORROW
COUNTRY STARS
2002 2:18
AMERICANA ROOTS: THE ESSENTIAL ALBUM
MANTECA
2002 2:19
THE BEST OF BLUEGRASS [SANCTUARY]
SANCTUARY
2003 2:18
LEGENDS OF BLUEGRASS [TIME LIFE]
BMG SPECIAL PRODUCTS
2004 2:18
LEGENDS: FOLK LEGENDS
LEGENDS
2005 2:18
O BROTHER
GOLDEN STARS
2005 2:16
THE BEST OF AMERICANA
BMG SPECIAL PRODUCTS
2007 2:18
BOB DYLAN'S THEME TIME RADIO HOUR: THE BEST OF THE THIRD SERIES
CHROME DREAMS
2010 2:17
r ROVI REVIEW
ROVI PICK
ALL-NEW 2011
SUPER DUTY
BUILT FORD TOUGH
MEDIA QUEUE: (2)
0:17
0:30
BIG ROCK CANDY MOUNTAIN
JOIN ROVI / SIGN IN

FIG. 18

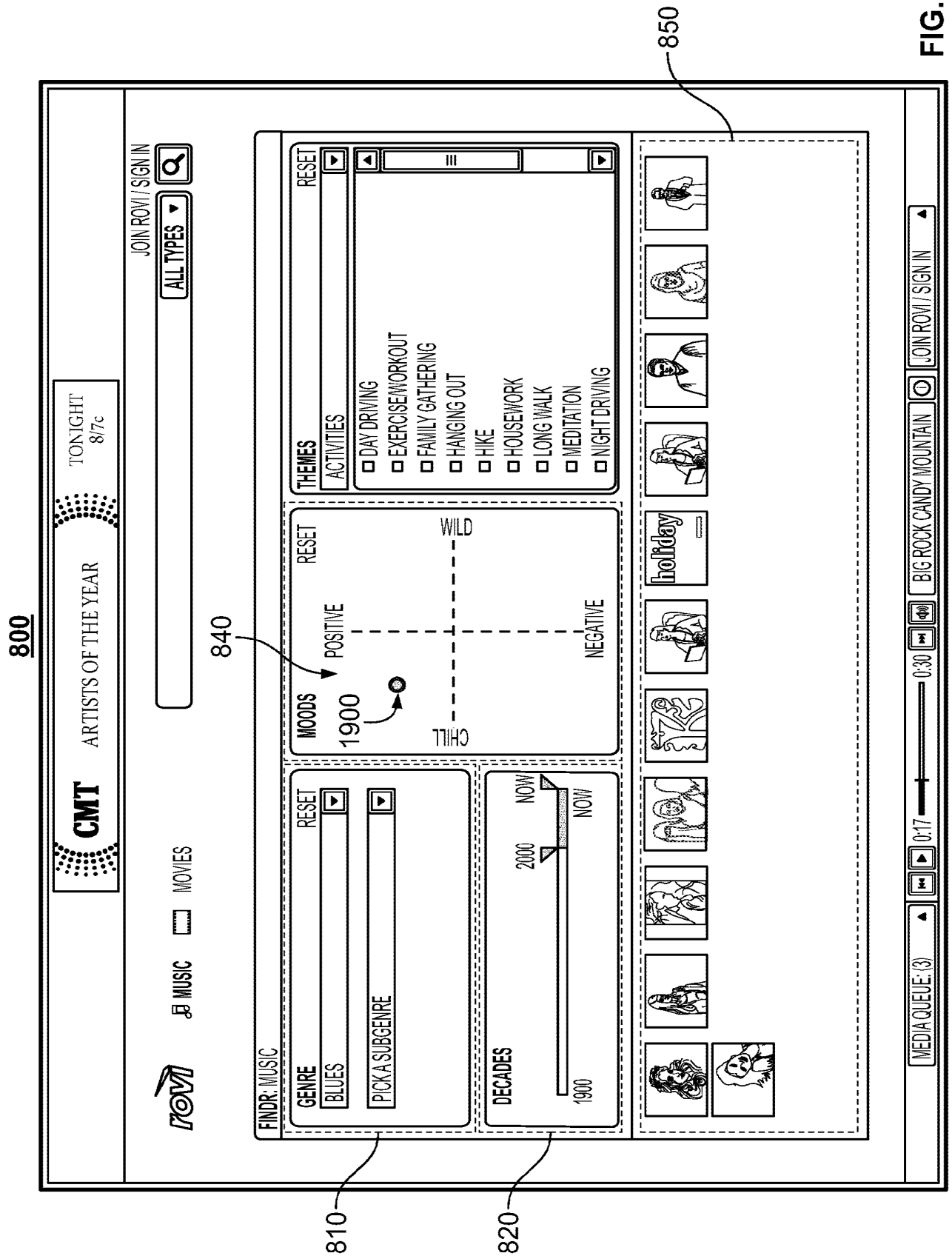

800
CMT
ARTISTS OF THE YEAR
TONIGHT 8/7c
JOIN ROVI / SIGN IN
ALL TYPES
rovi
MUSIC
MOVIES
840
FINDR: MUSIC
GENRE
RESET
BLUES
PICK A SUBGENRE
MOODS
RESET
POSITIVE
NEGATIVE
WILD
CHILL
1900
THEMES
RESET
ACTIVITIES
DAY DRIVING
EXERCISE/WORKOUT
FAMILY GATHERING
HANGING OUT
HIKE
HOUSEWORK
LONG WALK
MEDITATION
NIGHT DRIVING
DECADES
NOW
2000
1900
850
holiday
MEDIA QUEUE: (3)
0:17
0:30
BIG ROCK CANDY MOUNTAIN
JOIN ROVI / SIGN IN
810
820

FIG. 19

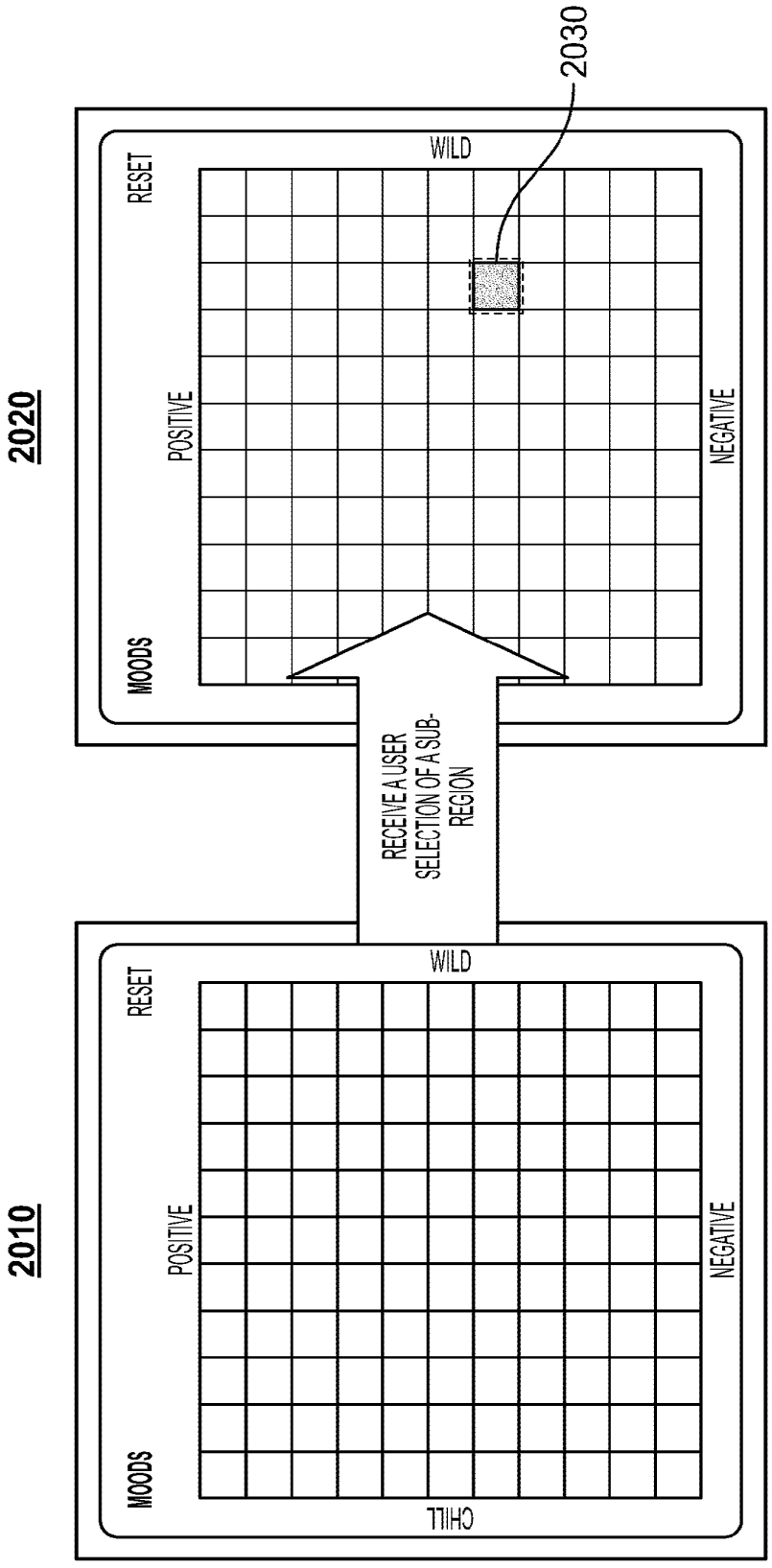

2030
2020
WILD
RESET
POSITIVE
NEGATIVE
MOODS
RECEIVE A USER SELECTION OF A SUB-REGION
2010
WILD
RESET
POSITIVE
NEGATIVE
MOODS
CHILL

FIG. 20

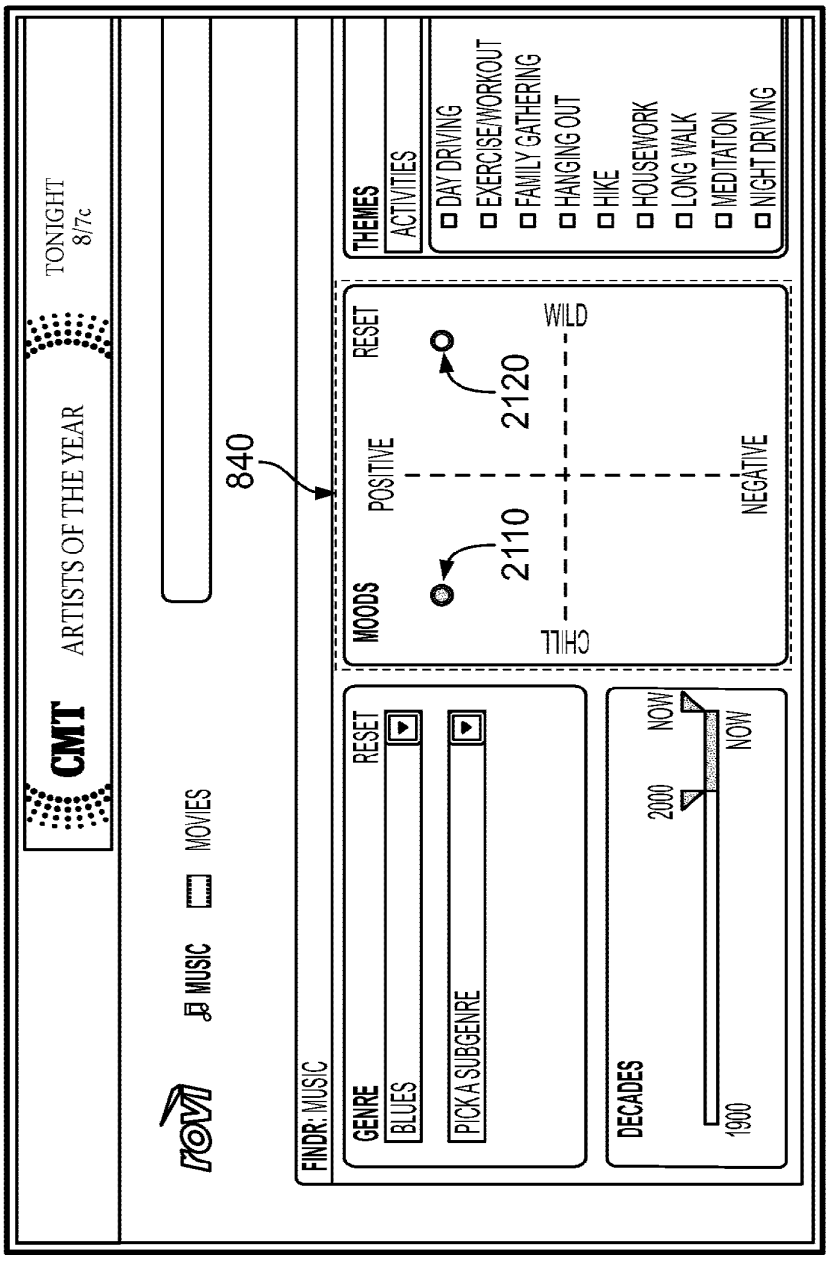

CMT
ARTISTS OF THE YEAR
TONIGHT
8/7c
MUSIC
MOVIES
840
FINDR: MUSIC
GENRE
RESET
BLUES
PICK A SUBGENRE
DECADES
2000
NOW
1900
NOW
MOODS
POSITIVE
RESET
2120
WILD
2110
CHILL
NEGATIVE
THEMES
ACTIVITIES
DAY DRIVING
EXERCISE/WORKOUT
FAMILY GATHERING
HANGING OUT
HIKE
HOUSEWORK
LONG WALK
MEDITATION
NIGHT DRIVING

FIG. 21

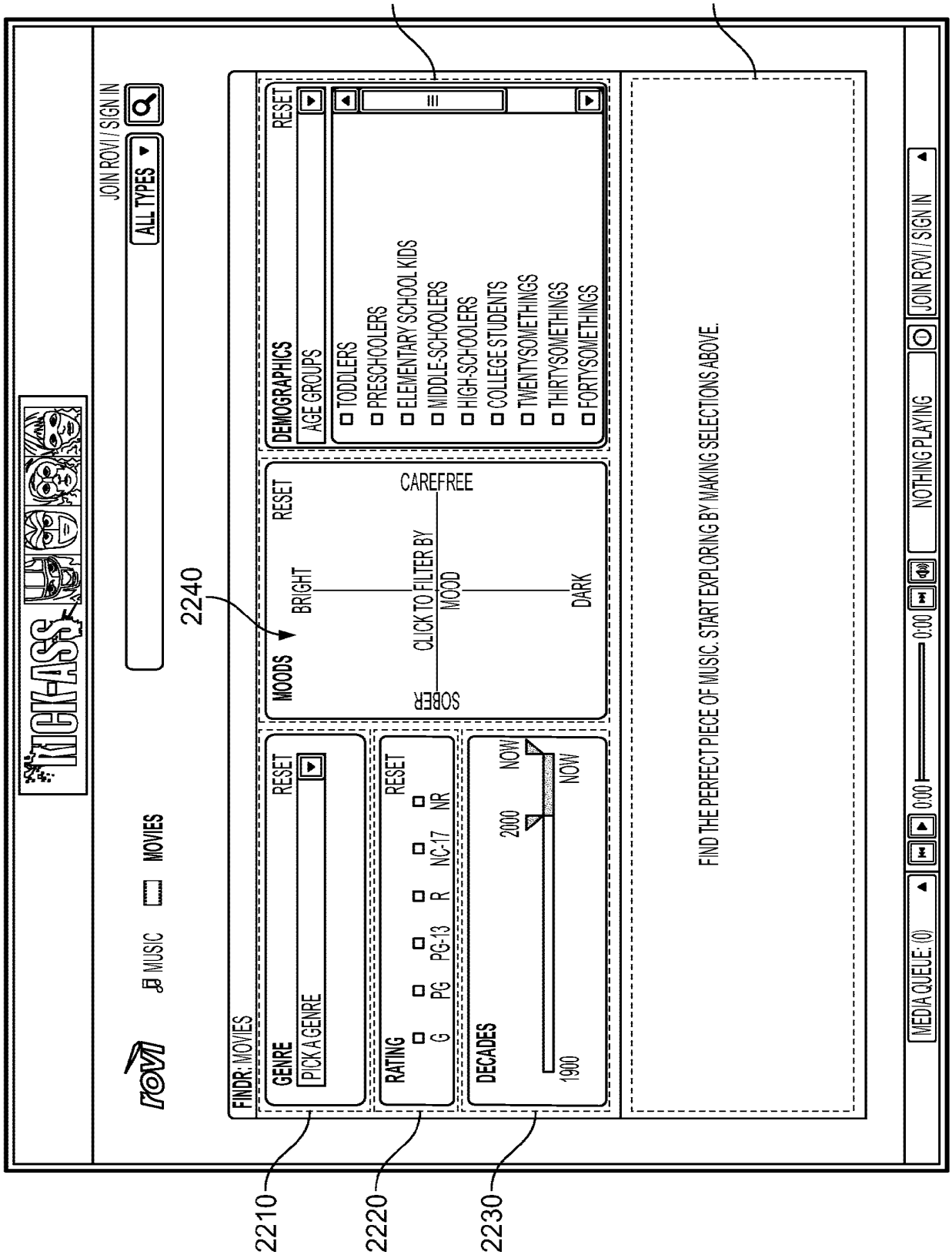

2200
2250
2260
2240
2210
2220
2230
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
FINDR: MOVIES
GENRE
RESET
PICK A GENRE
RATING
G
PG
PG-13
R
NC-17
NR
DECADES
2000
NOW
1900
MOODS
BRIGHT
CAREFREE
CLICK TO FILTER BY MOOD
SOBER
DARK
DEMOGRAPHICS
AGE GROUPS
TODDLERS
PRESCHOOLERS
ELEMENTARY SCHOOL KIDS
MIDDLE-SCHOOLERS
HIGH-SCHOOLERS
COLLEGE STUDENTS
TWENTYSOMETHINGS
THIRTYSOMETHINGS
FORTYSOMETHINGS
FIND THE PERFECT PIECE OF MUSIC. START EXPLORING BY MAKING SELECTIONS ABOVE.
MEDIA QUEUE: (0)
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 22

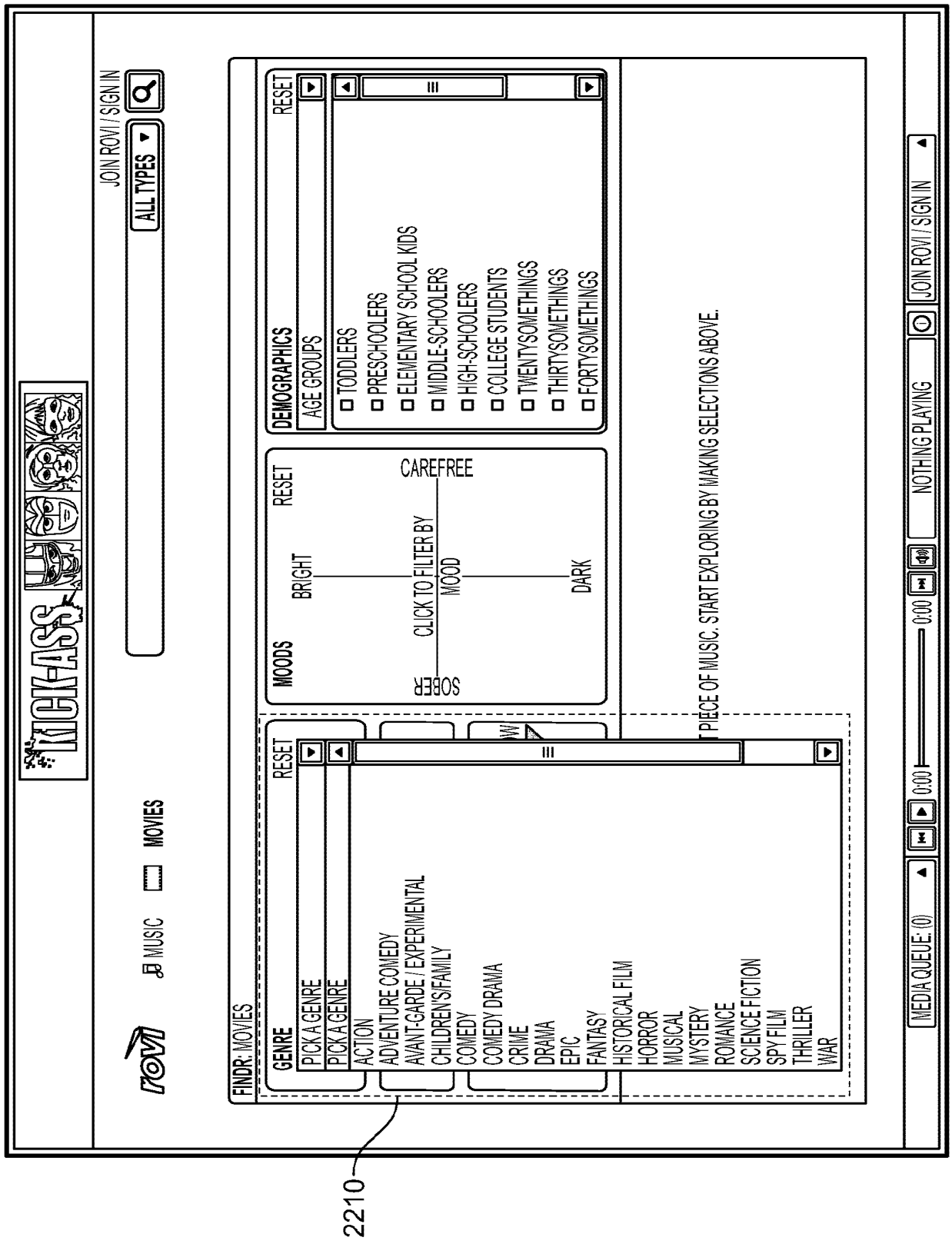

2200
KICK-ASS
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
FINDR: MOVIES
GENRE
RESET
PICK A GENRE
PICK A GENRE
ACTION
ADVENTURE COMEDY
AVANT-GARDE / EXPERIMENTAL
CHILDREN'S/FAMILY
COMEDY
COMEDY DRAMA
CRIME
DRAMA
EPIC
FANTASY
HISTORICAL FILM
HORROR
MUSICAL
MYSTERY
ROMANCE
SCIENCE FICTION
SPY FILM
THRILLER
WAR
MOODS
RESET
BRIGHT
CAREFREE
CLICK TO FILTER BY
MOOD
SOBER
DARK
DEMOGRAPHICS
RESET
AGE GROUPS
TODDLERS
PRESCHOOLERS
ELEMENTARY SCHOOL KIDS
MIDDLE-SCHOOLERS
HIGH-SCHOOLERS
COLLEGE STUDENTS
TWENTYSOMETHINGS
THIRTYSOMETHINGS
FORTYSOMETHINGS
T PIECE OF MUSIC. START EXPLORING BY MAKING SELECTIONS ABOVE.
MEDIA QUEUE (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN
2210

FIG. 23

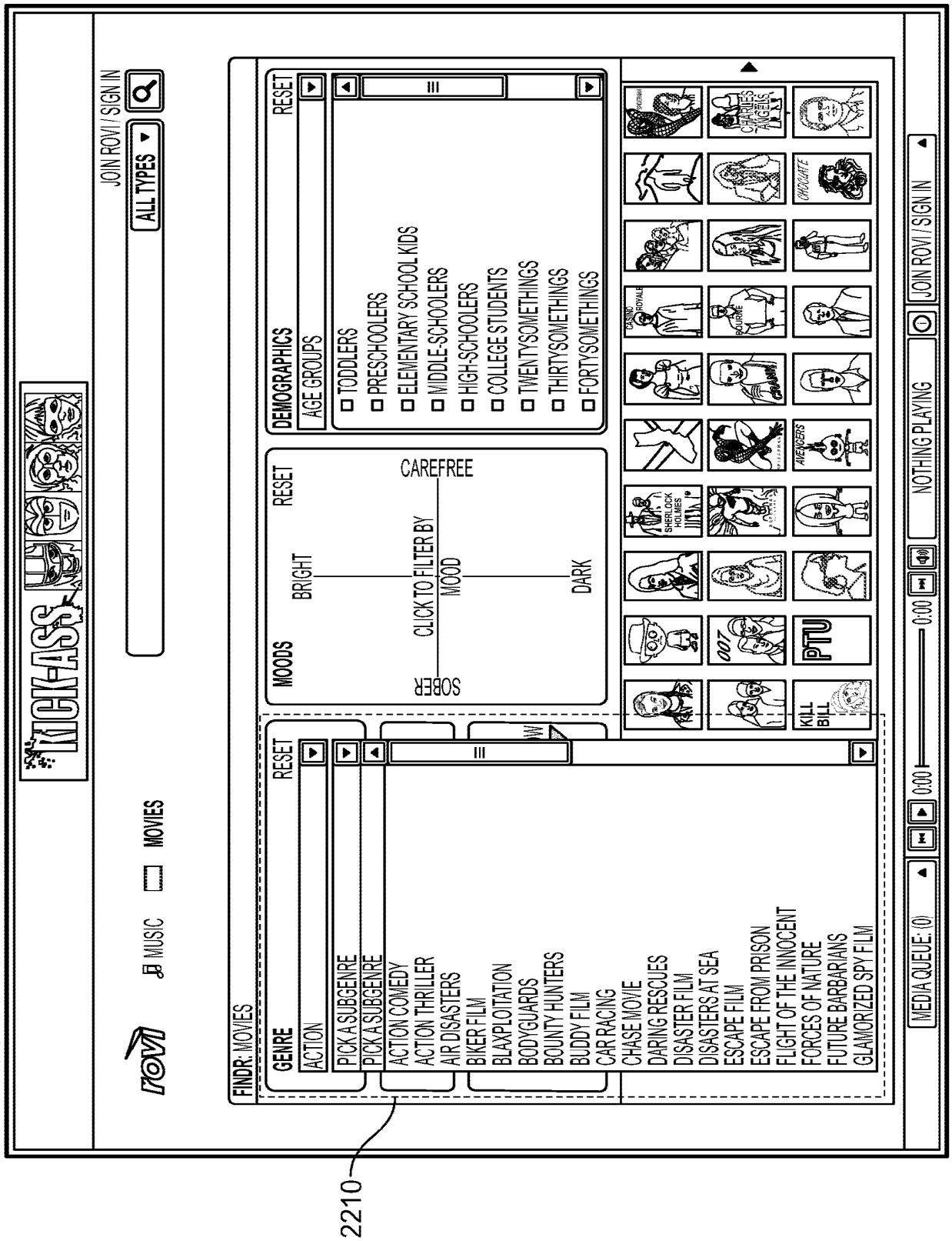

2200
MOCKASS
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
FINDR: MOVIES
GENRE
RESET
ACTION
PICK A SUBGENRE
PICK A SUBGENRE
ACTION COMEDY
ACTION THRILLER
AIR DISASTERS
BIKER FILM
BLAXPLOITATION
BODYGUARDS
BOUNTY HUNTERS
BUDDY FILM
CAR RACING
CHASE MOVIE
DARING RESCUES
DISASTER FILM
DISASTERS AT SEA
ESCAPE FILM
ESCAPE FROM PRISON
FLIGHT OF THE INNOCENT
FORCES OF NATURE
FUTURE BARBARIANS
GLAMORIZED SPY FILM
MOODS
RESET
BRIGHT
CAREFREE
CLICK TO FILTER BY MOOD
SOBER
DARK
DEMOGRAPHICS
RESET
AGE GROUPS
TODDLERS
PRESCHOOLERS
ELEMENTARY SCHOOL KIDS
MIDDLE-SCHOOLERS
HIGH-SCHOOLERS
COLLEGE STUDENTS
TWENTYSOMETHINGS
THIRTYSOMETHINGS
FORTYSOMETHINGS
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN
2210

FIG. 24

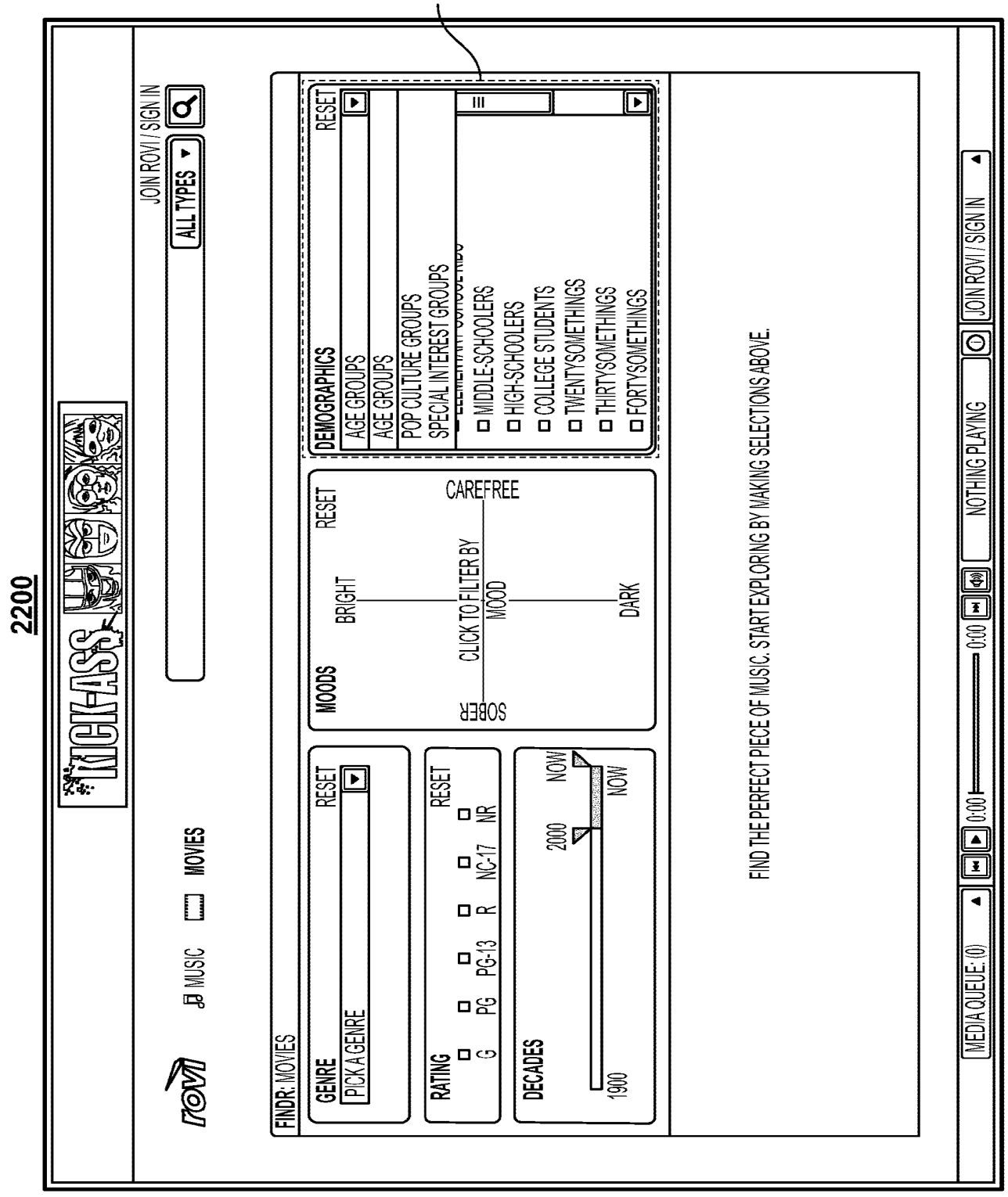

2200
2250
ROVI
MUSIC
MOVIES
JOIN ROVI / SIGN IN
ALL TYPES
FINDR: MOVIES
GENRE
RESET
PICK A GENRE
RATING
RESET
G
PG
PG-13
R
NC-17
NR
DECADES
2000
NOW
1900
MOODS
RESET
BRIGHT
CLICK TO FILTER BY MOOD
CAREFREE
SOBER
DARK
DEMOGRAPHICS
RESET
AGE GROUPS
AGE GROUPS
POP CULTURE GROUPS
SPECIAL INTEREST GROUPS
MIDDLE-SCHOOLERS
HIGH-SCHOOLERS
COLLEGE STUDENTS
TWENTYSOMETHINGS
THIRTYSOMETHINGS
FORTYSOMETHINGS
FIND THE PERFECT PIECE OF MUSIC. START EXPLORING BY MAKING SELECTIONS ABOVE.
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 25

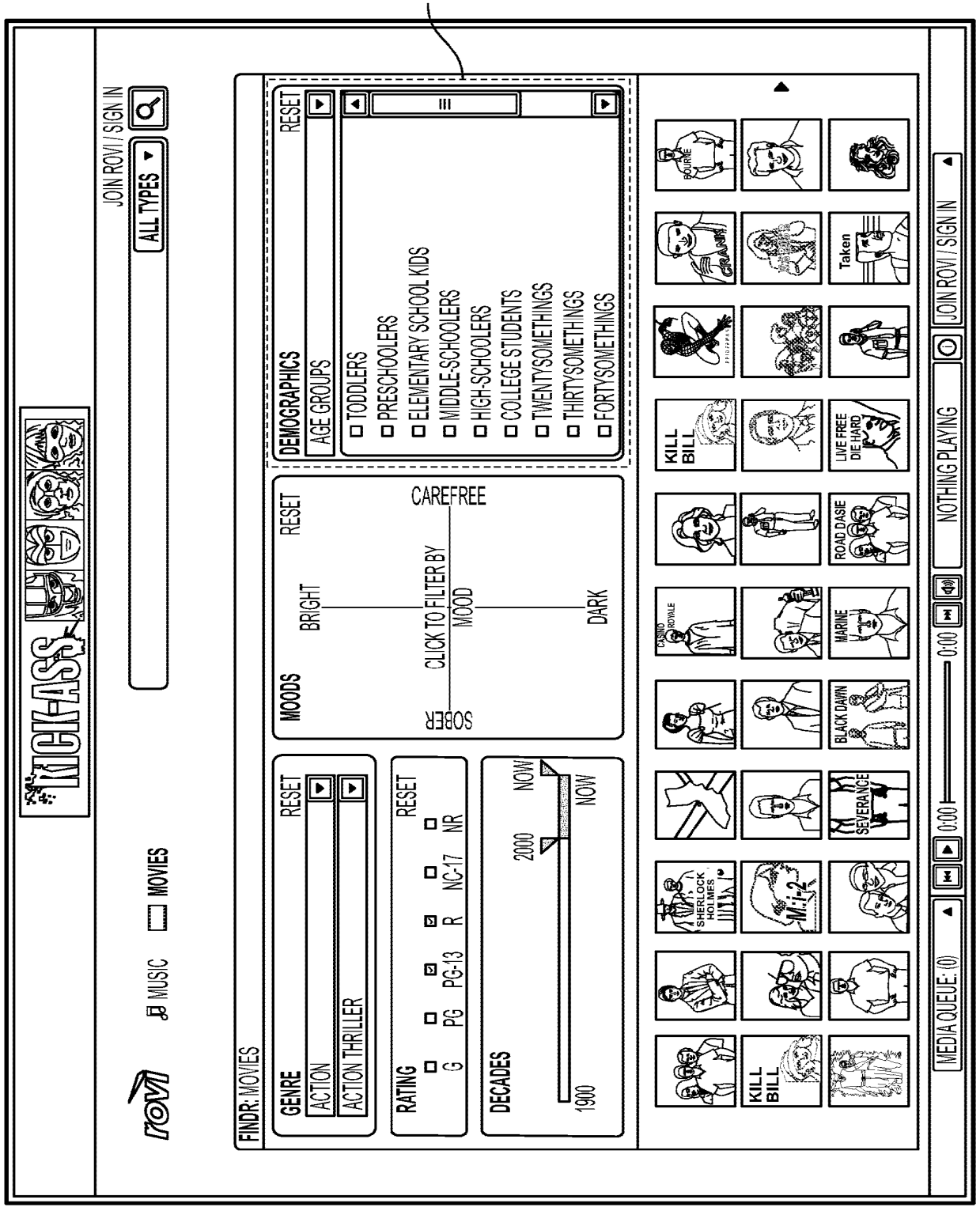

2200
2250
rovi
MUSIC
MOVIES
JOIN ROVI / SIGN IN
ALL TYPES
FINDR: MOVIES
GENRE
RESET
ACTION
ACTION THRILLER
RATING
RESET
G
PG
PG-13
R
NC-17
NR
DECADES
2000
NOW
1900
MOODS
RESET
BRIGHT
DARK
SOBER
CAREFREE
CLICK TO FILTER BY MOOD
DEMOGRAPHICS
RESET
AGE GROUPS
TODDLERS
PRESCHOOLERS
ELEMENTARY SCHOOL KIDS
MIDDLE-SCHOOLERS
HIGH-SCHOOLERS
COLLEGE STUDENTS
TWENTYSOMETHINGS
THIRTYSOMETHINGS
FORTYSOMETHINGS
KILL BILL
SHERLOCK HOLMES
M:i-2
SEVERANCE
BLACK DAWN
MARINE
ROAD DASIE
LIVE FREE DIE HARD
Taken
MEDIA QUEUE: (0)
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 26

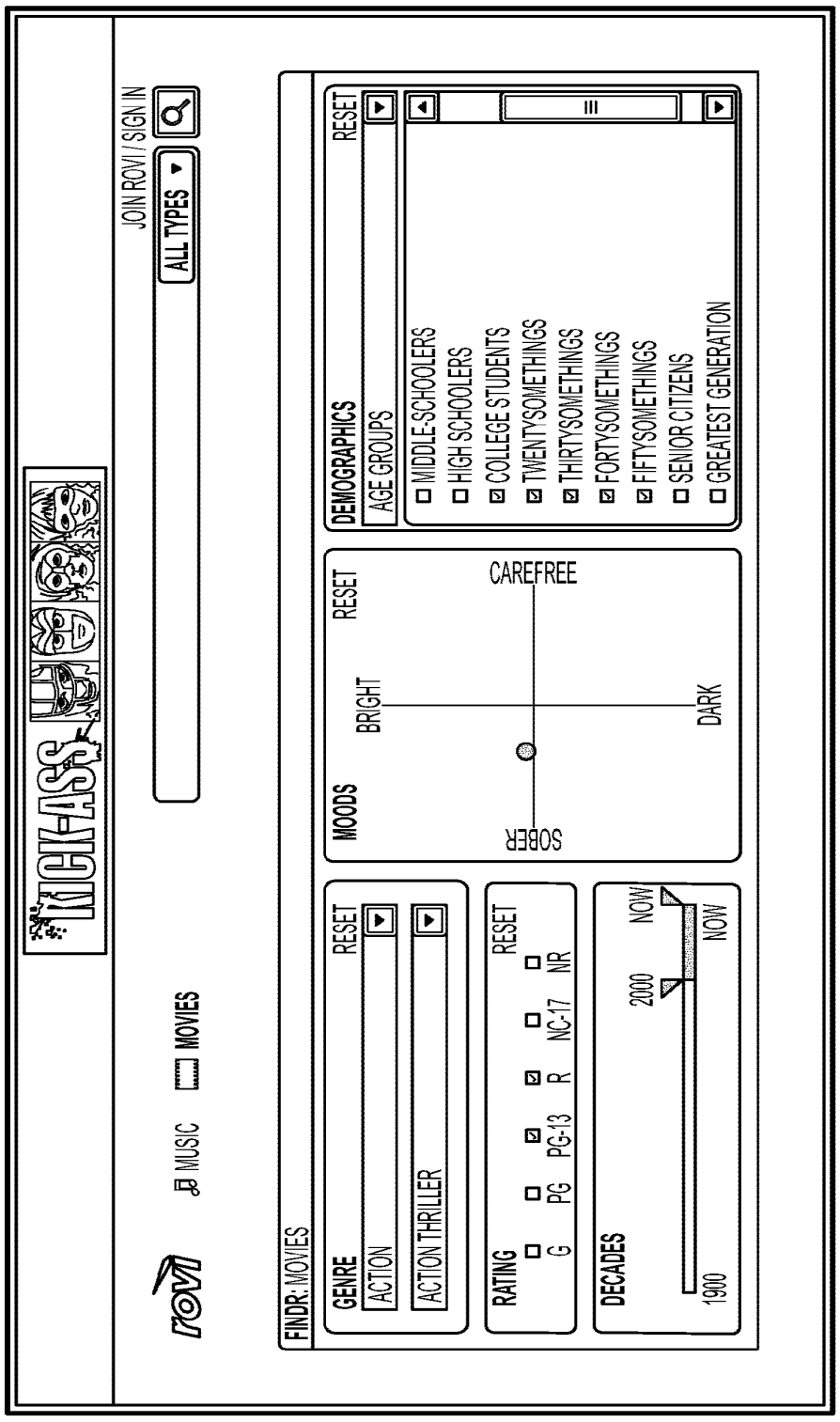

2200
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
FINDR: MOVIES
GENRE
RESET
ACTION
ACTION THRILLER
RATING
RESET
G
PG
PG-13
R
NC-17
NR
DECADES
1900
2000
NOW
NOW
MOODS
RESET
BRIGHT
DARK
CAREFREE
SOBER
DEMOGRAPHICS
RESET
AGE GROUPS
MIDDLE-SCHOOLERS
HIGH SCHOOLERS
COLLEGE STUDENTS
TWENTYSOMETHINGS
THIRTYSOMETHINGS
FORTYSOMETHINGS
FIFTYSOMETHINGS
SENIOR CITIZENS
GREATEST GENERATION

FIG. 27

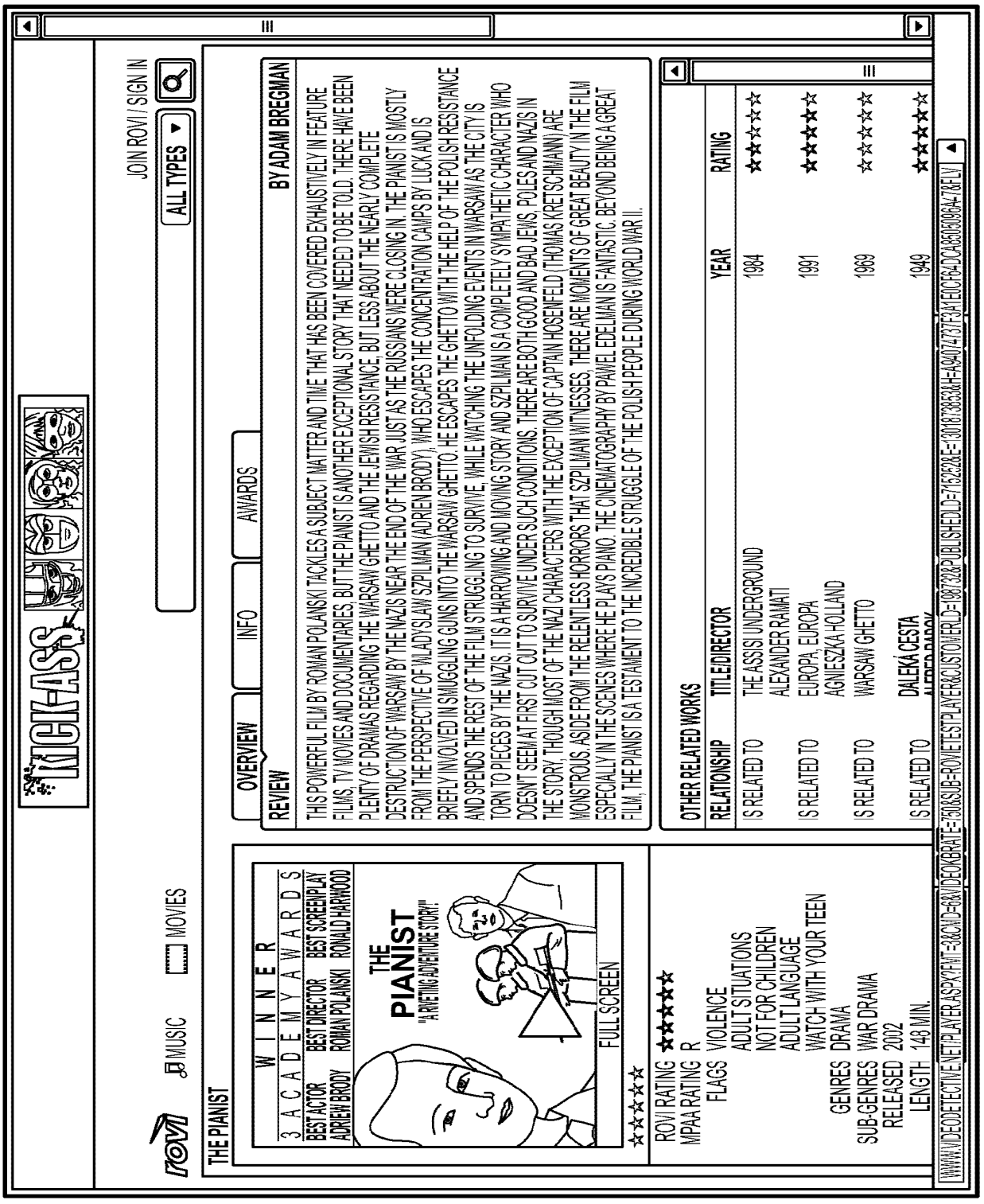

2800
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
THE PIANIST
WINNER
3 ACADEMY AWARDS
BEST ACTOR ADRIEN BRODY
BEST DIRECTOR ROMAN POLANSKI
BEST SCREENPLAY RONALD HARWOOD
THE PIANIST
"A RIVETING ADVENTURE STORY!"
FULL SCREEN
ROVI RATING
MPAA RATING R
FLAGS VIOLENCE
ADULT SITUATIONS
NOT FOR CHILDREN
ADULT LANGUAGE
WATCH WITH YOUR TEEN
GENRES DRAMA
SUB-GENRES WAR DRAMA
RELEASED 2002
LENGTH 148 MIN.
OVERVIEW
INFO
AWARDS
REVIEW
BY ADAM BREGMAN
THIS POWERFUL FILM BY ROMAN POLANSKI TACKLES A SUBJECT MATTER AND TIME THAT HAS BEEN COVERED EXHAUSTIVELY IN FEATURE FILMS, TV MOVIES AND DOCUMENTARIES. BUT THE PIANIST IS ANOTHER EXCEPTIONAL STORY THAT NEEDED TO BE TOLD. THERE HAVE BEEN PLENTY OF DRAMAS REGARDING THE WARSAW GHETTO AND THE JEWISH RESISTANCE, BUT LESS ABOUT THE NEARLY COMPLETE DESTRUCTION OF WARSAW BY THE NAZIS NEAR THE END OF THE WAR JUST AS THE RUSSIANS WERE CLOSING IN. THE PIANIST IS MOSTLY FROM THE PERSPECTIVE OF WLADYSLAW SZPILMAN (ADRIEN BRODY), WHO ESCAPES THE CONCENTRATION CAMPS BY LUCK AND IS BRIEFLY INVOLVED IN SMUGGLING GUNS INTO THE WARSAW GHETTO. HE ESCAPES THE GHETTO WITH THE HELP OF THE POLISH RESISTANCE AND SPENDS THE REST OF THE FILM STRUGGLING TO SURVIVE, WHILE WATCHING THE UNFOLDING EVENTS IN WARSAW AS THE CITY IS TORN TO PIECES BY THE NAZIS. IT IS A HARROWING AND MOVING STORY AND SZPILMAN IS A COMPLETELY SYMPATHETIC CHARACTER WHO DOESN'T SEEM AT FIRST CUT OUT TO SURVIVE UNDER SUCH CONDITIONS. THERE ARE BOTH GOOD AND BAD JEWS, POLES AND NAZIS IN THE STORY, THOUGH MOST OF THE NAZI CHARACTERS WITH THE EXCEPTION OF CAPTAIN HOSENFELD (THOMAS KRETSCHMANN) ARE MONSTROUS. ASIDE FROM THE RELENTLESS HORRORS THAT SZPILMAN WITNESSES, THERE ARE MOMENTS OF GREAT BEAUTY IN THE FILM ESPECIALLY IN THE SCENES WHERE HE PLAYS PIANO. THE CINEMATOGRAPHY BY PAWEL EDELMAN IS FANTASTIC. BEYOND BEING A GREAT FILM, THE PIANIST IS A TESTAMENT TO THE INCREDIBLE STRUGGLE OF THE POLISH PEOPLE DURING WORLD WAR II.
OTHER RELATED WORKS
RELATIONSHIP
TITLE/DIRECTOR
YEAR
RATING
IS RELATED TO
THE ASSISI UNDERGROUND
ALEXANDER RAMATI
1984
IS RELATED TO
EUROPA, EUROPA
AGNIESZKA HOLLAND
1991
IS RELATED TO
WARSAW GHETTO
1969
IS RELATED TO
DALEKÁ CESTA
1949

FIG. 28

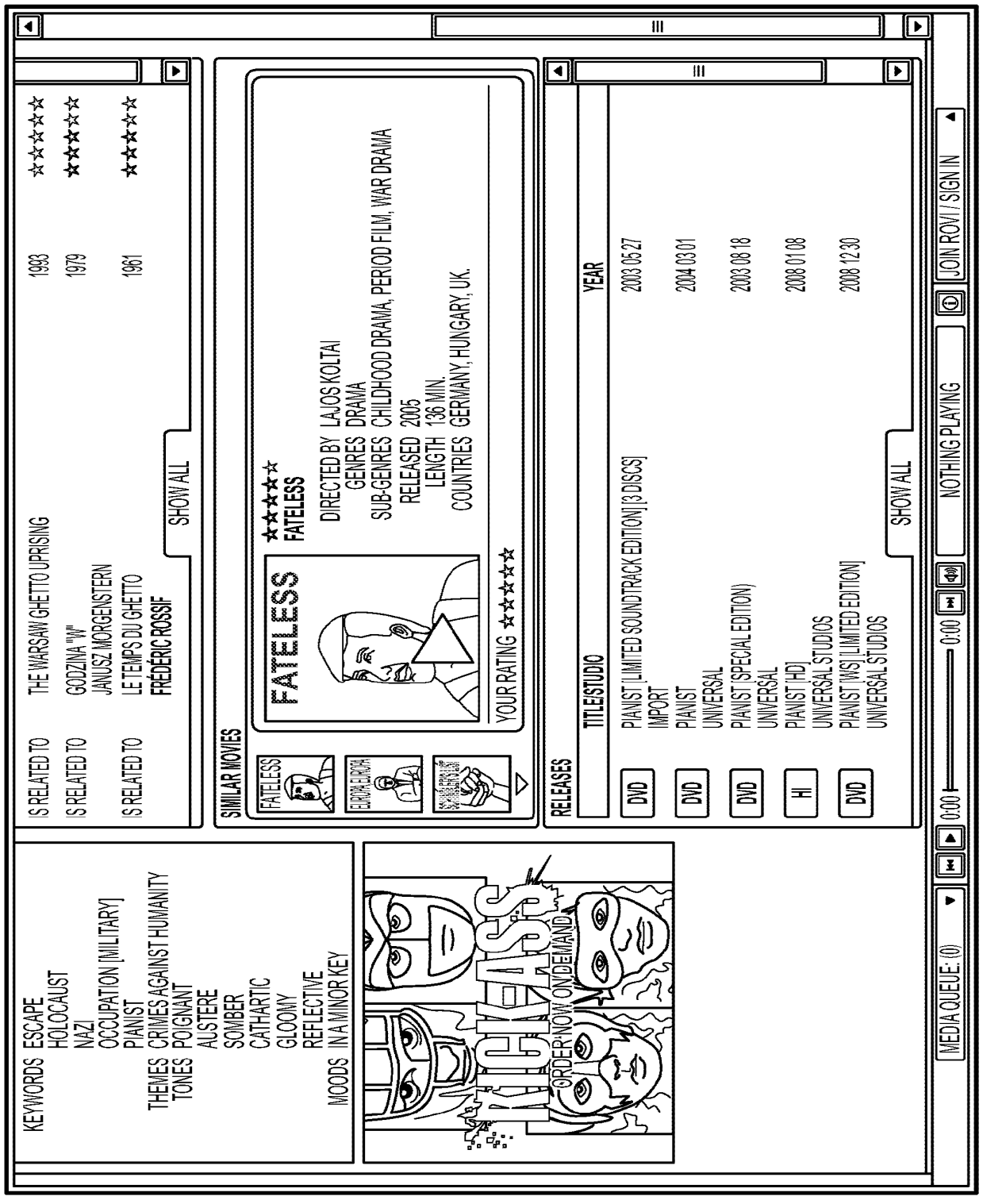

2800
KEYWORDS ESCAPE
HOLOCAUST
NAZI
OCCUPATION [MILITARY]
PIANIST
THEMES CRIMES AGAINST HUMANITY
TONES POIGNANT
AUSTERE
SOMBER
CATHARTIC
GLOOMY
REFLECTIVE
MOODS IN A MINOR KEY
ORDER NOW ON DEMAND
IS RELATED TO THE WARSAW GHETTO UPRISING 1993 ☆☆☆☆☆
IS RELATED TO GODZINA "W" 1979 ★★★★★
JANUSZ MORGENSTERN
IS RELATED TO LE TEMPS DU GHETTO 1961 ★★★★★
FRÉDÉRIC ROSSIF
SHOW ALL
SIMILAR MOVIES
FATELESS
EUROPA, EUROPA
SCHINDLER'S LIST
★★★★★
FATELESS
DIRECTED BY LAJOS KOLTAI
GENRES DRAMA
SUB-GENRES CHILDHOOD DRAMA, PERIOD FILM, WAR DRAMA
RELEASED 2005
LENGTH 136 MIN.
COUNTRIES GERMANY, HUNGARY, UK.
YOUR RATING ☆☆☆☆☆
RELEASES
TITLE/STUDIO
YEAR
DVD PIANIST [LIMITED SOUNDTRACK EDITION] [3 DISCS] 2003 05 27
IMPORT
DVD PIANIST 2004 03 01
UNIVERSAL
DVD PIANIST SPECIAL EDITION) 2003 08 18
UNIVERSAL
HI PIANIST [HD] 2008 01 08
UNIVERSAL STUDIOS
DVD PIANIST [WS] [LIMITED EDITION] 2008 12 30
UNIVERSAL STUDIOS
SHOW ALL
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 29

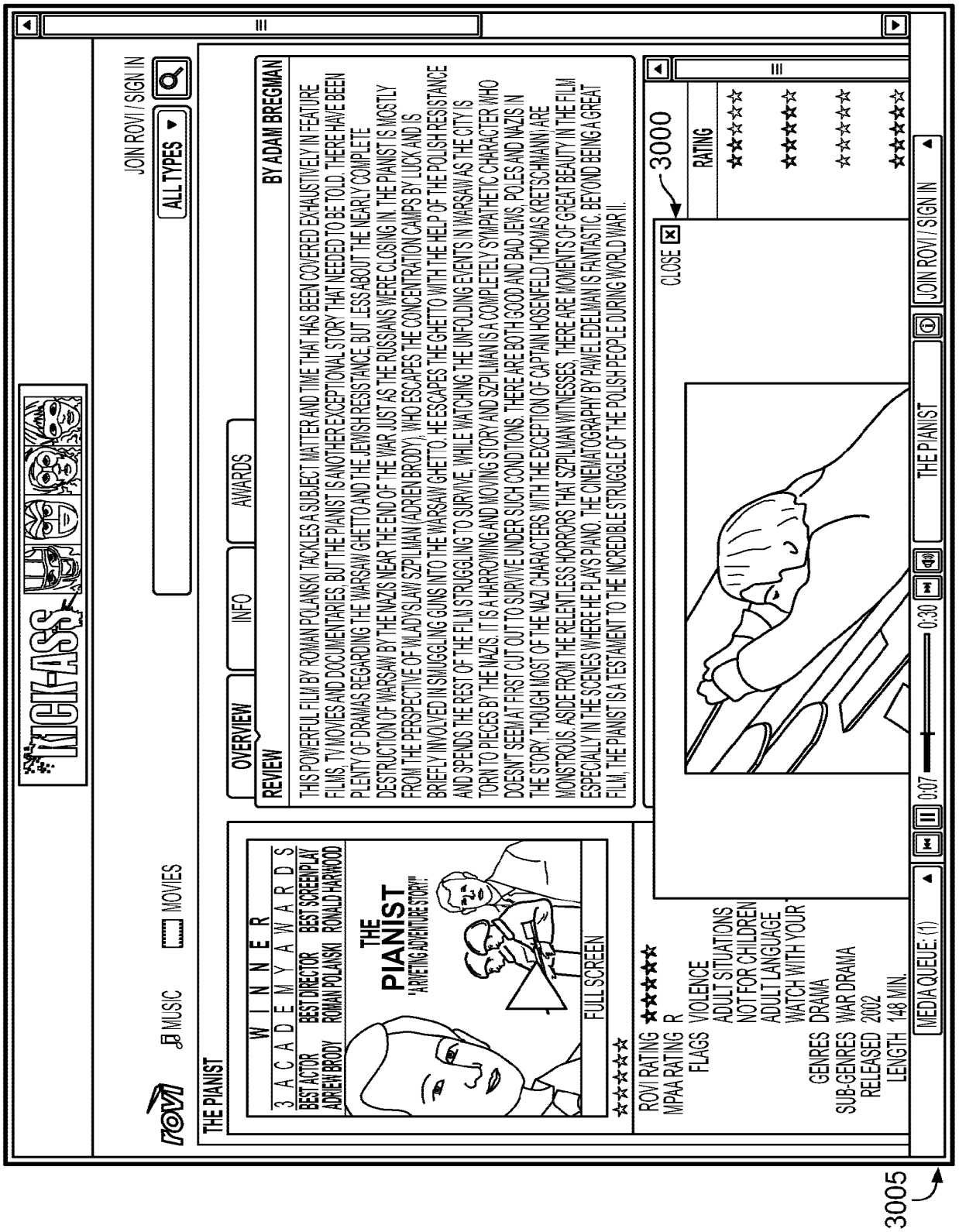

2800
KICK-ASS
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
OVERVIEW
INFO
AWARDS
REVIEW
BY ADAM BREGMAN
THIS POWERFUL FILM BY ROMAN POLANSKI TACKLES A SUBJECT MATTER AND TIME THAT HAS BEEN COVERED EXHAUSTIVELY IN FEATURE FILMS, TV MOVIES AND DOCUMENTARIES. BUT THE PIANIST IS ANOTHER EXCEPTIONAL STORY THAT NEEDED TO BE TOLD. THERE HAVE BEEN PLENTY OF DRAMAS REGARDING THE WARSAW GHETTO AND THE JEWISH RESISTANCE, BUT LESS ABOUT THE NEARLY COMPLETE DESTRUCTION OF WARSAW BY THE NAZIS NEAR THE END OF THE WAR JUST AS THE RUSSIANS WERE CLOSING IN. THE PIANIST IS MOSTLY FROM THE PERSPECTIVE OF WLADYSLAW SZPILMAN (ADRIEN BRODY), WHO ESCAPES THE CONCENTRATION CAMPS BY LUCK AND IS BRIEFLY INVOLVED IN SMUGGLING GUNS INTO THE WARSAW GHETTO. HE ESCAPES THE GHETTO WITH THE HELP OF THE POLISH RESISTANCE AND SPENDS THE REST OF THE FILM STRUGGLING TO SURVIVE, WHILE WATCHING THE UNFOLDING EVENTS IN WARSAW AS THE CITY IS TORN TO PIECES BY THE NAZIS. IT IS A HARROWING AND MOVING STORY AND SZPILMAN IS A COMPLETELY SYMPATHETIC CHARACTER WHO DOESN'T SEEM AT FIRST CUT OUT TO SURVIVE UNDER SUCH CONDITIONS. THERE ARE BOTH GOOD AND BAD JEWS, POLES AND NAZIS IN THE STORY, THOUGH MOST OF THE NAZI CHARACTERS WITH THE EXCEPTION OF CAPTAIN HOSENFELD (THOMAS KRETSCHMANN) ARE MONSTROUS. ASIDE FROM THE RELENTLESS HORRORS THAT SZPILMAN WITNESSES, THERE ARE MOMENTS OF GREAT BEAUTY IN THE FILM ESPECIALLY IN THE SCENES WHERE HE PLAYS PIANO. THE CINEMATOGRAPHY BY PAWEL EDELMAN IS FANTASTIC. BEYOND BEING A GREAT FILM, THE PIANIST IS A TESTAMENT TO THE INCREDIBLE STRUGGLE OF THE POLISH PEOPLE DURING WORLD WAR II.
THE PIANIST
WINNER
3 ACADEMY AWARDS
BEST ACTOR
ADRIEN BRODY
BEST DIRECTOR
ROMAN POLANSKI
BEST SCREENPLAY
RONALD HARWOOD
THE PIANIST
"A RIVETING ADVENTURE STORY!"
FULL SCREEN
ROVI RATING
MPAA RATING R
FLAGS VIOLENCE
ADULT SITUATIONS
NOT FOR CHILDREN
ADULT LANGUAGE
WATCH WITH YOUR
GENRES DRAMA
SUB-GENRES WAR DRAMA
RELEASED 2002
LENGTH 148 MIN.
3000
CLOSE
RATING
MEDIA QUEUE: (1)
0:07
0:30
THE PIANIST
JOIN ROVI / SIGN IN
3005

FIG. 30

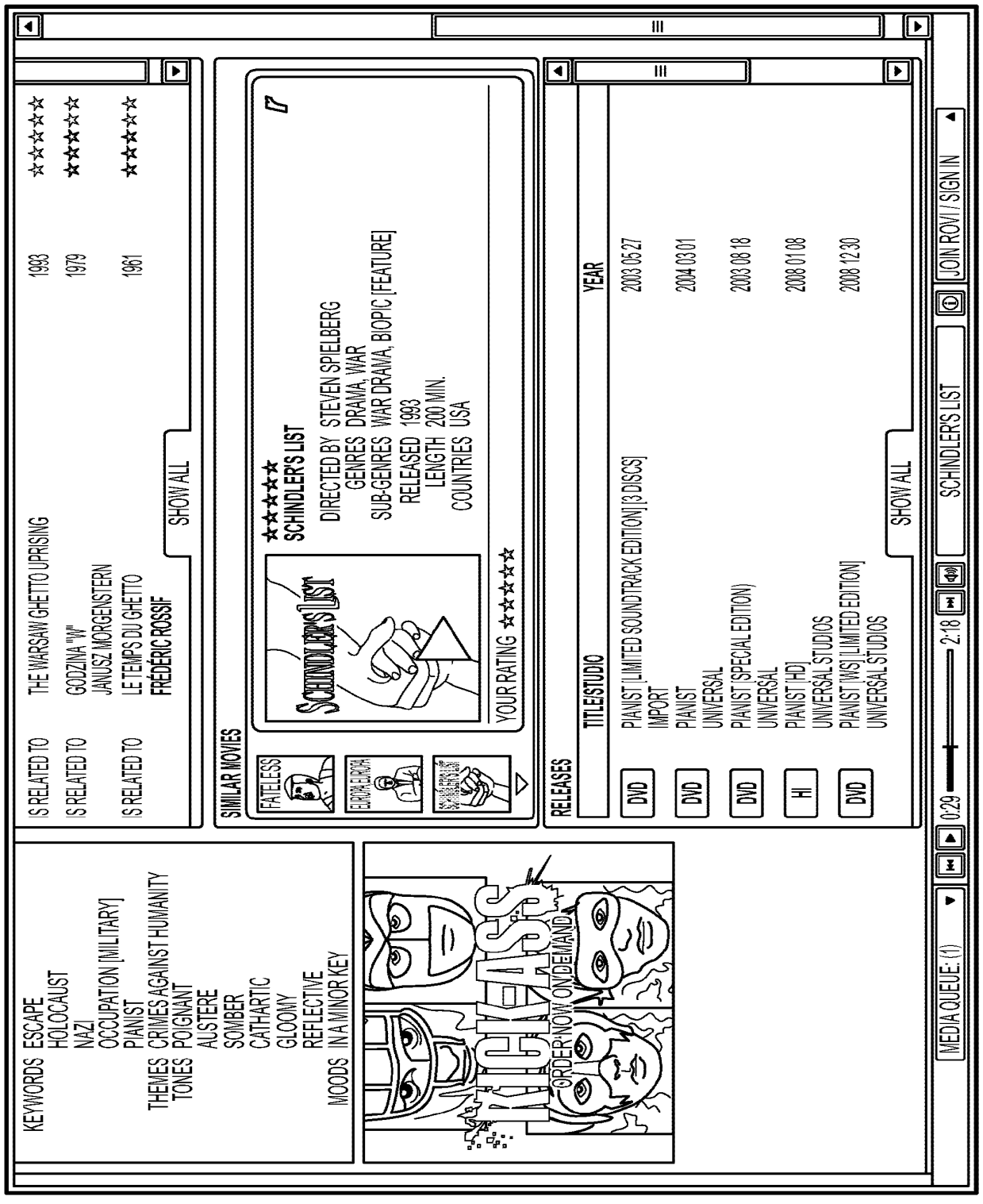

2800
IS RELATED TO THE WARSAW GHETTO UPRISING 1993
IS RELATED TO GODZINA "W" JANUSZ MORGENSTERN 1979
IS RELATED TO LE TEMPS DU GHETTO FRÉDÉRIC ROSSIF 1961
SHOW ALL
SIMILAR MOVIES
FATELESS
SCHINDLER'S LIST
DIRECTED BY STEVEN SPIELBERG
GENRES DRAMA, WAR
SUB-GENRES WAR DRAMA, BIOPIC [FEATURE]
RELEASED 1993
LENGTH 200 MIN.
COUNTRIES USA
YOUR RATING
KEYWORDS ESCAPE
HOLOCAUST
NAZI
OCCUPATION [MILITARY]
PIANIST
THEMES CRIMES AGAINST HUMANITY
TONES POIGNANT
AUSTERE
SOMBER
CATHARTIC
GLOOMY
REFLECTIVE
MOODS IN A MINOR KEY
ORDER NOW ON DEMAND
RELEASES
TITLE/STUDIO
YEAR
DVD PIANIST [LIMITED SOUNDTRACK EDITION] [3 DISCS] 2003 05 27
IMPORT
DVD PIANIST 2004 03 01
UNIVERSAL
DVD PIANIST SPECIAL EDITION) 2003 08 18
UNIVERSAL
HI PIANIST [HD] 2008 01 08
UNIVERSAL STUDIOS
DVD PIANIST [WS] [LIMITED EDITION] 2008 12 30
UNIVERSAL STUDIOS
SHOW ALL
MEDIA QUEUE: (1)
0:29
2:18
SCHINDLER'S LIST
JOIN ROVI / SIGN IN

FIG. 31

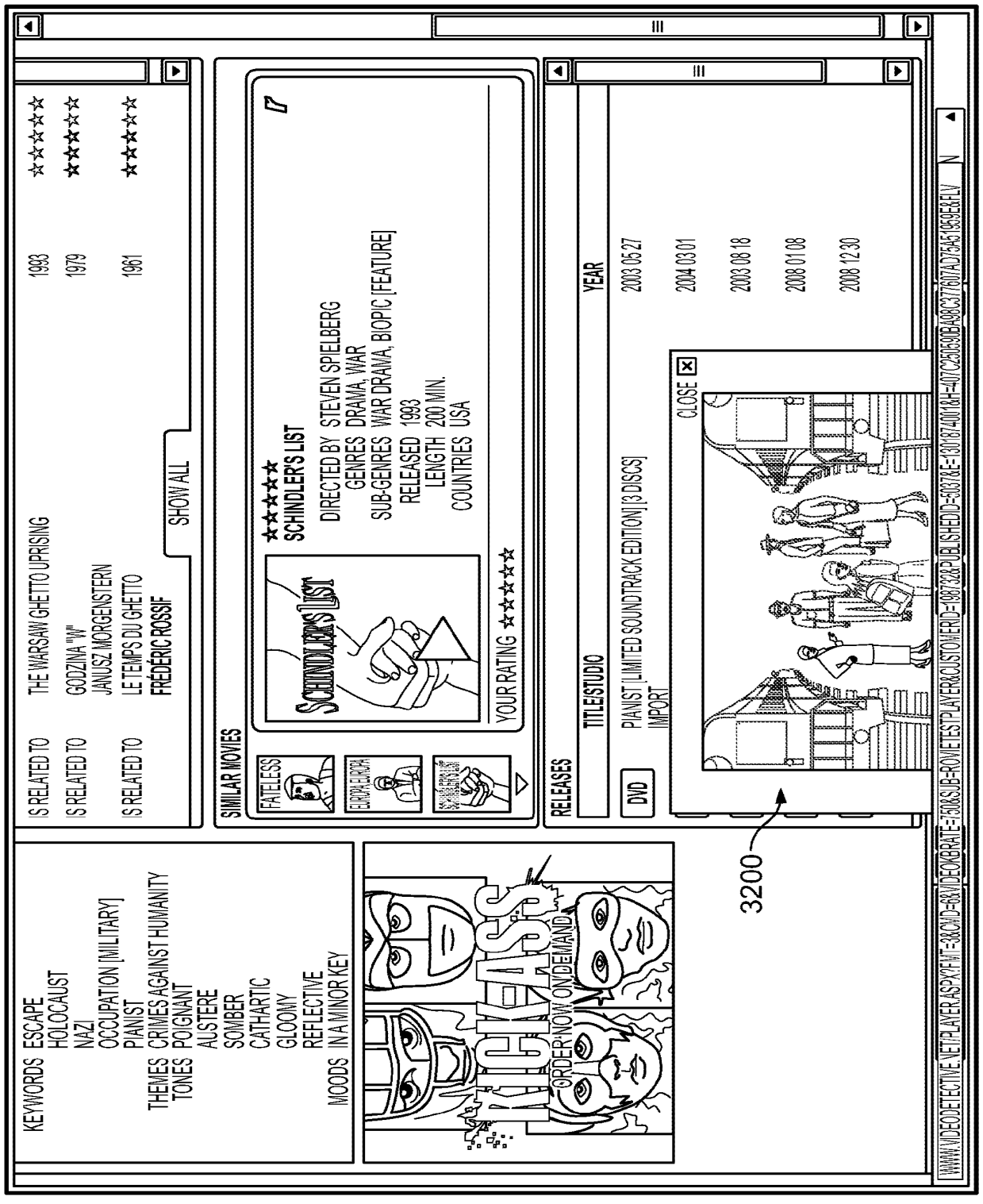

2800
IS RELATED TO THE WARSAW GHETTO UPRISING 1993
IS RELATED TO GODZINA "W" JANUSZ MORGENSTERN 1979
IS RELATED TO LE TEMPS DU GHETTO FRÉDÉRIC ROSSIF 1961
SHOW ALL
SIMILAR MOVIES
FATELESS
SCHINDLER'S LIST
YOUR RATING
SCHINDLER'S LIST
DIRECTED BY STEVEN SPIELBERG
GENRES DRAMA, WAR
SUB-GENRES WAR DRAMA, BIOPIC [FEATURE]
RELEASED 1993
LENGTH 200 MIN.
COUNTRIES USA
RELEASES
TITLE/STUDIO
YEAR
DVD
PIANIST [LIMITED SOUNDTRACK EDITION] [3 DISCS]
IMPORT
2003 05 27
2004 03 01
2003 08 18
2008 01 08
2008 12 30
CLOSE
KEYWORDS ESCAPE
HOLOCAUST
NAZI
OCCUPATION [MILITARY]
PIANIST
THEMES CRIMES AGAINST HUMANITY
TONES POIGNANT
AUSTERE
SOMBER
CATHARTIC
GLOOMY
REFLECTIVE
MOODS IN A MINOR KEY
ORDER NOW ON DEMAND
3200

FIG. 32

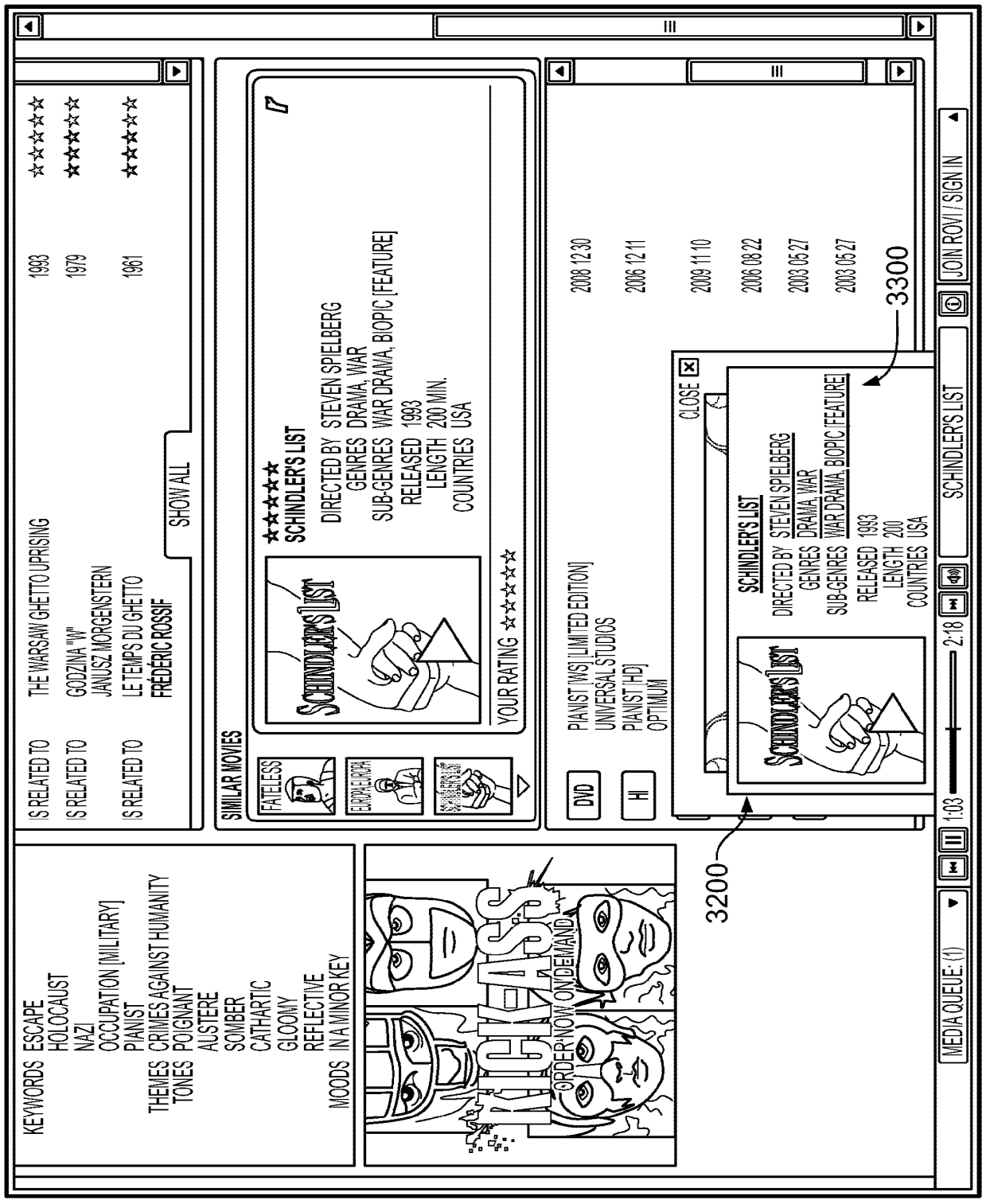

2800
KEYWORDS ESCAPE
HOLOCAUST
NAZI
OCCUPATION [MILITARY]
PIANIST
THEMES CRIMES AGAINST HUMANITY
TONES POIGNANT
AUSTERE
SOMBER
CATHARTIC
GLOOMY
REFLECTIVE
MOODS IN A MINOR KEY
ORDER NOW ON DEMAND
IS RELATED TO THE WARSAW GHETTO UPRISING 1993
IS RELATED TO GODZINA "W" JANUSZ MORGENSTERN 1979
IS RELATED TO LE TEMPS DU GHETTO FRÉDÉRIC ROSSIF 1961
SHOW ALL
SIMILAR MOVIES
FATELESS
SCHINDLER'S LIST
DIRECTED BY STEVEN SPIELBERG
GENRES DRAMA, WAR
SUB-GENRES WAR DRAMA, BIOPIC [FEATURE]
RELEASED 1993
LENGTH 200 MIN.
COUNTRIES USA
YOUR RATING
DVD
PIANIST WS [LIMITED EDITION]
UNIVERSAL STUDIOS
2008 12 30
HI
PIANIST HD]
OPTIMUM
2006 12 11
CLOSE
2009 11 10
2006 08 22
2003 05 27
2003 05 27
3300
3200
MEDIA QUEUE: (1)
1:03
2:18
SCHINDLER'S LIST
JOIN ROVI / SIGN IN

FIG. 33

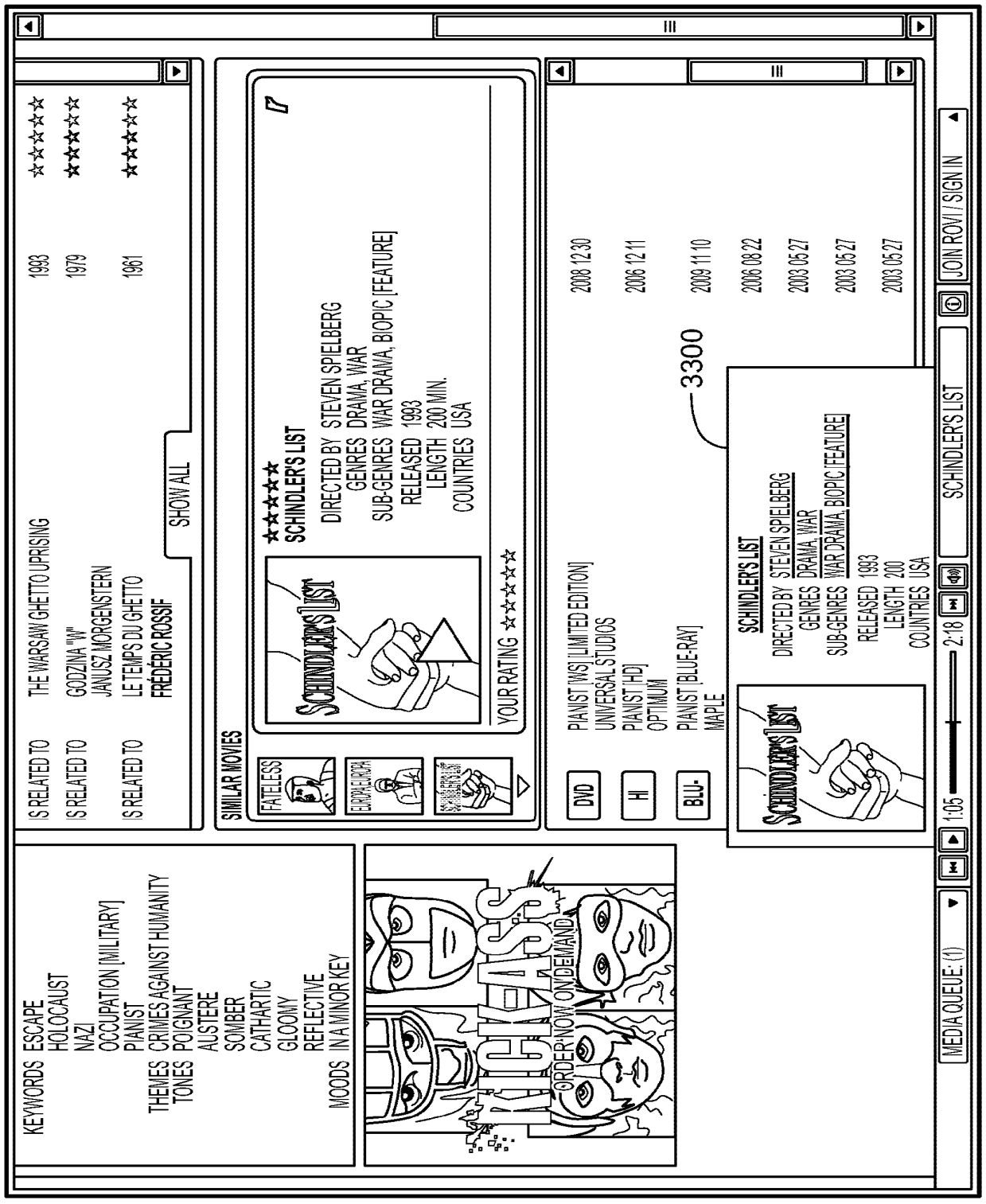

2800
KEYWORDS ESCAPE
HOLOCAUST
NAZI
OCCUPATION [MILITARY]
PIANIST
THEMES CRIMES AGAINST HUMANITY
TONES POIGNANT
AUSTERE
SOMBER
CATHARTIC
GLOOMY
REFLECTIVE
MOODS IN A MINOR KEY
ORDER NOW ON DEMAND
IS RELATED TO THE WARSAW GHETTO UPRISING 1993
IS RELATED TO GODZINA "W" JANUSZ MORGENSTERN 1979
IS RELATED TO LE TEMPS DU GHETTO FRÉDÉRIC ROSSIF 1961
SHOW ALL
SIMILAR MOVIES
FATELESS
SCHINDLER'S LIST
DIRECTED BY STEVEN SPIELBERG
GENRES DRAMA, WAR
SUB-GENRES WAR DRAMA, BIOPIC [FEATURE]
RELEASED 1993
LENGTH 200 MIN.
COUNTRIES USA
YOUR RATING
DVD PIANIST WS] [LIMITED EDITION]
UNIVERSAL STUDIOS
2008 12 30
HI PIANIST HD]
OPTIMUM
2006 12 11
BLU- PIANIST [BLUE-RAY]
MAPLE
2009 11 10
3300
SCHINDLER'S LIST
DIRECTED BY STEVEN SPIELBERG
GENRES DRAMA, WAR
SUB-GENRES WAR DRAMA, BIOPIC [FEATURE]
RELEASED 1993
LENGTH 200
COUNTRIES USA
2006 08 22
2003 05 27
2003 05 27
2003 05 27
MEDIA QUEUE: (1)
1:05
2:18
SCHINDLER'S LIST
JOIN ROVI / SIGN IN

FIG. 34

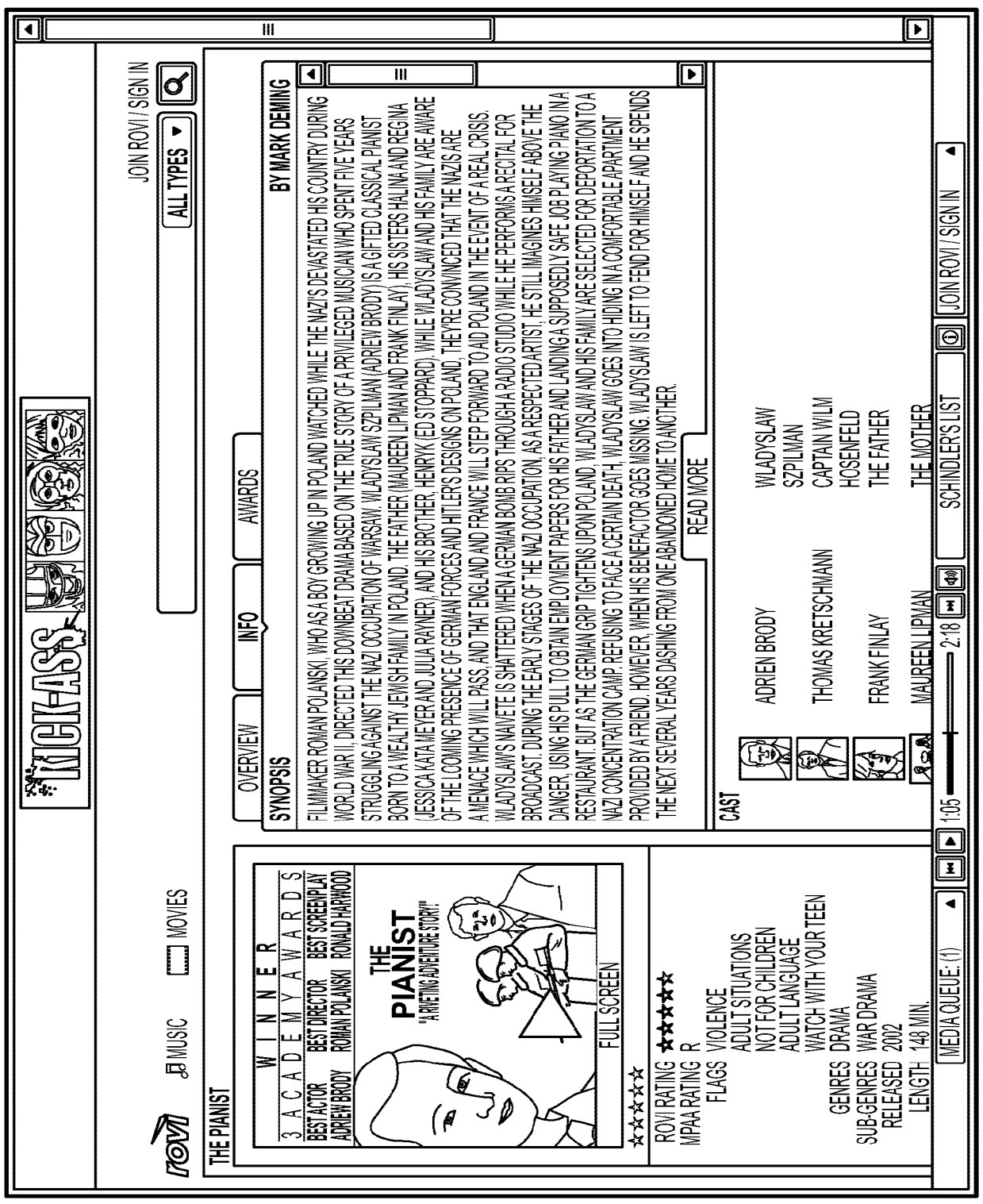

2800
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
THE PIANIST
WINNER
3 ACADEMY AWARDS
BEST ACTOR ADRIEN BRODY
BEST DIRECTOR ROMAN POLANSKI
BEST SCREENPLAY RONALD HARWOOD
THE PIANIST
"A RIVETING ADVENTURE STORY!"
FULL SCREEN
ROVI RATING
MPAA RATING R
FLAGS VIOLENCE
ADULT SITUATIONS
NOT FOR CHILDREN
ADULT LANGUAGE
WATCH WITH YOUR TEEN
GENRES DRAMA
SUB-GENRES WAR DRAMA
RELEASED 2002
LENGTH 148 MIN.
OVERVIEW
INFO
AWARDS
SYNOPSIS
BY MARK DEMING
FILMMAKER ROMAN POLANSKI, WHO AS A BOY GROWING UP IN POLAND WATCHED WHILE THE NAZIS DEVASTATED HIS COUNTRY DURING WORLD WAR II, DIRECTED THIS DOWNBEAT DRAMA BASED ON THE TRUE STORY OF A PRIVILEGED MUSICIAN WHO SPENT FIVE YEARS STRUGGLING AGAINST THE NAZI OCCUPATION OF WARSAW. WLADYSLAW SZPILMAN (ADRIEW BRODY) IS A GIFTED CLASSICAL PIANIST BORN TO A WEALTHY JEWISH FAMILY IN POLAND. THE FATHER (MAUREEN LIPMAN AND FRANK FINLAY), HIS SISTERS HALINA AND REGINA (JESSICA KATA MEYER AND JULIA RAYNER), AND HIS BROTHER, HENRYK (ED STOPPARD). WHILE WLADYSLAW AND HIS FAMILY ARE AWARE OF THE LOOMING PRESENCE OF GERMAN FORCES AND HITLER'S DESIGNS ON POLAND, THEY'RE CONVINCED THAT THE NAZIS ARE A MENACE WHICH WILL PASS, AND THAT ENGLAND AND FRANCE WILL STEP FORWARD TO AID POLAND IN THE EVENT OF A REAL CRISIS. WLADYSLAW'S NAIVETE IS SHATTERED WHEN A GERMAN BOMB RIPS THROUGH A RADIO STUDIO WHILE HE PERFORMS A RECITAL FOR BROADCAST. DURING THE EARLY STAGES OF THE NAZI OCCUPATION, AS A RESPECTED ARTIST, HE STILL IMAGINES HIMSELF ABOVE THE DANGER, USING HIS PULL TO OBTAIN EMPLOYMENT PAPERS FOR HIS FATHER AND LANDING A SUPPOSEDLY SAFE JOB PLAYING PIANO IN A RESTAURANT. BUT AS THE GERMAN GRIP TIGHTENS UPON POLAND, WLADYSLAW AND HIS FAMILY ARE SELECTED FOR DEPORTATION TO A NAZI CONCENTRATION CAMP. REFUSING TO FACE A CERTAIN DEATH, WLADYSLAW GOES INTO HIDING IN A COMFORTABLE APARTMENT PROVIDED BY A FRIEND. HOWEVER, WHEN HIS BENEFACTOR GOES MISSING, WLADYSLAW IS LEFT TO FEND FOR HIMSELF AND HE SPENDS THE NEXT SEVERAL YEARS DASHING FROM ONE ABANDONED HOME TO ANOTHER.
READ MORE
CAST
ADRIEN BRODY WLADYSLAW SZPILMAN
THOMAS KRETSCHMANN CAPTAIN WILM HOSENFELD
FRANK FINLAY THE FATHER
MAUREEN LIPMAN THE MOTHER
MEDIA QUEUE: (1)
1:05
2:18
SCHINDLER'S LIST
JOIN ROVI / SIGN IN

FIG. 35

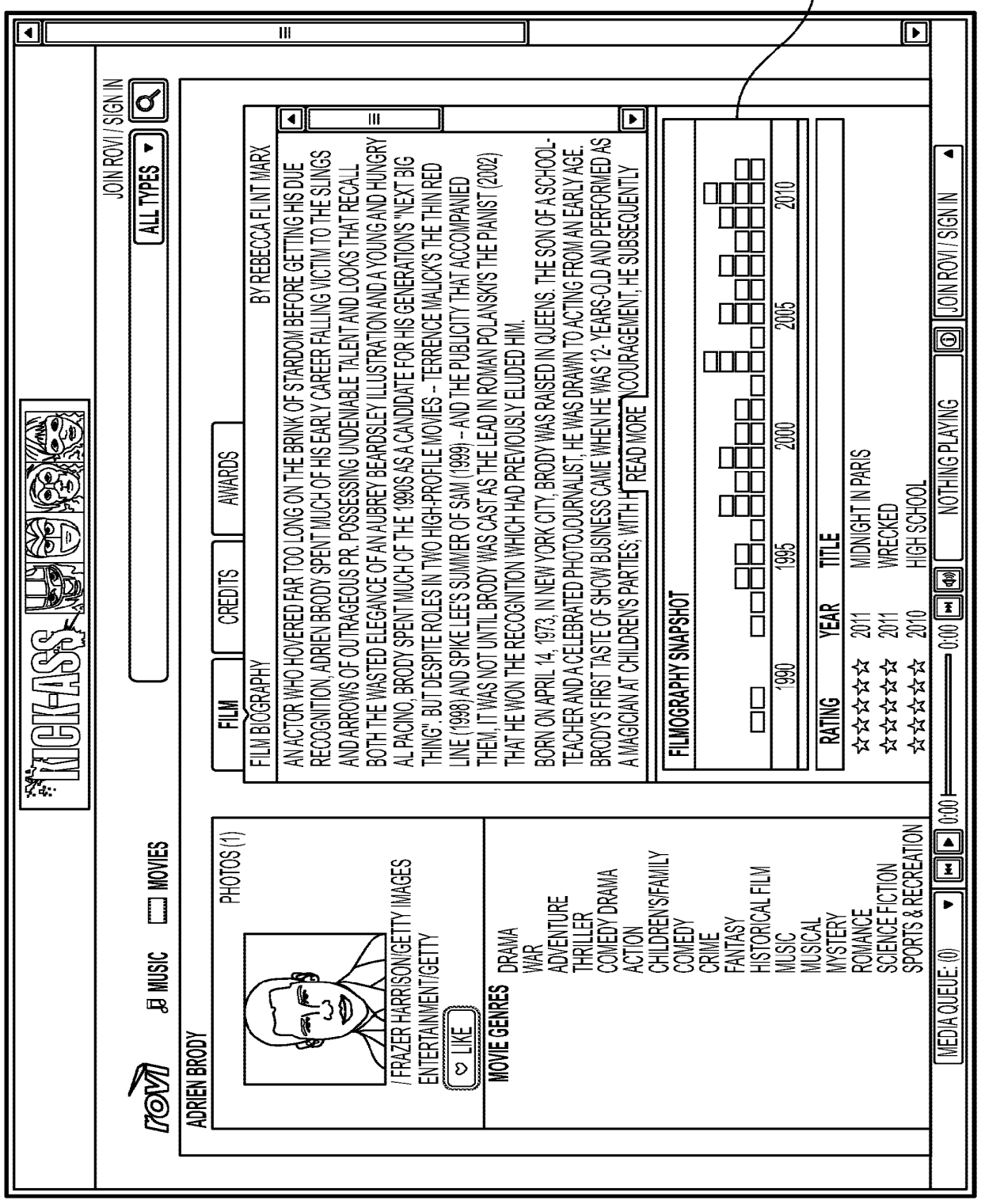

3600
3610
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
ADRIEN BRODY
PHOTOS (1)
/ FRAZER HARRISON/GETTY IMAGES ENTERTAINMENT/GETTY
LIKE
MOVIE GENRES
DRAMA
WAR
ADVENTURE
THRILLER
COMEDY DRAMA
ACTION
CHILDREN'S/FAMILY
COMEDY
CRIME
FANTASY
HISTORICAL FILM
MUSIC
MUSICAL
MYSTERY
ROMANCE
SCIENCE FICTION
SPORTS & RECREATION
FILM
CREDITS
AWARDS
FILM BIOGRAPHY
BY REBECCA FLINT MARX
AN ACTOR WHO HOVERED FAR TOO LONG ON THE BRINK OF STARDOM BEFORE GETTING HIS DUE RECOGNITION, ADRIEN BRODY SPENT MUCH OF HIS EARLY CAREER FALLING VICTIM TO THE SLINGS AND ARROWS OF OUTRAGEOUS PR. POSSESSING UNDENIABLE TALENT AND LOOKS THAT RECALL BOTH THE WASTED ELEGANCE OF AN AUBREY BEARDSLEY ILLUSTRATION AND A YOUNG AND HUNGRY AL PACINO, BRODY SPENT MUCH OF THE 1990S AS A CANDIDATE FOR HIS GENERATION'S "NEXT BIG THING". BUT DESPITE ROLES IN TWO HIGH-PROFILE MOVIES -- TERRENCE MALICK'S THE THIN RED LINE (1998) AND SPIKE LEE'S SUMMER OF SAM (1999) -- AND THE PUBLICITY THAT ACCOMPANIED THEM, IT WAS NOT UNTIL BRODY WAS CAST AS THE LEAD IN ROMAN POLANSKI'S THE PIANIST (2002) THAT HE WON THE RECOGNITION WHICH HAD PREVIOUSLY ELUDED HIM.
BORN ON APRIL 14, 1973, IN NEW YORK CITY, BRODY WAS RAISED IN QUEENS. THE SON OF A SCHOOL-TEACHER AND A CELEBRATED PHOTOJOURNALIST, HE WAS DRAWN TO ACTING FROM AN EARLY AGE. BRODY'S FIRST TASTE OF SHOW BUSINESS CAME WHEN HE WAS 12- YEARS-OLD AND PERFORMED AS A MAGICIAN AT CHILDREN'S PARTIES; WITH H
READ MORE
COURAGEMENT, HE SUBSEQUENTLY
FILMOGRAPHY SNAPSHOT
1990
1995
2000
2005
2010
RATING
YEAR
TITLE
2011 MIDNIGHT IN PARIS
2011 WRECKED
2010 HIGH SCHOOL
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 36

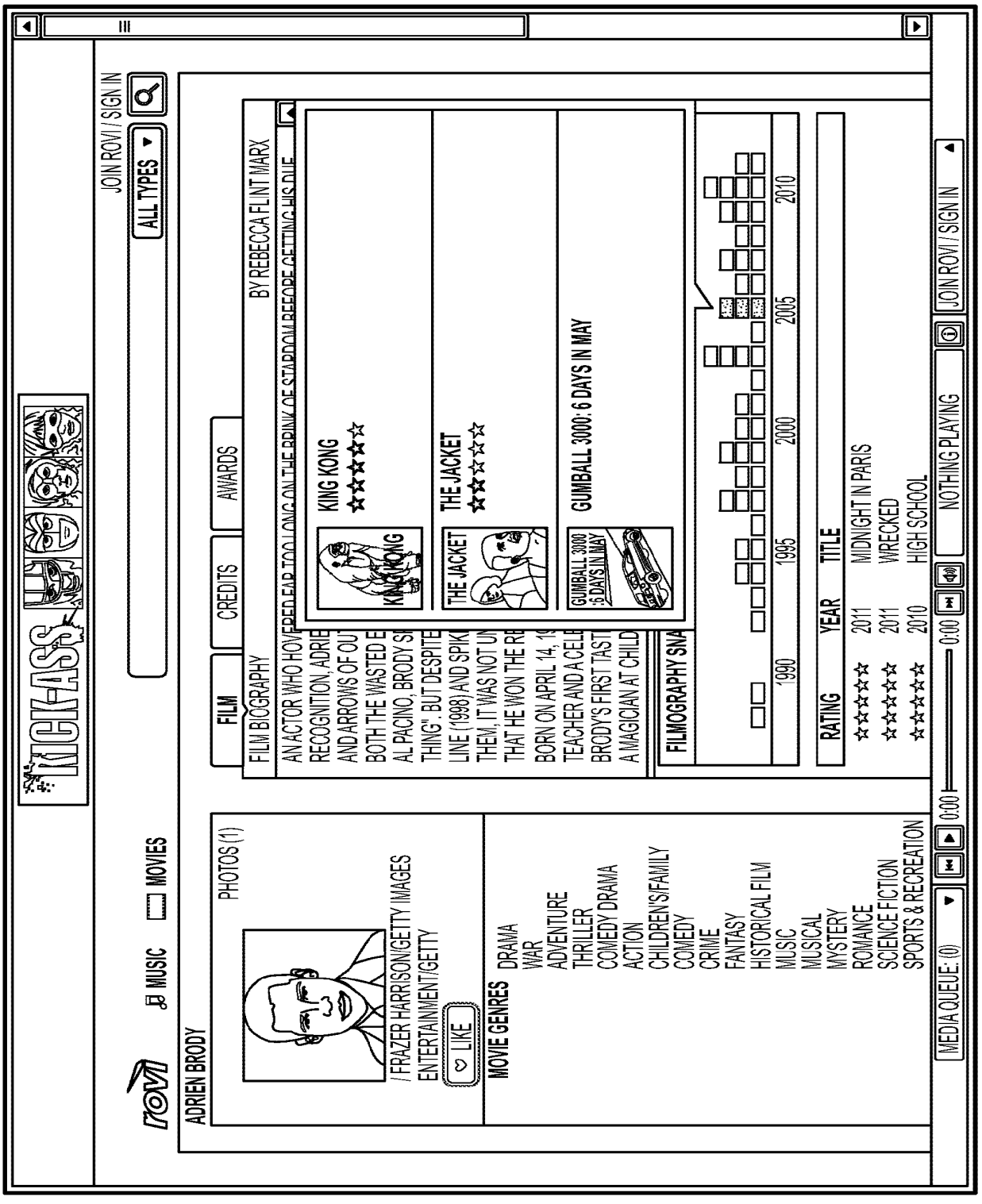

3600
KICK-ASS
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
ADRIEN BRODY
PHOTOS (1)
/ FRAZER HARRISON/GETTY IMAGES
ENTERTAINMENT/GETTY
LIKE
MOVIE GENRES
DRAMA
WAR
ADVENTURE
THRILLER
COMEDY DRAMA
ACTION
CHILDREN'S/FAMILY
COMEDY
CRIME
FANTASY
HISTORICAL FILM
MUSIC
MUSICAL
MYSTERY
ROMANCE
SCIENCE FICTION
SPORTS & RECREATION
FILM
CREDITS
AWARDS
FILM BIOGRAPHY
BY REBECCA FLINT MARX
AN ACTOR WHO HOV
RECOGNITION, ADRIE
AND ARROWS OF OU
BOTH THE WASTED E
AL PACINO, BRODY SI
THING". BUT DESPITE
LINE (1998) AND SPIK
THEM, IT WAS NOT UN
THAT HE WON THE RE
BORN ON APRIL 14, 19
TEACHER AND A CELE
BRODY'S FIRST TAST
A MAGICIAN AT CHILD
KING KONG
THE JACKET
GUMBALL 3000: 6 DAYS IN MAY
FILMOGRAPHY SNA
1990
1995
2000
2005
2010
RATING
YEAR
TITLE
2011 MIDNIGHT IN PARIS
2011 WRECKED
2010 HIGH SCHOOL
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 37

3600
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
ADRIEN BRODY
PHOTOS (1)
/ FRAZER HARRISON/GETTY IMAGES
ENTERTAINMENT/GETTY
LIKE
MOVIE GENRES
DRAMA
WAR
ADVENTURE
THRILLER
COMEDY DRAMA
ACTION
CHILDREN'S/FAMILY
COMEDY
CRIME
FANTASY
HISTORICAL FILM
MUSIC
MUSICAL
MYSTERY
ROMANCE
SCIENCE FICTION
SPORTS & RECREATION
FILM
CREDITS
AWARDS
FILM CREDITS
YEAR FILM CREDIT
2011 MIDNIGHT IN PARIS NORMAL ACTING
2011 WRECKED NORMAL ACTING
2010 HIGH SCHOOL NORMAL ACTING
2010 PREDATORS NORMAL ACTING
2010 SPLICE NORMAL ACTING
2010 THE EXPERIMENT NORMAL ACTING
2009 FANTASTIC MR. FOX VOICE
2009 GIALLO EXECUTIVE PRODUCER, NORMAL ACTING
2009 THE COURIER NORMAL ACTING, EXECUTIVE PRODUCER
2008 CADILLAC RECORDS NORMAL ACTING
2008 THE BROTHERS BLOOM NORMAL ACTING
2007 MANOLETE: BLOOD & PASSION NORMAL ACTING
2007 SELF-PORTRAIT WITH COWS GOING HOME AND OTHER WORKS: A PORTRAIT OF SYLVIA PLACHY COMPOSER (MUSIC SCORE)
2007 THE DARJEELING LIMITED NORMAL ACTING
2006 HOLLYWOODLAND NORMAL ACTING
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 38

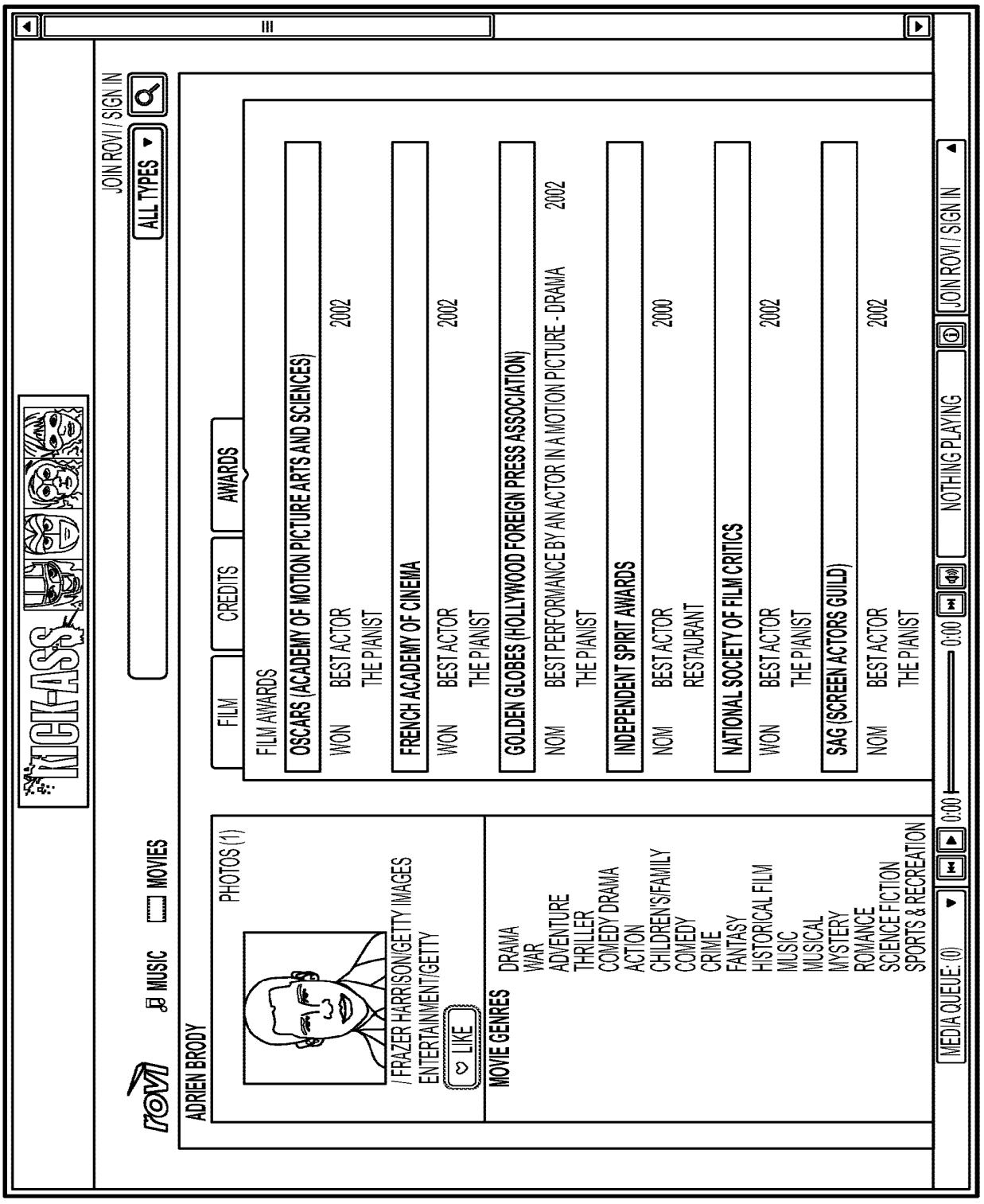

3600
MOVIES
MUSIC
JOIN ROVI / SIGN IN
ALL TYPES
ADRIEN BRODY
PHOTOS (1)
/ FRAZER HARRISON/GETTY IMAGES
ENTERTAINMENT/GETTY
LIKE
MOVIE GENRES
DRAMA
WAR
ADVENTURE
THRILLER
COMEDY DRAMA
ACTION
CHILDREN'S/FAMILY
COMEDY
CRIME
FANTASY
HISTORICAL FILM
MUSIC
MUSICAL
MYSTERY
ROMANCE
SCIENCE FICTION
SPORTS & RECREATION
FILM
CREDITS
AWARDS
FILM AWARDS
OSCARS (ACADEMY OF MOTION PICTURE ARTS AND SCIENCES)
WON BEST ACTOR 2002
THE PIANIST
FRENCH ACADEMY OF CINEMA
WON BEST ACTOR 2002
THE PIANIST
GOLDEN GLOBES (HOLLYWOOD FOREIGN PRESS ASSOCIATION)
NOM BEST PERFORMANCE BY AN ACTOR IN A MOTION PICTURE - DRAMA 2002
THE PIANIST
INDEPENDENT SPIRIT AWARDS
NOM BEST ACTOR 2000
RESTAURANT
NATIONAL SOCIETY OF FILM CRITICS
WON BEST ACTOR 2002
THE PIANIST
SAG (SCREEN ACTORS GUILD)
NOM BEST ACTOR 2002
THE PIANIST
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 39

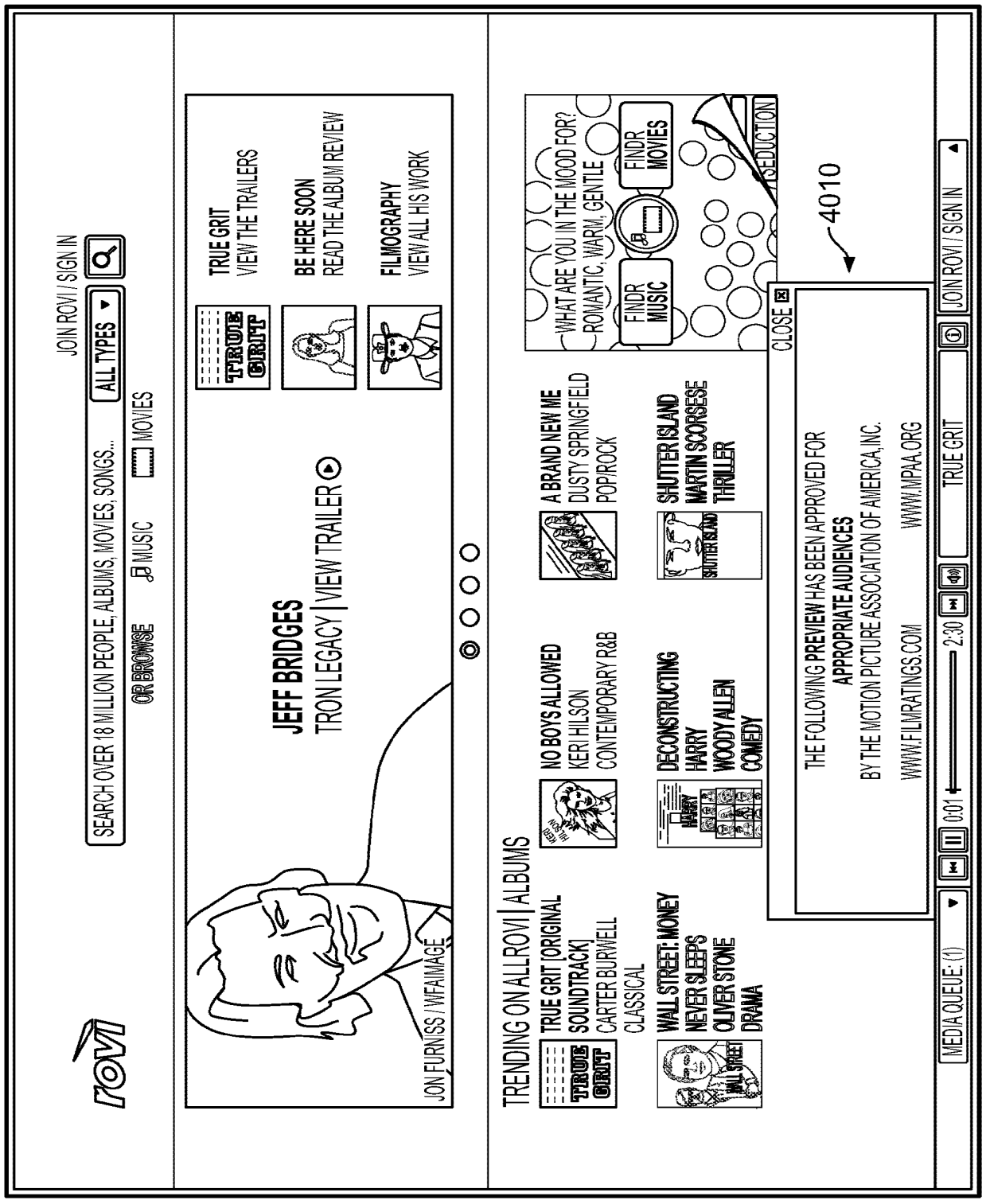

4000
rovi
JOIN ROVI / SIGN IN
SEARCH OVER 18 MILLION PEOPLE, ALBUMS, MOVIES, SONGS...
ALL TYPES
OR BROWSE
MUSIC
MOVIES
JEFF BRIDGES
TRON LEGACY | VIEW TRAILER
JON FURNISS / WFAIMAGE
TRUE GRIT
VIEW THE TRAILERS
BE HERE SOON
READ THE ALBUM REVIEW
FILMOGRAPHY
VIEW ALL HIS WORK
TRENDING ON ALL ROVI | ALBUMS
TRUE GRIT (ORIGINAL SOUNDTRACK)
CARTER BURWELL
CLASSICAL
NO BOYS ALLOWED
KERI HILSON
CONTEMPORARY R&B
A BRAND NEW ME
DUSTY SPRINGFIELD
POP/ROCK
WALL STREET: MONEY NEVER SLEEPS
OLIVER STONE
DRAMA
DECONSTRUCTING HARRY
WOODY ALLEN
COMEDY
SHUTTER ISLAND
MARTIN SCORSESE
THRILLER
WHAT ARE YOU IN THE MOOD FOR?
ROMANTIC, WARM, GENTLE
FINDR MUSIC
FINDR MOVIES
SEDUCTION
CLOSE
4010
THE FOLLOWING PREVIEW HAS BEEN APPROVED FOR
APPROPRIATE AUDIENCES
BY THE MOTION PICTURE ASSOCIATION OF AMERICA, INC.
WWW.FILMRATINGS.COM
WWW.MPAA.ORG
MEDIA QUEUE: (1)
0:01
2:30
TRUE GRIT
JOIN ROVI / SIGN IN

FIG. 40

4100
rovi
JOIN ROVI / SIGN IN
SEARCH OVER 18 MILLION PEOPLE, ALBUMS, MOVIES, SONGS...
ALL TYPES
OR BROWSE
MUSIC
MOVIES
SHAKIRA
SALE EL SOL LISTEN NOW
TIM MOSENTELDER / GETTY IMAGES
WHENEVER, WHEREVER
WATCH THE VIDEO
SHE WOLF
READ THE REVIEW
DISCOGRAPHY
VIEW ALL HER WORK
WHAT ARE YOU IN THE MOOD FOR?
ROMANTIC, WARM, GENTLE
FINDR MUSIC
FINDR MOVIES
SEDUCTION
TRENDING ON ALLROVI | ALBUMS
OTHER SOUNDS
YUSEF LATEEF QUINTET
JAZZ
GUSSIE PRESENTING I-ROY
I-ROY
REGGAE
ENTER THE DUBSTEP.
VOL. 2
BRAND NUBIAN
ALTERNATIVE RAP
SHUTTER ISLAND
MARTIN SCORSESE
THRILLER
THE WRESTLER
DARREN ARONOFSKY
DRAMA
SCROOGED
RICHARD DONNER
COMEDY
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
JOIN ROVI / SIGN IN

FIG. 41

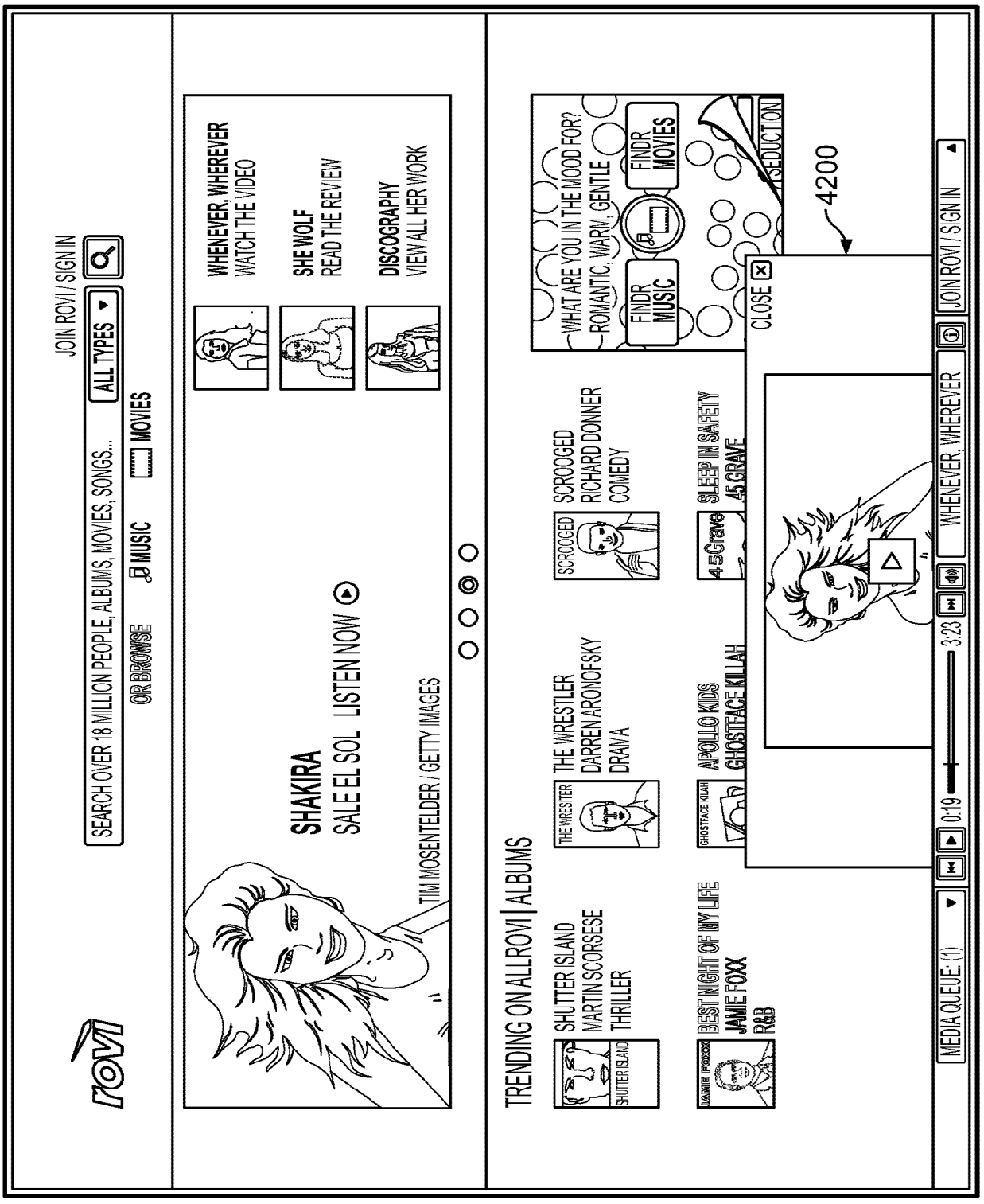

4100
rovi
JOIN ROVI / SIGN IN
SEARCH OVER 18 MILLION PEOPLE, ALBUMS, MOVIES, SONGS...
ALL TYPES
OR BROWSE
MUSIC
MOVIES
WHENEVER, WHEREVER
WATCH THE VIDEO
SHE WOLF
READ THE REVIEW
DISCOGRAPHY
VIEW ALL HER WORK
SHAKIRA
SALE EL SOL LISTEN NOW
TIM MOSENTELDER / GETTY IMAGES
TRENDING ON ALLROVI | ALBUMS
SHUTTER ISLAND
MARTIN SCORSESE
THRILLER
THE WRESTLER
DARREN ARONOFSKY
DRAMA
SCROOGED
RICHARD DONNER
COMEDY
BEST NIGHT OF MY LIFE
JAMIE FOXX
R&B
APOLLO KIDS
GHOSTFACE KILLAH
SLEEP IN SAFETY
45 GRAVE
WHAT ARE YOU IN THE MOOD FOR?
ROMANTIC, WARM, GENTLE
FINDR MUSIC
FINDR MOVIES
SEDUCTION
CLOSE
4200
MEDIA QUEUE: (1)
0:19
3:23
WHENEVER, WHEREVER
JOIN ROVI / SIGN IN

FIG. 42

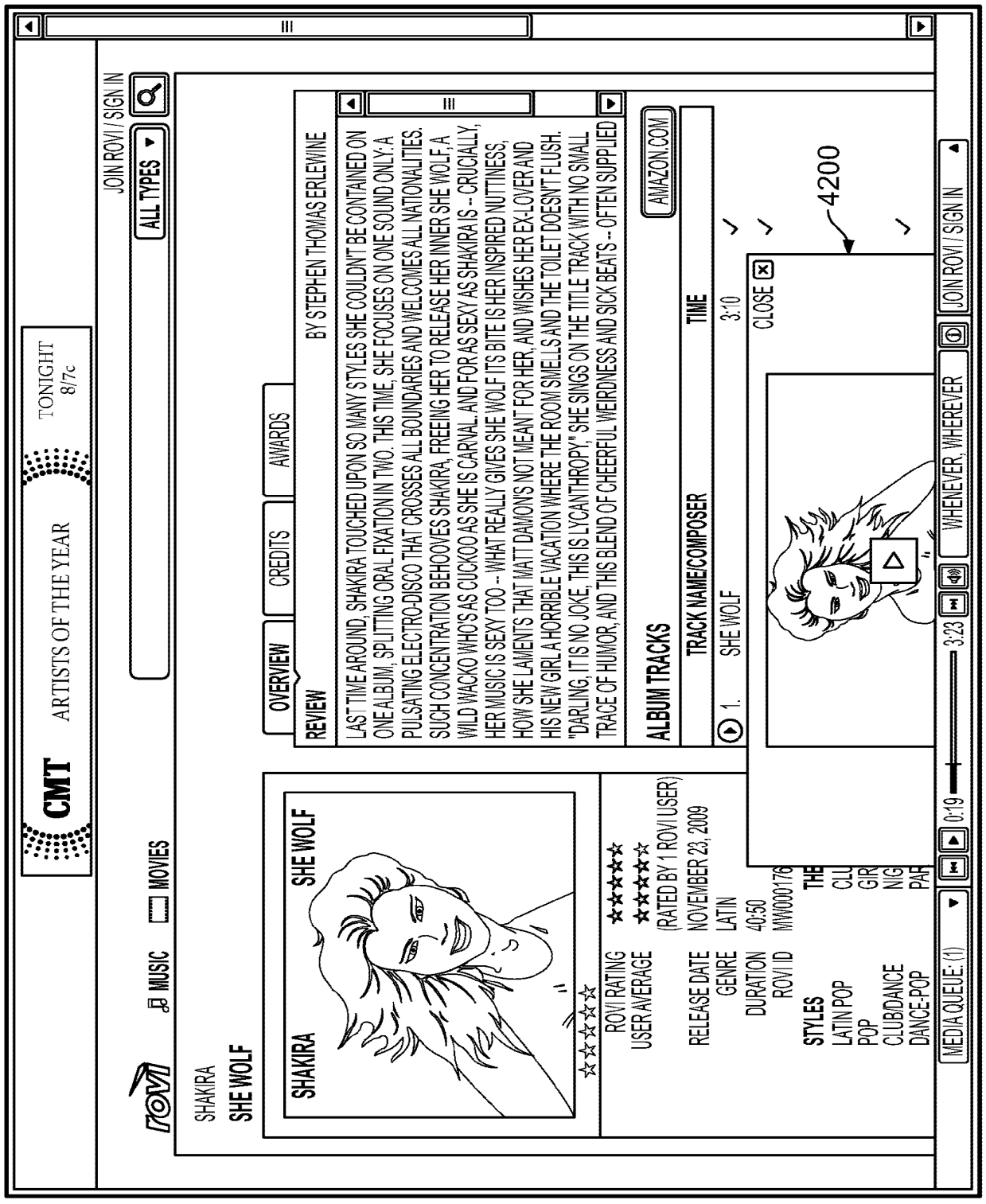

4300
CMT
ARTISTS OF THE YEAR
TONIGHT 8/7c
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
SHAKIRA
SHE WOLF
SHAKIRA
SHE WOLF
ROVI RATING
USER AVERAGE
(RATED BY 1 ROVI USER)
RELEASE DATE NOVEMBER 23, 2009
GENRE LATIN
DURATION 40:50
ROVI ID MW0000176
STYLES
LATIN POP
POP
CLUB/DANCE
DANCE-POP
OVERVIEW
CREDITS
AWARDS
REVIEW
BY STEPHEN THOMAS ERLEWINE
LAST TIME AROUND, SHAKIRA TOUCHED UPON SO MANY STYLES SHE COULDN'T BE CONTAINED ON ONE ALBUM, SPLITTING ORAL FIXATION IN TWO. THIS TIME, SHE FOCUSES ON ONE SOUND ONLY: A PULSATING ELECTRO-DISCO THAT CROSSES ALL BOUNDARIES AND WELCOMES ALL NATIONALITIES. SUCH CONCENTRATION BEHOOVES SHAKIRA, FREEING HER TO RELEASE HER INNER SHE WOLF, A WILD WACKO WHO'S AS CUCKOO AS SHE IS CARNAL. AND FOR AS SEXY AS SHAKIRA IS -- CRUCIALLY, HER MUSIC IS SEXY TOO -- WHAT REALLY GIVES SHE WOLF ITS BITE IS HER INSPIRED NUTTINESS, HOW SHE LAMENTS THAT MATT DAMON'S NOT MEANT FOR HER, AND WISHES HER EX-LOVER AND HIS NEW GIRL A HORRIBLE VACATION WHERE THE ROOM SMELLS AND THE TOILET DOESN'T FLUSH. "DARLING, IT IS NO JOKE, THIS IS LYCANTHROPY," SHE SINGS ON THE TITLE TRACK WITH NO SMALL TRACE OF HUMOR, AND THIS BLEND OF CHEERFUL WEIRDNESS AND SICK BEATS -- OFTEN SUPPLIED
ALBUM TRACKS
AMAZON.COM
TRACK NAME/COMPOSER
TIME
1. SHE WOLF 3:10
CLOSE
4200
MEDIA QUEUE: (1)
0:19
3:23
WHENEVER, WHEREVER
JOIN ROVI / SIGN IN

FIG. 43

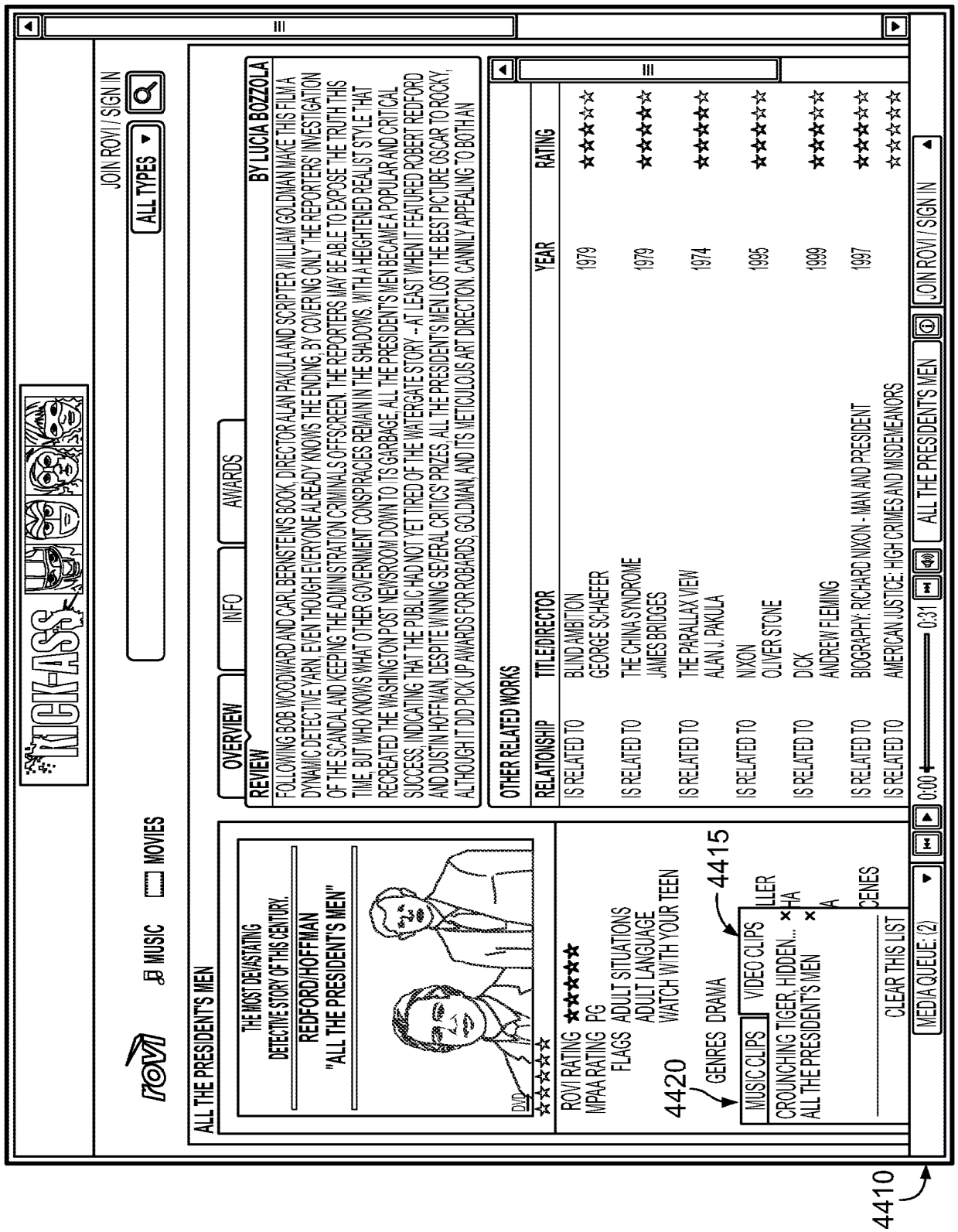

4410
4415
4420
JOIN ROVI / SIGN IN
ALL TYPES
MUSIC
MOVIES
ALL THE PRESIDENT'S MEN
THE MOST DEVASTATING DETECTIVE STORY OF THIS CENTURY.
REDFORD/HOFFMAN
"ALL THE PRESIDENT'S MEN"
DVD
ROVI RATING
MPAA RATING PG
FLAGS ADULT SITUATIONS
ADULT LANGUAGE
WATCH WITH YOUR TEEN
GENRES DRAMA
MUSIC CLIPS
VIDEO CLIPS
CROUNCHING TIGER, HIDDEN...
ALL THE PRESIDENT'S MEN
CLEAR THIS LIST
OVERVIEW
INFO
AWARDS
REVIEW
BY LUCIA BOZZOLA
FOLLOWING BOB WOODWARD AND CARL BERNSTEIN'S BOOK, DIRECTOR ALAN PAKULA AND SCRIPTER WILLIAM GOLDMAN MAKE THIS FILM A DYNAMIC DETECTIVE YARN, EVEN THOUGH EVERYONE ALREADY KNOWS THE ENDING, BY COVERING ONLY THE REPORTERS' INVESTIGATION OF THE SCANDAL AND KEEPING THE ADMINISTRATION CRIMINALS OFFSCREEN. THE REPORTERS MAY BE ABLE TO EXPOSE THE TRUTH THIS TIME, BUT WHO KNOWS WHAT OTHER GOVERNMENT CONSPIRACIES REMAIN IN THE SHADOWS. WITH A HEIGHTENED REALIST STYLE THAT RECREATED THE WASHINGTON POST NEWSROOM DOWN TO ITS GARBAGE, ALL THE PRESIDENT'S MEN BECAME A POPULAR AND CRITICAL SUCCESS, INDICATING THAT THE PUBLIC HAD NOT YET TIRED OF THE WATERGATE STORY -- AT LEAST WHEN IT FEATURED ROBERT REDFORD AND DUSTIN HOFFMAN. DESPITE WINNING SEVERAL CRITICS' PRIZES, ALL THE PRESIDENT'S MEN LOST THE BEST PICTURE OSCAR TO ROCKY, ALTHOUGH IT DID PICK UP AWARDS FOR ROBARDS, GOLDMAN, AND ITS METICULOUS ART DIRECTION. CANNILY APPEALING TO BOTH AN
OTHER RELATED WORKS
RELATIONSHIP
TITLE/DIRECTOR
YEAR
RATING
IS RELATED TO
BLIND AMBITION
GEORGE SCHAEFER
1979
IS RELATED TO
THE CHINA SYNDROME
JAMES BRIDGES
1979
IS RELATED TO
THE PARALLAX VIEW
ALAN J. PAKULA
1974
IS RELATED TO
NIXON
OLIVER STONE
1995
IS RELATED TO
DICK
ANDREW FLEMING
1999
IS RELATED TO
BIOGRAPHY: RICHARD NIXON - MAN AND PRESIDENT
1997
IS RELATED TO
AMERICAN JUSTICE: HIGH CRIMES AND MISDEMEANORS
MEDIA QUEUE: (2)
0:00
0:31
ALL THE PRESIDENT'S MEN
JOIN ROVI / SIGN IN

FIG. 44

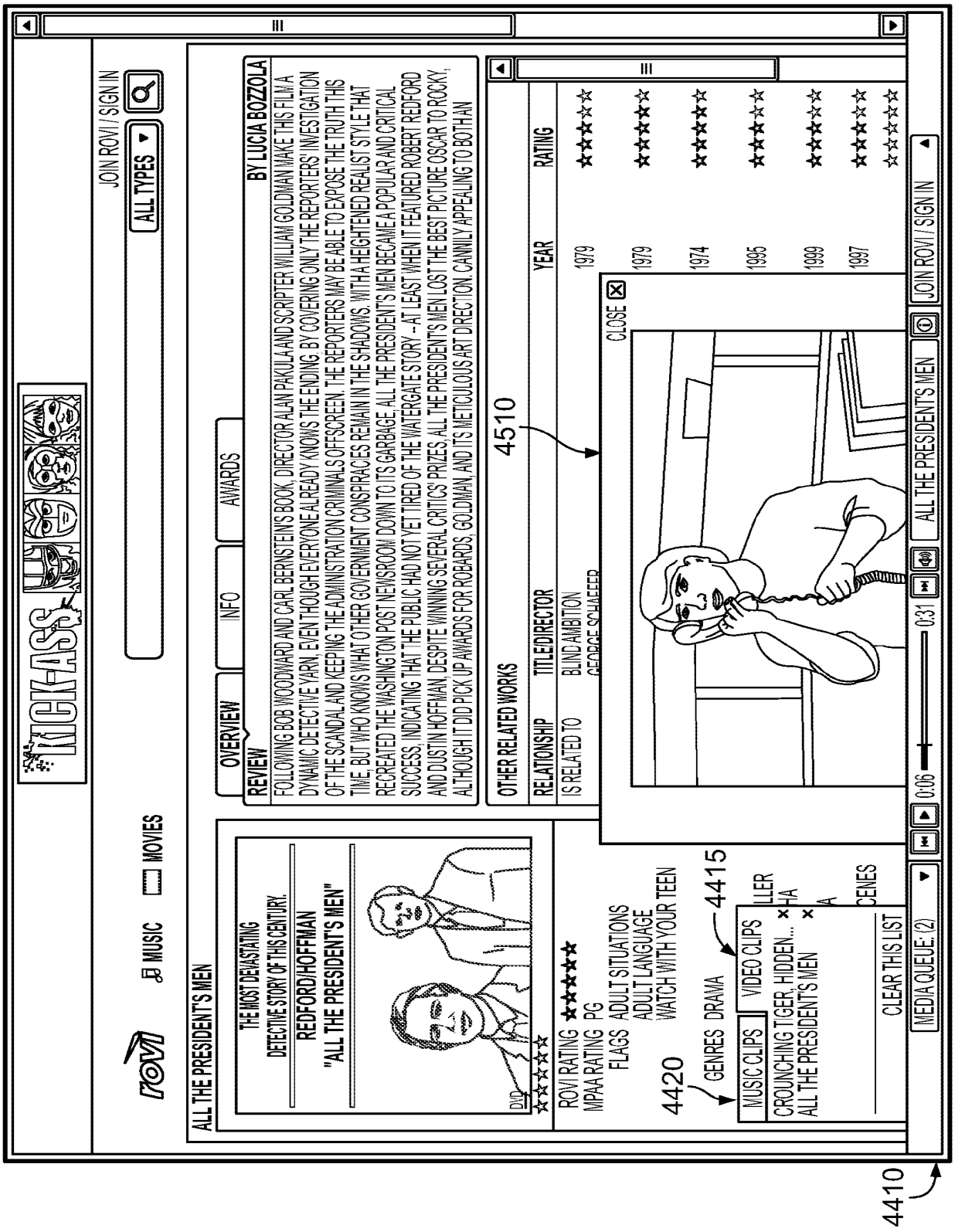

KICK-ASS
JOIN ROVI / SIGN IN
MUSIC
MOVIES
ALL TYPES
OVERVIEW
INFO
AWARDS
REVIEW
BY LUCIA BOZZOLA
FOLLOWING BOB WOODWARD AND CARL BERNSTEIN'S BOOK, DIRECTOR ALAN PAKULA AND SCRIPTER WILLIAM GOLDMAN MAKE THIS FILM A DYNAMIC DETECTIVE YARN, EVEN THOUGH EVERYONE ALREADY KNOWS THE ENDING. BY COVERING ONLY THE REPORTERS' INVESTIGATION OF THE SCANDAL AND KEEPING THE ADMINISTRATION CRIMINALS OFFSCREEN, THE REPORTERS MAY BE ABLE TO EXPOSE THE TRUTH THIS TIME, BUT WHO KNOWS WHAT OTHER GOVERNMENT CONSPIRACIES REMAIN IN THE SHADOWS. WITH A HEIGHTENED REALIST STYLE THAT RECREATED THE WASHINGTON POST NEWSROOM DOWN TO ITS GARBAGE, ALL THE PRESIDENT'S MEN BECAME A POPULAR AND CRITICAL SUCCESS, INDICATING THAT THE PUBLIC HAD NOT YET TIRED OF THE WATERGATE STORY -- AT LEAST WHEN IT FEATURED ROBERT REDFORD AND DUSTIN HOFFMAN. DESPITE WINNING SEVERAL CRITICS' PRIZES, ALL THE PRESIDENT'S MEN LOST THE BEST PICTURE OSCAR TO ROCKY, ALTHOUGH IT DID PICK UP AWARDS FOR ROBARDS, GOLDMAN, AND ITS METICULOUS ART DIRECTION. CANNILY APPEALING TO BOTH AN
4510
OTHER RELATED WORKS
RELATIONSHIP
TITLE/DIRECTOR
YEAR
RATING
IS RELATED TO
BLIND AMBITION
1979
1979
1974
1995
1999
1997
CLOSE
ALL THE PRESIDENT'S MEN
THE MOST DEVASTATING DETECTIVE STORY OF THIS CENTURY.
REDFORD/HOFFMAN
"ALL THE PRESIDENT'S MEN"
DVD
ROVI RATING
MPAA RATING PG
FLAGS ADULT SITUATIONS
ADULT LANGUAGE
WATCH WITH YOUR TEEN
4420
GENRES DRAMA
4415
MUSIC CLIPS
VIDEO CLIPS
CROUNCHING TIGER, HIDDEN...
ALL THE PRESIDENT'S MEN
CLEAR THIS LIST
MEDIA QUEUE: (2)
0:06
0:31
JOIN ROVI / SIGN IN
4410

FIG. 45

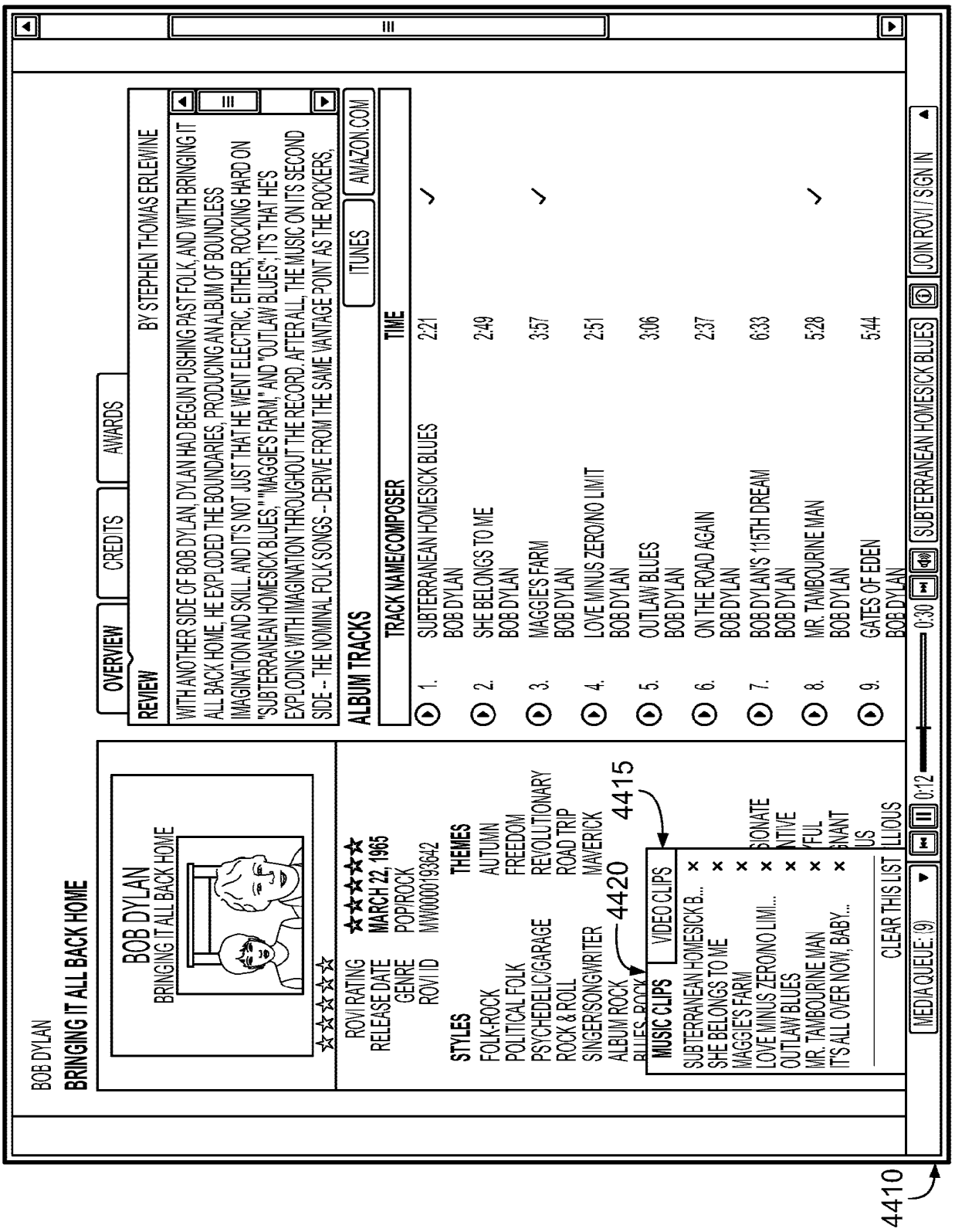

BOB DYLAN
BRINGING IT ALL BACK HOME
OVERVIEW
CREDITS
AWARDS
REVIEW
BY STEPHEN THOMAS ERLEWINE
WITH ANOTHER SIDE OF BOB DYLAN, DYLAN HAD BEGUN PUSHING PAST FOLK, AND WITH BRINGING IT ALL BACK HOME, HE EXPLODED THE BOUNDARIES, PRODUCING AN ALBUM OF BOUNDLESS IMAGINATION AND SKILL. AND IT'S NOT JUST THAT HE WENT ELECTRIC, EITHER, ROCKING HARD ON "SUBTERRANEAN HOMESICK BLUES," "MAGGIE'S FARM," AND "OUTLAW BLUES"; IT'S THAT HE'S EXPLODING WITH IMAGINATION THROUGHOUT THE RECORD. AFTER ALL, THE MUSIC ON ITS SECOND SIDE -- THE NOMINAL FOLK SONGS -- DERIVE FROM THE SAME VANTAGE POINT AS THE ROCKERS,
BOB DYLAN
BRINGING IT ALL BACK HOME
ROVI RATING
RELEASE DATE MARCH 22, 1965
GENRE POP/ROCK
ROVI ID MW0000193642
STYLES
FOLK-ROCK
POLITICAL FOLK
PSYCHEDELIC/GARAGE
ROCK & ROLL
SINGER/SONGWRITER
ALBUM ROCK
THEMES
AUTUMN
FREEDOM
REVOLUTIONARY
ROAD TRIP
MAVERICK
4420
4415
MUSIC CLIPS
VIDEO CLIPS
SUBTERRANEAN HOMESICK B...
SHE BELONGS TO ME
MAGGIE'S FARM
LOVE MINUS ZERO/NO LIMI...
OUTLAW BLUES
MR. TAMBOURINE MAN
IT'S ALL OVER NOW, BABY...
CLEAR THIS LIST
ALBUM TRACKS
ITUNES
AMAZON.COM
TRACK NAME/COMPOSER
TIME
1. SUBTERRANEAN HOMESICK BLUES 2:21
BOB DYLAN
2. SHE BELONGS TO ME 2:49
BOB DYLAN
3. MAGGIE'S FARM 3:57
BOB DYLAN
4. LOVE MINUS ZERO/NO LIMIT 2:51
BOB DYLAN
5. OUTLAW BLUES 3:06
BOB DYLAN
6. ON THE ROAD AGAIN 2:37
BOB DYLAN
7. BOB DYLAN'S 115TH DREAM 6:33
BOB DYLAN
8. MR. TAMBOURINE MAN 5:28
BOB DYLAN
9. GATES OF EDEN 5:44
BOB DYLAN
MEDIA QUEUE: (9)
0:12
0:30
SUBTERRANEAN HOMESICK BLUES
JOIN ROVI / SIGN IN
4410

FIG. 46

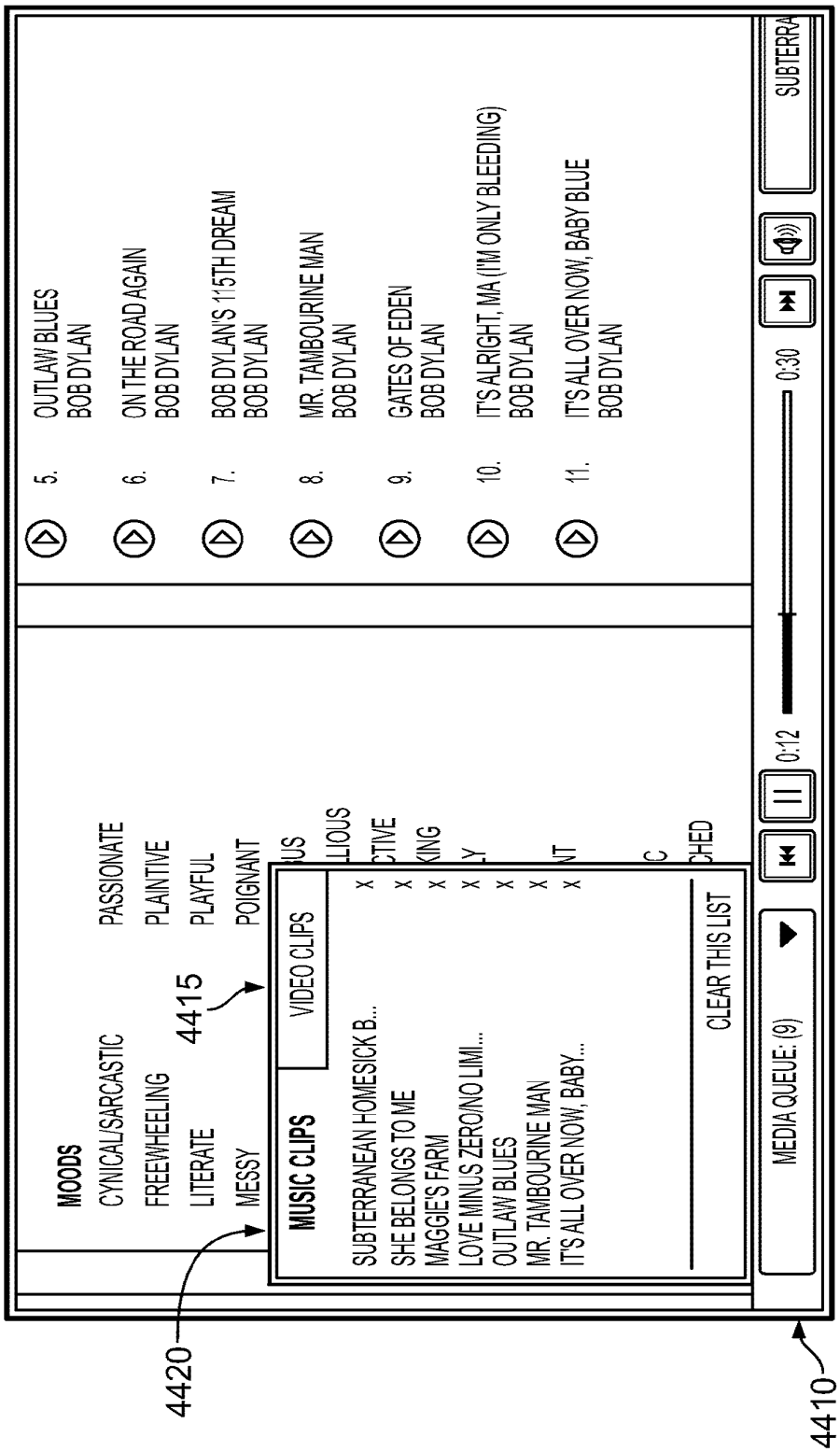

MOODS
CYNICAL/SARCASTIC
FREEWHEELING
LITERATE
MESSY
PASSIONATE
PLAINTIVE
PLAYFUL
POIGNANT
4415
MUSIC CLIPS
VIDEO CLIPS
SUBTERRANEAN HOMESICK B...
SHE BELONGS TO ME
MAGGIE'S FARM
LOVE MINUS ZERO/NO LIMI...
OUTLAW BLUES
MR. TAMBOURINE MAN
IT'S ALL OVER NOW, BABY...
CLEAR THIS LIST
MEDIA QUEUE: (9)
0:12
0:30
5. OUTLAW BLUES BOB DYLAN
6. ON THE ROAD AGAIN BOB DYLAN
7. BOB DYLAN'S 115TH DREAM BOB DYLAN
8. MR. TAMBOURINE MAN BOB DYLAN
9. GATES OF EDEN BOB DYLAN
10. IT'S ALRIGHT, MA (I'M ONLY BLEEDING) BOB DYLAN
11. IT'S ALL OVER NOW, BABY BLUE BOB DYLAN
SUBTERRA
4420
4410

FIG. 47

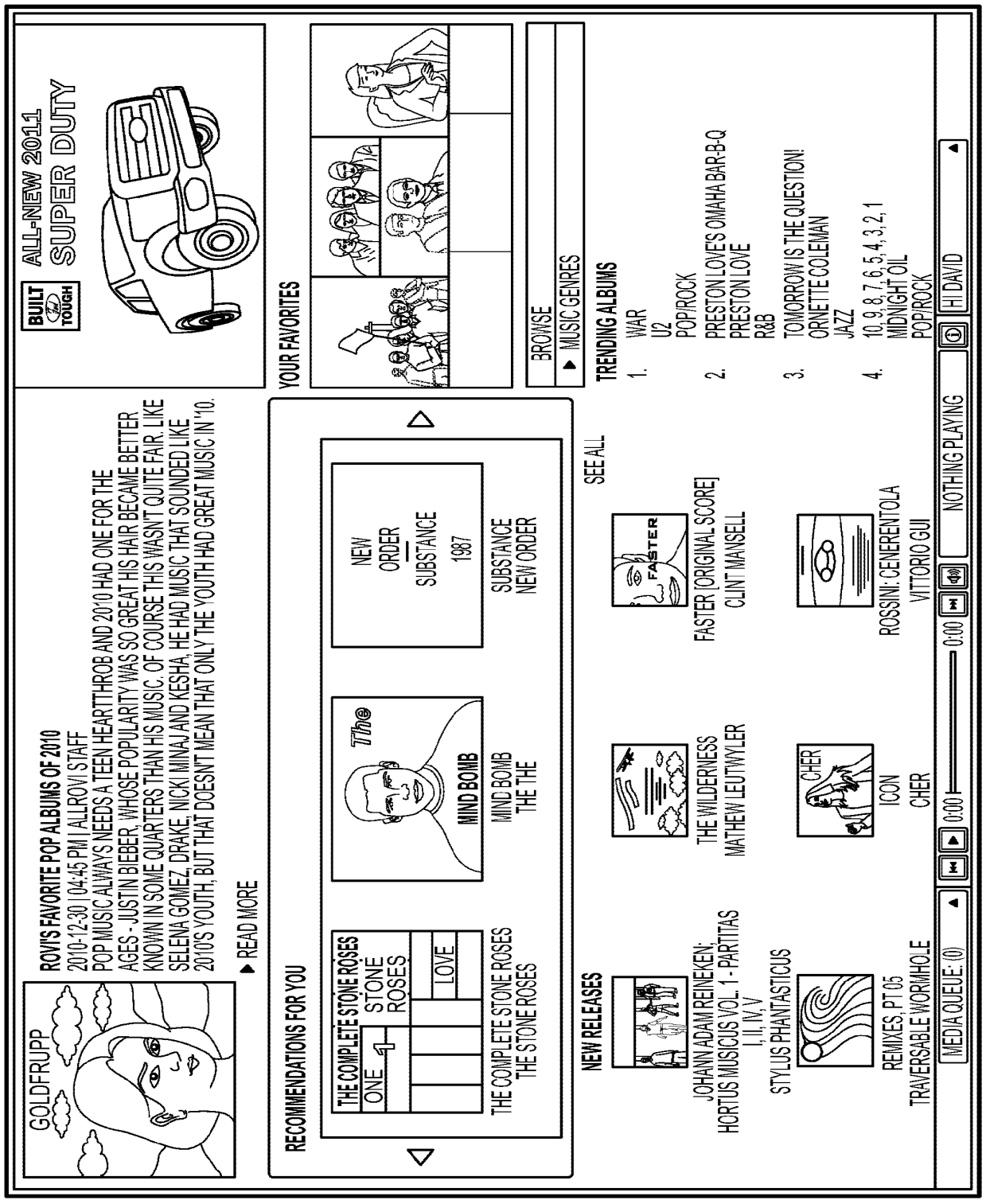

GOLDFRUPP
ROVI'S FAVORITE POP ALBUMS OF 2010
2010-12-30 | 04:45 PM | ALLROVI STAFF
POP MUSIC ALWAYS NEEDS A TEEN HEARTTHROB AND 2010 HAD ONE FOR THE AGES - JUSTIN BIEBER, WHOSE POPULARITY WAS SO GREAT HIS HAIR BECAME BETTER KNOWN IN SOME QUARTERS THAN HIS MUSIC. OF COURSE THIS WASN'T QUITE FAIR. LIKE SELENA GOMEZ, DRAKE, NICKI MINAJ AND KESHA, HE HAD MUSIC THAT SOUNDED LIKE 2010'S YOUTH, BUT THAT DOESN'T MEAN THAT ONLY THE YOUTH HAD GREAT MUSIC IN '10.
READ MORE
BUILT FORD TOUGH
ALL-NEW 2011
SUPER DUTY
RECOMMENDATIONS FOR YOU
THE COMPLETE STONE ROSES
ONE
STONE ROSES
LOVE
THE COMPLETE STONE ROSES
THE STONE ROSES
The
MIND BOMB
MIND BOMB
THE THE
NEW ORDER — SUBSTANCE 1987
SUBSTANCE
NEW ORDER
YOUR FAVORITES
BROWSE
MUSIC GENRES
NEW RELEASES
SEE ALL
JOHANN ADAM REINEKEN: HORTUS MUSICUS VOL. 1 - PARTITAS I, II, IV, V
THE WILDERNESS
MATHEW LEUTWYLER
FASTER
FASTER [ORIGINAL SCORE]
CLINT MANSELL
STYLUS PHANTASTICUS
REMIXES, PT 05
TRAVERSABLE WORMHOLE
CHER
ICON
CHER
ROSSINI: CENERENTOLA
VITTORIO GUI
TRENDING ALBUMS
1. WAR
U2
POP/ROCK
2. PRESTON LOVES OMAHA BAR-B-Q
PRESTON LOVE
R&B
3. TOMORROW IS THE QUESTION!
ORNETTE COLEMAN
JAZZ
4. 10, 9, 8, 7, 6, 5, 4, 3, 2, 1
MIDNIGHT OIL
POP/ROCK
MEDIA QUEUE: (0)
0:00
0:00
NOTHING PLAYING
HI DAVID

FIG. 48

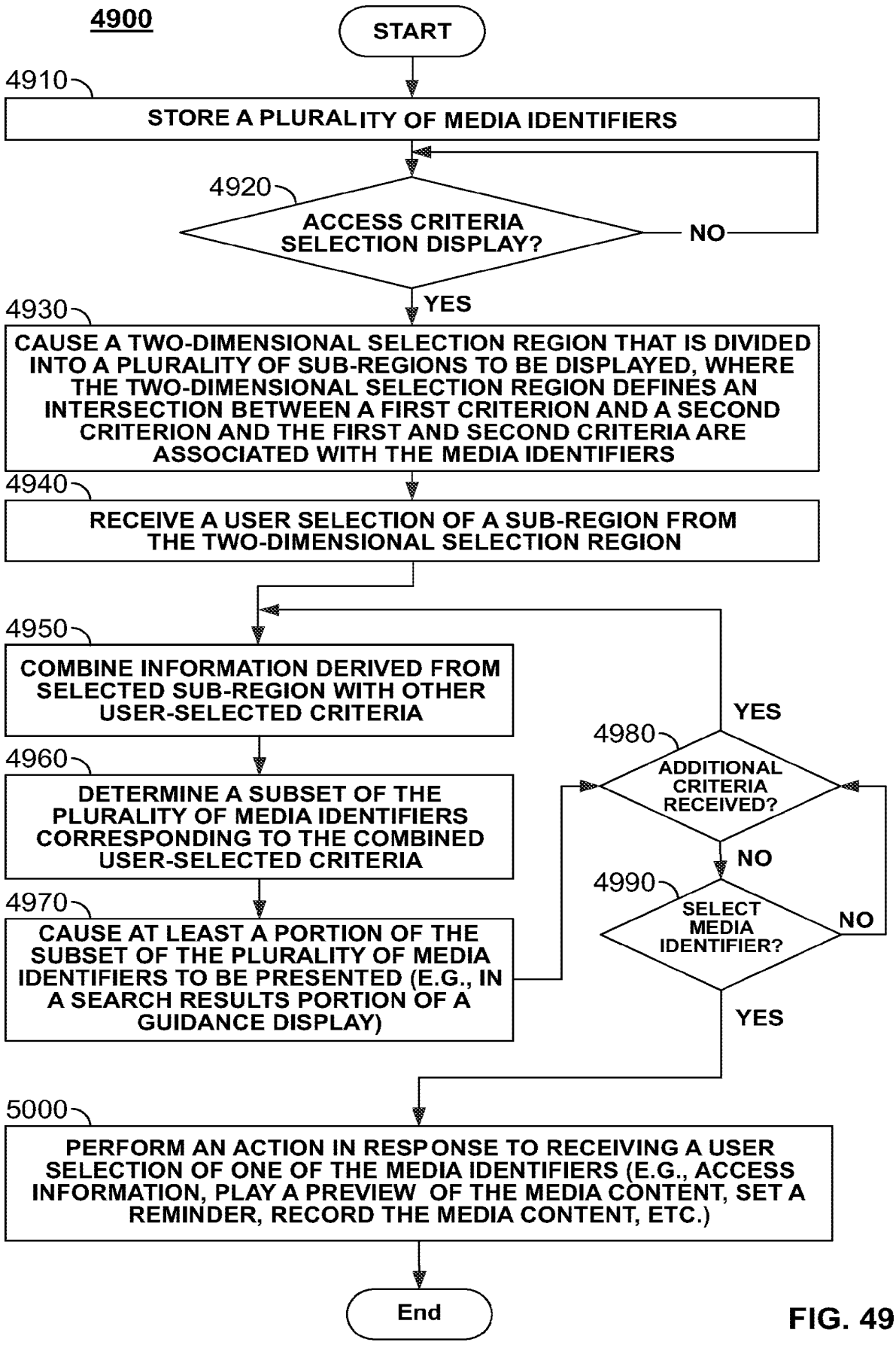

4900
START
4910
STORE A PLURALITY OF MEDIA IDENTIFIERS
4920
ACCESS CRITERIA SELECTION DISPLAY?
NO
YES
4930
CAUSE A TWO-DIMENSIONAL SELECTION REGION THAT IS DIVIDED INTO A PLURALITY OF SUB-REGIONS TO BE DISPLAYED, WHERE THE TWO-DIMENSIONAL SELECTION REGION DEFINES AN INTERSECTION BETWEEN A FIRST CRITERION AND A SECOND CRITERION AND THE FIRST AND SECOND CRITERIA ARE ASSOCIATED WITH THE MEDIA IDENTIFIERS
4940
RECEIVE A USER SELECTION OF A SUB-REGION FROM THE TWO-DIMENSIONAL SELECTION REGION
4950
COMBINE INFORMATION DERIVED FROM SELECTED SUB-REGION WITH OTHER USER-SELECTED CRITERIA
4960
DETERMINE A SUBSET OF THE PLURALITY OF MEDIA IDENTIFIERS CORRESPONDING TO THE COMBINED USER-SELECTED CRITERIA
4970
CAUSE AT LEAST A PORTION OF THE SUBSET OF THE PLURALITY OF MEDIA IDENTIFIERS TO BE PRESENTED (E.G., IN A SEARCH RESULTS PORTION OF A GUIDANCE DISPLAY)
4980
ADDITIONAL CRITERIA RECEIVED?
YES
NO
4990
SELECT MEDIA IDENTIFIER?
NO
YES
5000
PERFORM AN ACTION IN RESPONSE TO RECEIVING A USER SELECTION OF ONE OF THE MEDIA IDENTIFIERS (E.G., ACCESS INFORMATION, PLAY A PREVIEW OF THE MEDIA CONTENT, SET A REMINDER, RECORD THE MEDIA CONTENT, ETC.)
End

FIG. 49

```
<?xml version="1.0" encoding="ISO-8859-1" ?>

<music_data>
        <item1=track1>
                <artist>"John Lee Hooker"</artist>
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                <subgenre>country_blues, harmonic_blues</subgenre>
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FIG. 50

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(71) Applicant: **FLEXTRONICS AP, LLC** [US/US]; 6201 America Center Drive, San Jose, California 95134 (US).

(72) Inventor; and
(71) Applicant *(for US only)*: **ZHANG, Xin** [CN/CN]; No. 11 Jiangxi Road, Qingdao, Shandong 266071 (CN).

(72) Inventors: **SHOYKHER, Mikhail**; 32 Bentoak Crescent, Thornhill, Ontario L4J8S5 (CA). **MILANO, Eduardo Diego Torres**; 629 Marley Road, Burlington, Ontario L7T 3R8 (CA). **VISOSKY, John S.**; 11 Lady Diana Court, Gormley, Ontario L0H 1G0 (CA). **CHEN, Tong**; 19 Campden Place, Markham, Ontario L6C 2J4 (CA). **CAO, Zhe**; Hisense Key Lab, Jamdeo, No. 11 Jiangxi Road, Qingdao, Shandong 266071 (CN).

(74) Agent: **LIU, SHEN & ASSOCIATES**; A0601, Huibin Building, No.8 Beichen Dong Street, Chaoyang District, Beijing 100101 (CN).

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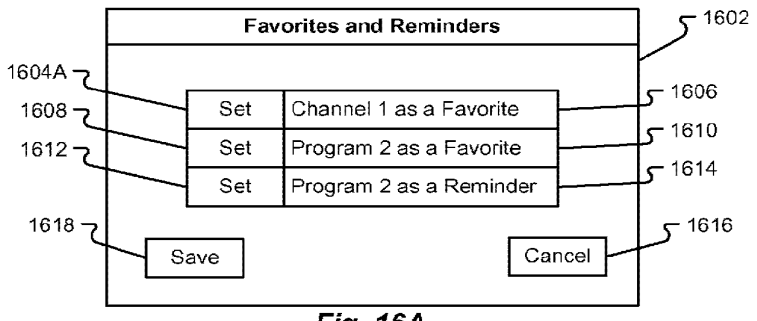


Fig. 16A

(57) Abstract: An intelligent TV is provided. The intelligent TV provides a management system for favorites and reminders. Selecting a program, associated with a television channel, allows a user to be presented with a list of options, such as making the program a favorite, the associated channel a favorite, or setting a reminder for programs of a like title, channel, and time.

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MANAGEMENT OF PROGRAM INFORMATION AND REMINDERS

CROSS REFERENCE TO RELATED APPLICATION

The present application claims the benefits of and priority, under 35 U.S.C. § 119(e), to U.S. Provisional Application Serial Nos. 61/684,672 filed August 17, 2012, "Smart TV"; 61/702,650 filed September 18, 2012, "Smart TV"; 61/697,710 filed September 6, 2012, "Social TV"; 61/700,182 filed September 12, 2012, "Social TV Roadmap"; 61/736,692 filed December 13, 2012, "SmartTV"; 61/798,821 filed March 15, 2013, "SmartTV"; 61/804,942 filed March 25, 2013, "SmartTV"; 61/804,998 filed March 25, 2013, "SmartTV"; 61/804,971 filed March 25, 2013, "SmartTV"; 61/804,990 filed March 25, 2013, "SmartTV"; 61/805,003 filed March 25, 2013, "SmartTV"; 61/805,053 filed March 25, 2013, "SmartTV"; 61/805,030 filed March 25, 2013, "SmartTV"; 61/805,027 filed March 25, 2013, "SmartTV"; 61/805,042 filed March 25, 2013, "SmartTV"; and 61/805,038 filed March 25, 2013, "SmartTV." Each of the aforementioned documents is incorporated herein by reference in their entirety for all that they teach and for all purposes.

BACKGROUND

Consolidation of device features or technological convergence is in an increasing trend. Technological convergence describes the tendency for different technological systems to evolve toward performing similar tasks. As people use more devices, the need to carry those devices, charge those devices, update software on those devices, etc. becomes more cumbersome. To compensate for these problems, technology companies have been integrating features from different devices into one or two multi-functional devices. For example, cellular phones are now capable of accessing the Internet, taking photographs, providing calendar functions, etc.

The consolidation trend is now affecting the design and functionality of devices generally used in the home. For example, audio receivers can access the Internet, digital video recorders can store or provide access to digital photographs, etc. The television in home audio/video systems remains a cornerstone device because the display function cannot be integrated into other devices. As such, consolidating home devices leads to integrating

features and functionality into the television. The emergence of the Smart Television (Smart TV) is evidence of the trend to consolidate functionality into the television.

A Smart TV is generally conceived as a device that integrates access to the Internet and Web 2.0 features into television sets. The Smart TV represents the trend of technological convergence between computers and television sets. The Smart TV generally focuses on online interactive media, Internet TV, on-demand streaming media, and generally does not focus on traditional broadcast media. Unfortunately, most Smart TVs have yet to provide seamless and intuitive user interfaces for navigating and/or executing the various features of the Smart TV. As such, there are still issues with the consolidation of features and the presentation of these features in Smart TVs.

SUMMARY

There is a need for an Intelligent TV with intuitive user interfaces and with seamless user interaction capability. These and other needs are addressed by the various aspects, embodiments, and/or configurations of the present disclosure. Also, while the disclosure is presented in terms of exemplary embodiments, it should be appreciated that individual aspects of the disclosure can be separately claimed.

The embodiments herein, include a method, comprising: presenting, on a television operable to present live television content, a programming guide, the programming guide, further comprising, a number of television channels and a number of programs associated with ones of the number of television channels; receiving a selection from a user indicating one of (a) a reminder and (b) a favorite; upon determining the selection indicates the reminder, searching the programming guide for matches between the first selected program and a number of future programs by determining equivalency of name and channel; upon determining that one of the number of future programs that match the first selected program will begin within a first predetermined time, displaying a reminder dialog; and removing the reminder dialog upon the reminder dialog receiving one of (a) a second user input selecting the one of the future programs to be presented by the television, (b) the second user input selecting a cancel operation, and (c) a signal indicating the occurrence of no user input within a second predetermined time.

In another embodiment, a television is disclosed, comprising: a processor to execute instructions; a data storage to store at least one of data and instructions; a network interface to receive television content information, the television content information further comprising, a programming guide with a number of television channels and a number of programs associated with ones of the number of television channels; and whereby the processor is further operable to (a) cause the television to present the programming guide, (b) receive a first user input associated with a first selected program of the number of programs, the first user input indicating a selection of one of (i) a reminder and (ii) a favorite; (c) search the programming guide for matches between the first selected program and a number of future programs by determining equivalency of name and channel; (d) upon determining that one of the number of future programs that match the first selected program will begin within a first predetermined time, display a reminder dialog; and (e) remove the reminder dialog upon the reminder dialog receiving one of (i) a second user input selecting the one of the future programs to be presented by the television, (ii) the second user input selecting a cancel operation, and (iii) a signal indicating the occurrence of no user input within a second predetermined time.

In another embodiment, a non-transitory medium is disclosed with instructions that when executed cause a machine to perform: presenting, on a television operable to present live television content, a programming guide, the programming guide, further comprising, a number of television channels and a number of programs associated with ones of the number of television channels; receiving a first user input associated with a first selected program of the number of programs, the first user input indicating a selection of one of (a) a reminder and (b) a favorite; searching the programming guide for matches between the first selected program and a number of future programs by determining equivalency of name and channel; upon determining that one of the number of future programs that match the first selected program will begin within a first predetermined time, displaying a reminder dialog; and removing the reminder dialog upon the reminder dialog receiving one of (a) a second user input selecting the one of the future programs to be presented by the television, (b) the second user input selecting a cancel operation, and (c) a signal indicating the occurrence of no user input within a second predetermined time.

The present disclosure can provide a number of advantages depending on the particular aspect, embodiment, and/or configuration. One advantage is the unified presentation of operations for reminders and favorites to a user.

These and other advantages will be apparent from the disclosure.

The phrases "at least one", "one or more", and "and/or" are open-ended expressions that are both conjunctive and disjunctive in operation. For example, each of the expressions "at least one of A, B and C", "at least one of A, B, or C", "one or more of A, B, and C", "one or more of A, B, or C" and "A, B, and/or C" means A alone, B alone, C alone, A and B together, A and C together, B and C together, or A, B and C together.

The term "a" or "an" entity refers to one or more of that entity. As such, the terms "a" (or "an"), "one or more" and "at least one" can be used interchangeably herein. It is also to be noted that the terms "comprising", "including", and "having" can be used interchangeably.

The term "automatic" and variations thereof, as used herein, refers to any process or operation done without material human input when the process or operation is performed. However, a process or operation can be automatic, even though performance of the process or operation uses material or immaterial human input, if the input is received before performance of the process or operation. Human input is deemed to be material if such input influences how the process or operation will be performed. Human input that consents to the performance of the process or operation is not deemed to be "material."

A "blog" (a blend of the term web log) is a type of website or part of a website supposed to be updated with new content from time to time. Blogs are usually maintained by an individual with regular entries of commentary, descriptions of events, or other material such as graphics or video. Entries are commonly displayed in reverse-chronological order.

A "blogging service" is a blog-publishing service that allows private or multi-user blogs with time-stamped entries.

The term "cable TV" refers to a system of distributing television programs to subscribers via radio frequency (RF) signals transmitted through coaxial cables or light pulses through fiber-optic cables. This contrasts with traditional broadcast television (terrestrial television) in which the television signal is transmitted over the air by radio waves and received by a television antenna attached to the television.

The term "channel" or "television channel," as used herein, can be a physical or virtual channel over which a television station or television network is distributed. A physical cannel in analog television can be an amount of bandwidth, typically 6, 7, or 8 MHz, that occupies a predetermine channel frequency. A virtual channel is a representation, in cable or satellite television, of a data stream for a particular television media provider (e.g., CDS, TNT, HBO, etc.).

The term "computer-readable medium," as used herein, refers to any tangible storage and/or transmission medium that participate in providing instructions to a processor for execution. Such a medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. Non-volatile media includes, for example, NVRAM, or magnetic or optical disks. Volatile media includes dynamic memory, such as main memory. Common forms of computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, or any other magnetic medium, magneto-optical medium, a CD-ROM, any other optical medium, punch cards, paper tape, any other physical medium with patterns of holes, a RAM, a PROM, and EPROM, a FLASH-EPROM, a solid state medium like a memory card, any other memory chip or cartridge, a carrier wave as described hereinafter, or any other medium from which a computer can read. A digital file attachment to e-mail or other self-contained information archive or set of archives is considered a distribution medium equivalent to a tangible storage medium. When the computer-readable media is configured as a database, it is to be understood that the database may be any type of database, such as relational, hierarchical, object-oriented, and/or the like. Accordingly, the disclosure is considered to include a tangible storage medium or distribution medium and prior art-recognized equivalents and successor media, in which the software implementations of the present disclosure are stored.

The term "enhanced television" (ETV) refers to a collection of specifications developed under the OpenCable project of CableLabs (Cable Television Laboratories, Inc.) that define an ETV Application consisting of resources (files) adhering to the Enhanced TV Binary Interchange Format (EBIF) content format as well as PNG images, JPEG images, and PFR downloadable fonts. An ETV application is normally delivered through an MPEG transport stream and accompanies an MPEG program containing video and audio elementary streams.

An "ETV Application" is a collection of resources (files) that include one or more EBIF resources that represent viewable information in the form of pages. Two forms of a given ETV Application may be distinguished: (1) an interchange form and (2) an execution form. The interchange form of an ETV Application consists of the resources (files) that represent the compiled application prior to its actual execution by an ETV User Agent. The execution form of an ETV Application consists of the stored, and possibly mutated forms of these resources while being decoded, presented, and executed by an ETV User Agent. An "ETV User Agent" is a software component that operates on a set-top box, a television, or any other computing environment capable of receiving, decoding, presenting, and processing an ETV Application. This component usually provides, along with its host hardware environment, one or more mechanisms for an end-user to navigate and interact with the multimedia content represented by ETV Applications.

The term "high-definition television" (HDTV) provides a resolution that is substantially higher than that of standard-definition television. HDTV may be transmitted in various formats, namely 1080p - 1920×1080p: 2,073,600 pixels (approximately 2.1 megapixels) per frame, 1080i (which is typically either 1920×1080i: 1,036,800 pixels (approximately 1 megapixel) per field or 2,073,600 pixels (approximately 2.1 megapixels) per frame or 1440×1080i:[1] 777,600 pixels (approximately 0.8 megapixels) per field or 1,555,200 pixels (approximately 1.6 megapixels) per frame), or 720p - 1280×720p: 921,600 pixels (approximately 0.9 megapixels) per frame. As will be appreciated, "frame size" in pixels is defined as number of horizontal pixels × number of vertical pixels, for example 1280 × 720 or 1920 × 1080. Often the number of horizontal pixels is implied from context and is omitted, as in the case of 720p and 1080p, "scanning system" is identified with the letter "p" for progressive scanning or "i" for interlaced scanning, and "frame rate" is identified as number of video frames per second. For interlaced systems an alternative form of specifying number of fields per second is often used. For purposes of this disclosure, "high-definition television" is deemed to include other high-definition analog or digital video formats, including ultra high definition television.

The term "internet television" (otherwise known as Internet TV, Online Television, or Online TV) is the digital distribution of television content via the Internet. It should not be

confused with Web television - short programs or videos created by a wide variety of companies and individuals, or Internet protocol television (IPTV) - an emerging internet technology standard for use by television broadcasters. Internet Television is a general term that covers the delivery of television shows and other video content over the internet by video streaming technology, typically by major traditional television broadcasters. It does not describe a technology used to deliver content (see Internet protocol television). Internet television has become very popular through services such as RTÉ Player in Ireland; BBC iPlayer, 4oD, ITV Player (also STV Player and UTV Player) and Demand Five in the United Kingdom; Hulu in the United States; Nederland 24 in the Netherlands; ABC iview and Australia Live TV in Australia; Tivibu in Turkey; and iWanTV! in the Philippines.

The term "internet protocol television" (IPTV) refers to a system through which television services are delivered using the Internet protocol suite over a packet-switched network such as the Internet, instead of being delivered through traditional terrestrial, satellite signal, and cable television formats. IPTV services may be classified into three main groups, namely live television, with or without interactivity related to the current TV show; time-shifted television: catch-up TV (replays a TV show that was broadcast hours or days ago), start-over TV (replays the current TV show from its beginning); and video on demand (VOD): browse a catalog of videos, not related to TV programming. IPTV is distinguished from Internet television by its on-going standardization process (e.g., European Telecommunications Standards Institute) and preferential deployment scenarios in subscriber-based telecommunications networks with high-speed access channels into end-user premises via set-top boxes or other customer-premises equipment.

The term "silo," as used herein, can be a logical representation of an input, source, or application. An input can be a device or devices (e.g., DVD, VCR, etc.) electrically connected to the television through a port (e.g., HDMI, video/audio inputs, etc.) or through a network (e.g., LAN WAN, etc.). Rather than a device or devices, the input could be configured as an electrical or physical connection to one or more devices. A source, particularly a content source, can be a data service that provides content (e.g., a media center, a file system, etc.). An application can be a software service that provides a particular type of function (e.g., Live TV, Video on Demand, User Applications, photograph display, etc.).

The silo, as a logical representation, can have an associated definition or property, such as a setting, feature, or other characteristic.

The term "panel," as used herein, can mean a user interface displayed in at least a portion of the display. The panel may be interactive (e.g., accepts user input) or informational (e.g., does not accept user input). A panel may be translucent whereby the panel obscures but does not mask the underlying content being displayed in the display. Panels may be provided in response to a user input from a button or remote control interface.

The term "screen," as used herein, refers to a physical structure that includes one or more hardware components that provide the device with the ability to render a user interface and/or receive user input. A screen can encompass any combination of gesture capture region, a touch sensitive display, and/or a configurable area. The device can have one or more physical screens embedded in the hardware. However a screen may also include an external peripheral device that may be attached and detached from the device. In embodiments, multiple external devices may be attached to the device. For example, another screen may be included with a remote control unit that interfaces with the Intelligent TV.

The term "media" of "multimedia," as used herein, refers to content that may assume one of a combination of different content forms. Multimedia can include one or more of, but is not limited to, text, audio, still images, animation, video, or interactivity content forms.

The term "Intelligent TV," as used herein, refers to a television configured to provide one or more intuitive user interfaces and interactions based on a unique application platform and architecture. The Intelligent TV utilizes processing resources associated with the television to integrate Internet connectivity with parallel application functionality. This integration allows a user the ability to intuitively access various sources of media and content (e.g., Internet, over-the-top content, on-demand streaming media, over-the-air broadcast media, and/or other forms of information) via the Intelligent TV in a quick and efficient manner. Although the Intelligent TV disclosed herein may comprise one or more components of a "smart TV," it is an aspect of the Intelligent TV to provide expanded intuitive user interaction capability for navigating and executing the various features of the television. A "smart TV," sometimes referred to as a connected TV, or hybrid TV (not to be confused with IPTV, Internet TV, or with Web TV), describes a trend of integration of the Internet and Web 2.0

features into television sets and set-top boxes, as well as the technological convergence between computers and these television sets/set-top boxes. The smart TV devices have a higher focus on online interactive media, Internet TV, over-the-top content, as well as on-demand streaming media, and less focus on traditional broadcast media than traditional television sets and set-top boxes. As can be appreciated, the Intelligent TV encompasses a broader range of technology than that of the smart TV defined above.

The term "television" is a telecommunication medium, device (or set) or set of associated devices, programming, and/or transmission for transmitting and receiving moving images that can be monochrome (black-and-white) or colored, with or without accompanying sound. Different countries use one of the three main video standards for TVs, namely PAL, NTSC or SECAM. Television is most commonly used for displaying broadcast television signals. The broadcast television system is typically disseminated via radio transmissions on designated channels in the 54–890 MHz frequency band. A common television set comprises multiple internal electronic circuits, including those for receiving and decoding broadcast signals. A visual display device which lacks a tuner is properly called a video monitor, rather than a television. A television may be different from other monitors or displays based on the distance maintained between the user and the television when the user watches the media and based on the inclusion of a tuner or other electronic circuit to receive the broadcast television signal.

The term "Live TV," as used herein, refers to a television production broadcast in real-time, as events happen, in the present.

The term "standard-definition television" (SDTV) is a television system that uses a resolution that is not considered to be either high-definition television (HDTV 720p and 1080p) or enhanced-definition television (EDTV 480p). The two common SDTV signal types are 576i, with 576 interlaced lines of resolution, derived from the European-developed PAL and SECAM systems; and 480i based on the American National Television System Committee NTSC system. In the US, digital SDTV is broadcast in the same 4:3 aspect ratio as NTSC signals. However, in other parts of the world that used the PAL or SECAM analog standards, standard-definition television is now usually shown with a 16:9 aspect ratio. Standards that support digital SDTV broadcast include DVB, ATSC and ISDB. Television

signals are transmitted in digital form, and their pixels have a rectangular shape, as opposed to square pixels that are used in modern computer monitors and modern implementations of HDTV. The table below summarizes pixel aspect ratios for various kinds of SDTV video signal. Note that the actual image (be it 4:3 or 16:9) is always contained in the center 704 horizontal pixels of the digital frame, regardless of how many horizontal pixels (704 or 720) are used. In case of digital video signal having 720 horizontal pixels, only the center 704 pixels contain actual 4:3 or 16:9 image, and the 8 pixel wide stripes from either side are called nominal analogue blanking and should be discarded before displaying the image. Nominal analogue blanking should not be confused with overscan, as overscan areas are part of the actual 4:3 or 16:9 image.

The term "video on demand (VOD)," as used herein, refers to systems and processes which allow users to select and watch/listen to video or audio content on demand. VOD systems may stream content, to view the content in real time, or download the content to a storage medium for viewing at a later time.

The term "satellite positioning system receiver" refers to a wireless receiver or transceiver to receive and/or send location signals from and/or to a satellite positioning system, such as the Global Positioning System ("GPS") (US), GLONASS (Russia), Galileo positioning system (EU), Compass navigation system (China), and Regional Navigational Satellite System (India).

The term "display," as used herein, refers to at least a portion of a screen used to display the output of the television to a user. A display may be a single-screen display or a multi-screen display, referred to as a composite display. A composite display can encompass the touch sensitive display of one or more screens. A single physical screen can include multiple displays that are managed as separate logical displays. Thus, different content can be displayed on the separate displays although part of the same physical screen.

The term "displayed image," as used herein, refers to an image produced on the display. A typical displayed image is a television broadcast or menu. The displayed image may occupy all or a portion of the display.

The term "display orientation," as used herein, refers to the way in which a rectangular display is oriented by a user for viewing. The two most common types of display orientation

are portrait and landscape. In landscape mode, the display is oriented such that the width of the display is greater than the height of the display (such as a 4:3 ratio, which is 4 units wide and 3 units tall, or a 16:9 ratio, which is 16 units wide and 9 units tall). Stated differently, the longer dimension of the display is oriented substantially horizontal in landscape mode while the shorter dimension of the display is oriented substantially vertical. In the portrait mode, by contrast, the display is oriented such that the width of the display is less than the height of the display. Stated differently, the shorter dimension of the display is oriented substantially horizontal in the portrait mode while the longer dimension of the display is oriented substantially vertical.

The term "module," as used herein, refers to any known or later developed hardware, software, firmware, artificial intelligence, fuzzy logic, or combination of hardware and software that is capable of performing the functionality associated with that element.

The terms "determine," "calculate" and "compute," and variations thereof, as used herein, are used interchangeably and include any type of methodology, process, mathematical operation or technique.

The term "touch screen" or "touchscreen" refer to screen that can receive user contact or other tactile input, such as a stylus. The touch screen may sense user contact in a number of different ways, such as by a change in an electrical parameter (e.g., resistance or capacitance), acoustic wave variations, infrared radiation proximity detection, light variation detection, and the like. In a resistive touch screen, for example, normally separated conductive and resistive metallic layers in the screen pass an electrical current. When a user touches the screen, the two layers make contact in the contacted location, whereby a change in electrical field is noted and the coordinates of the contacted location calculated. In a capacitive touch screen, a capacitive layer stores electrical charge, which is discharged to the user upon contact with the touch screen, causing a decrease in the charge of the capacitive layer. The decrease is measured, and the contacted location coordinates determined. In a surface acoustic wave touch screen, an acoustic wave is transmitted through the screen, and the acoustic wave is disturbed by user contact. A receiving transducer detects the user contact instance and determines the contacted location coordinates.

The term "web television" is original television content produced for broadcast via the

World Wide Web. Some major distributors of web television are YouTube, Myspace, Newgrounds, Blip.tv, and Crackle.

The terms "instant message" and "instant messaging" refer to a form of real-time text communication between two or more people, typically based on typed text.

The term "internet search engine" refers to a web search engine designed to search for information on the World Wide Web and FTP servers. The search results are generally presented in a list of results often referred to as SERPS, or "search engine results pages". The information may consist of web pages, images, information and other types of files. Some search engines also mine data available in databases or open directories. Web search engines work by storing information about many web pages, which they retrieve from the html itself. These pages are retrieved by a Web crawler (sometimes also known as a spider) — an automated Web browser which follows every link on the site. The contents of each page are then analyzed to determine how it should be indexed (for example, words are extracted from the titles, headings, or special fields called meta tags). Data about web pages are stored in an index database for use in later queries. Some search engines, such as Google™, store all or part of the source page (referred to as a cache) as well as information about the web pages, whereas others, such as AltaVista™, store every word of every page they find.

The terms "online community", "e-community", or "virtual community" mean a group of people that primarily interact via a computer network, rather than face to face, for social, professional, educational or other purposes. The interaction can use a variety of media formats, including wikis, blogs, chat rooms, Internet forums, instant messaging, email, and other forms of electronic media. Many media formats are used in social software separately or in combination, including text-based chatrooms and forums that use voice, video text or avatars.

The term "remote control" refers to a component of an electronics device, most commonly a television set, DVD player and/or home theater system for operating the device wirelessly, typically from a short line-of-sight distance. Remote control normally uses infrared and/or radio frequency (RF) signaling and can include WiFi, wireless USB, Bluetooth™ connectivity, motion sensor enabled capabilities and/or voice control. A

touchscreen remote control is a handheld remote control device which uses a touchscreen user interface to replace most of the hard, built-in physical buttons used in normal remote control devices.

The term "satellite TV" refers to television programming delivered by the means of communications satellites and received by an outdoor antenna, usually a parabolic reflector generally referred to as a satellite dish, and as far as household usage is concerned, a satellite receiver either in the form of an external set-top box or a satellite tuner module built into a TV set.

The term "social network service" is a service provider that builds online communities of people, who share interests and/or activities, or who are interested in exploring the interests and activities of others. Most social network services are web-based and provide a variety of ways for users to interact, such as e-mail and instant messaging services.

The term "social network" refers to a web-based social network.

The term "gesture" refers to a user action that expresses an intended idea, action, meaning, result, and/or outcome. The user action can include manipulating a device (e.g., opening or closing a device, changing a device orientation, moving a trackball or wheel, etc.), movement of a body part in relation to the device, movement of an implement or tool in relation to the device, audio inputs, etc. A gesture may be made on a device (such as on the screen) or with the device to interact with the device.

The term "gesture capture" refers to a sense or otherwise a detection of an instance and/or type of user gesture. The gesture capture can occur in one or more areas of the screen. A gesture region can be on the display, where it may be referred to as a touch sensitive display or off the display where it may be referred to as a gesture capture area.

The term "electronic address" refers to any contactable address, including a telephone number, instant message handle, e-mail address, Universal Resource Locator (URL), Universal Resource Identifier (URI), Address of Record (AOR), electronic alias in a database, like addresses, and combinations thereof.

It shall be understood that the term "means," as used herein, shall be given its broadest possible interpretation in accordance with 35 U.S.C., Section 112(f). Accordingly, a claim incorporating the term "means" shall cover all structures, materials, or acts set forth herein,

and all of the equivalents thereof. Further, the structures, materials or acts and the equivalents thereof shall include all those described in the summary of the invention, brief description of the drawings, detailed description, abstract, and claims themselves.

The preceding is a simplified summary of the disclosure to provide an understanding of some aspects of the disclosure. This summary is neither an extensive nor exhaustive overview of the disclosure and its various aspects, embodiments, and/or configurations. It is intended neither to identify key or critical elements of the disclosure nor to delineate the scope of the disclosure but to present selected concepts of the disclosure in a simplified form as an introduction to the more detailed description presented below. As will be appreciated, other aspects, embodiments, and/or configurations of the disclosure are possible utilizing, alone or in combination, one or more of the features set forth above or described in detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1A includes a first view of an embodiment of an environment of an intelligent television;

Fig. 1B includes a second view of an embodiment of an environment of an intelligent television;

Fig. 2A includes a first view of an embodiment of an intelligent television;

Fig. 2B includes a second view of an embodiment of an intelligent television;

Fig. 2C includes a third view of an embodiment of an intelligent television;

Fig. 2D includes a fourth view of an embodiment of an intelligent television;

Fig. 3 is a block diagram of an embodiment of the hardware of an intelligent television;

Fig. 4 is a block diagram of an embodiment of the intelligent television software and/or firmware;

Fig. 5 is a second block diagram of an embodiment of the intelligent television software and/or firmware;

Fig. 6 is a third block diagram of an embodiment of the intelligent television software and/or firmware;

FIG. 7 is a plan view of an embodiment of a handheld remote control;

Fig. 8 is a side view of an embodiment of a remote control;

Fig. 9A is a bottom view of an embodiment of a remote control with a joystick in a neutral position;

Fig. 9B is a bottom view of an embodiment of a remote control with the joystick in a lower position;

Fig. 9C is a bottom view of an embodiment of a remote control with the joystick in an upper position;

Fig. 10 is a plan view of another embodiment of a handheld remote control;

Fig. 11A is a front view of an embodiment of an Intelligent TV screen;

Fig. 11B is a front view of an embodiment of an Intelligent TV screen;

Fig. 11C is a front view of an embodiment of an Intelligent TV screen;

Fig. 12 is a block diagram of an embodiment of a handheld remote control of either Fig. 7 or 10;

Fig. 13 is a block diagram of an embodiment of a content data service;

Fig. 14 is a block diagram of an embodiment of a program management and reminder system;

Fig. 15 illustrates one embodiment of a channel displayed on intelligent TV;

Figs. 16A-16B illustrate one set of interactions upon a particular program, such as program 2 of Fig. 15;

Figs. 17A-17B illustrate a flowchart providing one embodiment of a process for managing favorites and reminders; and

Fig. 18 illustrates one embodiment of a reminder dialog.

In the appended figures, similar components and/or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label by a letter that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label.

DETAILED DESCRIPTION

Presented herein are embodiments of a device. The device can be a network-enabled telecommunications device, such as a television, an electronic visual display device, or other smart device. The device can include one or more screens, or sections of a screen, that are configured to receive and present information from a number of sources. Further, the device can receive user input in unique ways. The overall design and functionality of the device provides for an enhanced user experience making the device more useful and more efficient.

Intelligent Television (TV) Environment:

Referring to Figs. 1A and 1B, an Intelligent TV, or device, 100 is shown. It is anticipated that the Intelligent TV 100 may be used for entertainment, business applications, social interaction, content creation and/or consumption, and to organize and control one or more other devices that are in communication with the Intelligent TV 100. As can be appreciated, the Intelligent TV 100 can be used to enhance the user interactive experience whether at home or at work.

In some embodiments, the Intelligent TV 100 may be configured to receive and understand a variety of user and/or device inputs. For example, a user may interface with the Intelligent TV 100 via one or more physical or electrical controls, such as buttons, switches, touch sensitive screens/regions (e.g., capacitive touch, resistive touch, etc.), and/or other controls associated with the Intelligent TV 100. In some cases, the Intelligent TV 100 may include the one or more interactive controls. Additionally or alternatively, the one or more controls may be associated with a remote control. The remote control may communicate with the Intelligent TV 100 via wired and/or wireless signals. As can be appreciated, the remote control may operate via radio frequency (RF), infrared (IR), and/or a specific wireless communications protocol (e.g., Bluetooth™, Wi-Fi, etc.). In some cases, the controls, whether physical or electrical, may be configured (e.g., programmed) to suit a user's preferences.

Additionally or alternatively, smart phones, tablets, computers, laptops, netbooks, and other smart devices may be used to control the Intelligent TV 100. For example, control of the Intelligent TV 100 may be achieved via an application running on a smart device. The application may be configured to present a user with various Intelligent TV 100 controls in an intuitive user interface (UI) on a screen associated with the device 100. The screen may be

a touch sensitive, or touch screen, display. Selections input by a user via the UI may be configured to control the Intelligent TV 100 by the application accessing one or more communication features associated with the smart device.

It is anticipated that the Intelligent TV 100 can receive input via various input devices including, but in no way limited to, video, audio, radio, light, tactile, and combinations thereof. Among other things, these input devices may be configured to allow the Intelligent TV 100 to see, recognize, and react to user gestures. For instance, a user may talk to the Intelligent TV 100 in a conversational manner. The Intelligent TV 100 may hear and understand voice commands in a manner similar to a smart device's intelligent personal assistant and voice-controlled navigator application (e.g., Apple's Siri, Android's Skyvi, Robin, Iris, and other applications).

The Intelligent TV 100 may also be a communications device which can establish network connections 104 through many alternate means, including wired 108 or wireless 112 means, over cellular networks 116 to connect via cellular base antenna 142 to telephone networks operated by telephone company 146, and by using a telephone line 120 to connect to telephone networks operated by telephone company 146. These connections 104 enable the Intelligent TV 100 to access one or more communication networks 132. The communication networks may comprise any type of known communication medium or collection of communication media and may use any type of protocols to transport messages or signals between endpoints. The communication networks may include wired and/or wireless communication technologies. The Internet is an example of a communication network 132 that constitutes an Internet Protocol (IP) network consisting of many computers, computing networks, and other communication devices located all over the world, which are connected through many telephone systems and other means.

Other examples of the communication network 132 include, without limitation, a standard Plain Old Telephone System (POTS), an Integrated Services Digital Network (ISDN), the Public Switched Telephone Network (PSTN), a Local Area Network (LAN), a Wide Area Network (WAN), a cellular network, and any other type of packet-switched or circuit-switched network known in the art. In addition, it can be appreciated that the communication network 132 need not be limited to any one network type, and instead may be

comprised of a number of different networks and/or network types.

In some embodiments, the Intelligent TV 100 may be equipped with multiple communication means. The multiple communication means may allow the Intelligent TV 100 to communicate across Local Area Networks (LANs) 124, wireless local area networks (WLANs) 128, and other networks 132. The networks 132 may be connected in a redundant manner to ensure network access. In other words, if one connection is interrupted, the intelligent TV 100 can use an alternate communications path to reestablish and/or maintain the network connection 104. Among other things, the Intelligent TV 100 may use these network connections 104 to send and receive information, interact with an electronic program guide (EPG) 136, receive software updates 140, contact customer service 144 (e.g., to receive help or service, etc.), and/or access remotely stored digital media libraries 148. In addition, these connections can allow the Intelligent TV 100 to make phone calls, send and/or receive email messages, send and/or receive text messages (such as email and instant messages), surf the Internet using an internet search engine, post blogs by a blogging service, and connect/interact with social media sites and/or an online community (e.g., Facebook™, Twitter™, LinkedIn™, Pinterest™, Google+™, MySpace™, and the like) maintained by a social network service. In combination with other components of the Intelligent TV 100 described in more detail below, these network connections 104 also enable the Intelligent TV 100 to conduct video teleconferences, electronic meetings, and other communications. The Intelligent TV 100 may capture and store images and sound, using associated cameras, microphones, and other sensors. Additionally or alternatively, the Intelligent TV 100 may create and save screen shots of media, images, and data displayed on a screen associated with the Intelligent TV 100.

Further, as shown in Fig. 1B, the Intelligent TV 100 can interact with other electronic devices 168 by either by the wired 108 and/or wireless 112 connections. As described herein, components of the Intelligent TV 100 allow the device 100 to be connected to devices 168 including, but not limited to, DVD players 168a, BluRay players 168b, portable digital media devices 168c, smart phones 168d, tablet devices 168e, personal computers 168f, external cable boxes 168g, keyboards 168h, pointing devices 168i, printers 168j, game controllers and/or game pads 168k, satellite dishes 168l, external display devices 168m, and

other universal serial bus (USB), local area network (LAN), Bluetooth™, or high-definition multimedia interface (HDMI) compliant devices, and/or wireless devices. When connected to an external cable box 168g or satellite dish 168l, the Intelligent TV 100 can access additional media content. Also, as further described below, the Intelligent TV 100 is capable of receiving digital and/or analog signals broadcast by TV stations. The Intelligent TV 100 can be configured as one or more of a standard-definition television, enhanced television, and high-definition television. It may operate as one or more of cable, Internet, Internet Protocol, satellite, web, and/or smart television. The Intelligent TV 100 may also be used to control the operation of, and may interface with, other smart components such as security systems 172, door/gate controllers 176, remote video cameras 180, lighting systems 184, thermostats 188, refrigerators 192, and other appliances.

Intelligent TV:

Figs. 2A-2D illustrate components of the Intelligent TV 100. In general, as shown by Fig. 2A, the Intelligent TV 100 can be supported by a removable base or stand 204 that is attached to a frame 208. The frame 208 surrounds edges of a display screen 212, leaving a front surface of the display screen 212 uncovered. The display screen 212 may comprise a Liquid Crystal Display (LCD) screen, a plasma screen, Light Emitting Diode (LED) screen, or other screen types. In embodiments, the entire front surface of the screen 212 may be touch sensitive and capable of receiving input by the user touching the front surface of the screen 212.

The Intelligent TV 100 may include integrated speakers 216 and at least one microphone 220. A first area of the frame 208 may comprise a horizontal gesture capture region 224 and second areas comprise vertical gesture capture regions 228. The gesture capture regions 224, 228 may comprise areas or regions that are capable of receiving input by recognizing gestures made by the user, and in some examples, without the need for the user to actually touch the screen 212 surface of the Intelligent TV 100. However, the gesture capture regions 224, 228 may not include pixels that can perform a display function or capability.

One or more image capture devices 232, such as a camera, can be included for capturing still and/or video images. The image capture device 232 can include or be associated with additional elements, such as a flash or other light source 236 and a range finding device 240

to assist focusing of the image capture device. In addition, the microphone 220, gesture capture regions 224, 228, image capture devices 232, and the range finding device 240 may be used by the Intelligent TV 100 to recognize individual users. Additionally or alternatively, the Intelligent TV 100 may learn and remember preferences associated with the individual users. In some embodiments, the learning and remembering (i.e., identifying and recalling stored information) may be associated with the recognition of a user.

An IR transmitter and receiver 244 may also be provided to connect the Intelligent TV 100 with a remote control device (not shown) or other IR devices. Additionally or alternatively, the remote control device may transmit wireless signals via RF, light, and/or a means other than IR. Also shown in Fig. 2A is an audio jack 248, which may be hidden behind a panel that is hinged or removable. The audio jack 248 accommodates a tip, ring, sleeve (TRS) connector, for example, to allow the user to utilize headphones, a headset, or other external audio equipment.

The Intelligent TV 100 can also include a number of buttons 252. For example, Fig. 2A illustrates the buttons 252 on the top of the Intelligent TV 100, although the buttons could be placed at other locations. As shown, the Intelligent TV 100 includes six buttons 252a-f, which can be configured for specific inputs. For example, the first button 252a may be configured as an on/off button used to control overall system power to the Intelligent TV 100. The buttons 252 may be configured to, in combination or alone, control a number of aspects of the Intelligent TV 100. Some non-limiting examples include, but are not limited to, overall system volume, brightness, the image capture device, the microphone, and initiation/termination of a video conference. Instead of separate buttons, two of the buttons may be combined into a rocker button. This rocker button arrangement may be useful in situations where the buttons are configured to control features such as volume or brightness. In some embodiments, one or more of the buttons 252 are capable of supporting different user commands. By way of example, a normal press has a duration commonly of less than about 1 second and resembles a quick input. A medium press has a duration commonly of 1 second or more but less than about 12 seconds. A long press has a duration commonly of about 12 seconds or more. The function of the buttons is normally specific to the application that is active on the Intelligent TV 100. In the video conference application for

instance and depending on the particular button, a normal, medium, or long press can mean end the video conference, increase or decrease the volume, increase a rate speed associated with a response to an input, and toggle microphone mute. Depending on the particular button, a normal, medium, or long press can also control the image capture device 232 to increase zoom, decrease zoom, take a photograph, or record video.

In support of communications functions or capabilities, the Intelligent TV 100 can include one or more shared or dedicated antennae 256 and wired broadband connections 260 as shown in Fig. 2B. The antennae 256 also enable the Intelligent TV 100 to receive digital and/or analog broadcast TV channels. The wired broadband connections 260 are, for example, a Digital Subscriber Line (DSL), an optical line, an Ethernet port, an IEEE 1394 interface, or other interfaces. The Intelligent TV 100 also has a telephone line jack 262 to further provide communications capability.

In addition to the removable base 204, the Intelligent TV 100 may include hardware and mounting points 264 on a rear surface to facilitate mounting the Intelligent TV 100 to a surface, such as a wall. In one example, the Intelligent TV 100 may incorporate at least one Video Equipment Standards Association (VESA) mounting interface for attaching the device 100 to the surface.

As shown in Fig. 2C, the Intelligent TV 100 may include docking interfaces or ports 268. The docking ports 268 may include proprietary or universal ports to support the interconnection of the Intelligent TV 100 to other devices or components, which may or may not include additional or different capabilities from those integral to the Intelligent TV 100. In addition to supporting an exchange of communication signals between the Intelligent TV 100 and a connected device or component, the docking ports 268 can support the supply of power to the connected device or component. The docking ports 268 can also comprise an intelligent element that comprises a docking module for controlling communications or other interactions between the Intelligent TV 100 and the connected device or component.

The Intelligent TV 100 also includes a number of card slots 272 and network or peripheral interface ports 276. The card slots 272 may accommodate different types of cards including subscriber identity modules (SIM), secure digital (SD) cards, MiniSD cards, flash memory cards, and other cards. Ports 276 in embodiments may include input/output

(I/O) ports, such as universal serial bus (USB) ports, parallel ports, game ports, and high-definition multimedia interface (HDMI) connectors.

An audio/video (A/V) I/O module 280 can be included to provide audio to an interconnected speaker or other device, and to receive audio input from a connected microphone or other device. As an example, the audio input/output interface 280 may comprise an associated amplifier and analog-to-digital converter.

Hardware Features:

Fig. 3 illustrates components of a Intelligent TV 100 in accordance with embodiments of the present disclosure. In general, the Intelligent TV 100 includes a primary screen 304. Screen 304 can be a touch sensitive screen and can include different operative areas.

For example, a first operative area, within the screen 304, may comprise a display 310. In some embodiments, the display 310 may be touch sensitive. In general, the display 310 may comprise a full color, display.

A second area within the screen 304 may comprise a gesture capture region 320. The gesture capture region 320 may comprise an area or region that is outside of the display 310 area, and that is capable of receiving input, for example in the form of gestures provided by a user. However, the gesture capture region 320 does not include pixels that can perform a display function or capability.

A third region of the screen 304 may comprise a configurable area 312. The configurable area 312 is capable of receiving input and has display or limited display capabilities. In embodiments, the configurable area 312 may present different input options to the user. For example, the configurable area 312 may display buttons or other relatable items. Moreover, the identity of displayed buttons, or whether any buttons are displayed at all within the configurable area 312 of a screen 304, may be determined from the context in which the Intelligent TV 100 is used and/or operated.

In an exemplary touch sensitive screen 304 embodiment, the touch sensitive screen 304 comprises a liquid crystal display extending across at least those regions of the touch sensitive screen 304 that are capable of providing visual output to a user, and a capacitive input matrix over those regions of the touch sensitive screen 304 that are capable of receiving input from the user.

One or more display controllers 316 may be provided for controlling the operation of the screen 304. The display controller 316 may control the operation of the touch sensitive screen 304, including input (touch sensing) and output (display) functions. The display controller 316 may also control the operation of the screen 304 and may interface with other inputs, such as infrared and/or radio input signals (e.g., door/gate controllers, alarm system components, etc.). In accordance with still other embodiments, the functions of a display controller 316 may be incorporated into other components, such as a processor 364.

The processor 364 may comprise a general purpose programmable processor or controller for executing application programming or instructions. In accordance with at least some embodiments, the processor 364 may include multiple processor cores, and/or implement multiple virtual processors. In accordance with still other embodiments, the processor 364 may include multiple physical processors. As a particular example, the processor 364 may comprise a specially configured application specific integrated circuit (ASIC) or other integrated circuit, a digital signal processor, a controller, a hardwired electronic or logic circuit, a programmable logic device or gate array, a special purpose computer, or the like. The processor 364 generally functions to run programming code or instructions implementing various functions of the Intelligent TV 100.

In support of connectivity functions or capabilities, the Intelligent TV 100 can include a module for encoding/decoding and/or compression/decompression 366 for receiving and managing digital television information. Encoding/decoding compression/decompression module 366 enables decompression and/or decoding of analog and/or digital information dispatched by a public television chain or in a private television network and received across antenna 324, I/O module 348, wireless connectivity module 328, and/or other wireless communications module 332. The television information may be sent to screen 304 and/or attached speakers receiving analog or digital reception signals. Any encoding/decoding and compression/decompression is performable on the basis of various formats (e.g., audio, video, and data). Encrypting module 368 is in communication with encoding/decoding compression/decompression module 366 and enables the confidentiality of all the data received or transmitted by the user or supplier.

In support of communications functions or capabilities, the Intelligent TV 100 can

include a wireless connectivity module 328. As examples, the wireless connectivity module 328 can comprise a GSM, CDMA, FDMA and/or analog cellular telephony transceiver capable of supporting voice, multimedia and/or data transfers over a cellular network. Alternatively or in addition, the Intelligent TV 100 can include an additional or other wireless communications module 332. As examples, the other wireless communications module 332 can comprise a Wi-Fi, Blutooth™, WiMax, infrared, or other wireless communications link. The wireless connectivity module 328 and the other wireless communications module 332 can each be associated with a shared or a dedicated antenna 324 and a shared or dedicated I/O module 348.

An input/output module 348 and associated ports may be included to support communications over wired networks or links, for example with other communication devices, server devices, and/or peripheral devices. Examples of an input/output module 348 include an Ethernet port, a Universal Serial Bus (USB) port, Thunderbolt™ or Light Peak interface, Institute of Electrical and Electronics Engineers (IEEE) 1394 port, or other interface.

An audio input/output interface/device(s) 344 can be included to provide analog audio to an interconnected speaker or other device, and to receive analog audio input from a connected microphone or other device. As an example, the audio input/output interface/device(s) 344 may comprise an associated amplifier and analog-to-digital converter. Alternatively or in addition, the Intelligent TV 100 can include an integrated audio input/output device 356 and/or an audio jack for interconnecting an external speaker or microphone. For example, an integrated speaker and an integrated microphone can be provided, to support near talk or speaker phone operations.

A port interface 352 may be included. The port interface 352 may include proprietary or universal ports to support the interconnection of the device 100 to other devices or components, such as a dock, which may or may not include additional or different capabilities from those integral to the device 100. In addition to supporting an exchange of communication signals between the device 100 and another device or component, the docking port 136 and/or port interface 352 can support the supply of power to or from the device 100. The port interface 352 also comprises an intelligent element that comprises a

docking module for controlling communications or other interactions between the Intelligent TV 100 and a connected device or component. The docking module may interface with software applications that allow for the remote control of other devices or components (e.g., media centers, media players, and computer systems).

An Intelligent TV 100 may also include memory 308 for use in connection with the execution of application programming or instructions by the processor 364, and for the temporary or long term storage of program instructions and/or data. As examples, the memory 308 may comprise RAM, DRAM, SDRAM, or other solid state memory. Alternatively or in addition, data storage 314 may be provided. Like the memory 308, the data storage 314 may comprise a solid state memory device or devices. Alternatively or in addition, the data storage 314 may comprise a hard disk drive or other random access memory.

Hardware buttons 358 can be included for example for use in connection with certain control operations. One or more image capture interfaces/devices 340, such as a camera, can be included for capturing still and/or video images. Alternatively or in addition, an image capture interface/device 340 can include a scanner, code reader, or motion sensor. An image capture interface/device 340 can include or be associated with additional elements, such as a flash or other light source. The image capture interfaces/devices 340 may interface with a user ID module 350 that assists in identifying users of the Intelligent TV 100.

The Intelligent TV 100 can also include a global positioning system (GPS) receiver 336. In accordance with embodiments of the present invention, the GPS receiver 336 may further comprise a GPS module that is capable of providing absolute location information to other components of the Intelligent TV 100. As will be appreciated, other satellite-positioning system receivers can be used in lieu of or in addition to GPS.

Power can be supplied to the components of the Intelligent TV 100 from a power source and/or power control module 360. The power control module 360 can, for example, include a battery, an AC-to-DC converter, power control logic, and/or ports for interconnecting the Intelligent TV 100 to an external source of power.

Communication between components of the Intelligent TV 100 is provided by bus 322. Bus 322 may comprise one or more physical buses for control, addressing, and/or data

transmission. Bus 322 may be parallel, serial, a hybrid thereof, or other technology.

Firmware and Software:

An embodiment of the software system components and modules 400 is shown in Fig. 4. The software system 400 may comprise one or more layers including, but not limited to, an operating system kernel 404, one or more libraries 408, an application framework 412, and one or more applications 416. The one or more layers 404-416 can communicate with each other to perform functions for the Intelligent TV 100.

An operating system (OS) kernel 404 contains the primary functions that allow the software to interact with hardware associated with the Intelligent TV 100. Kernel 404 can include a collection of software that manages the computer hardware resources and provides services for other computer programs or software code. The operating system kernel 404 is the main component of the operating system and acts as an intermediary between the applications and data processing done with the hardware components. Part of the operating system kernel 404 can include one or more device drivers 420. A device driver 420 can be any code within the operating system that helps operate or control a device or hardware attached to or associated with the Intelligent TV. The driver 420 can include code for operating video, audio, and/or other multimedia components of the Intelligent TV 100. Examples of drivers include display, camera, flash, binder (IPC), keypad, WiFi, and audio drivers.

Library 408 can contain code or other components that may be accessed and implemented during the operation of the software system 400. The library 408 may contain one or more of, but is not limited to, an operating system runtime library 424, a TV services hardware abstraction layer (HAL) library 428, and/or a data service library 432. The OS runtime library 424 may contain the code required by the operating system kernel 404 or other operating system functions to be executed during the runtime of the software system 400. The library can include the code that is initiated during the running of the software system 400.

The TV services hardware abstraction layer library 428 can include code required by TV services either executed in the application framework 412 or an application 416. The TV services HAL library 428 is specific to the Intelligent TV 100 operations that control different

functions of the Intelligent TV. The TV service HAL library 428 can also be formed from other types of application languages or embodiments of different types of code or formats for code beyond the hardware abstraction layer.

The data services library 432 can include the one or more components or codes to implement components for the data services function. The data services function can be implemented in the application framework 412 and/or applications layer 416. An embodiment of a function of the data services and the type of components that may be included is shown in Fig. 6.

The application framework 412 can include a general abstraction for providing functionality that can be selected by one or more applications 416 to provide specific application functions or software for those applications. Thus, the framework 412 can include one or more different services, or other applications, that can be accessed by the applications 416 to provide general functions across two or more applications. Such functions include, for example, management of one or more of windows or panels, surfaces, activities, content, and resources, The application framework 412 can include one or more, but is not limited to, TV services 434, TV services framework 440, TV resources 444, and user interface components 448.

The TV services framework 440 can provide an additional abstraction for different TV services. TV services framework 440 allows for the general access and function of services that are associated with the TV functionality. The TV services 436 are general services provided within the TV services framework 440 that can be accessed by applications in the applications layer 416. The TV resources 444 provide code for accessing TV resources 444 including any types of storage, video, audio, or other functionality provided with the Intelligent TV 100. The TV resources 444, TV services 436, and TV services framework 440 provide for the different implementations of TV functionality that may occur with the Intelligent TV 100.

One or more user interface components 448 can provide general components for display of the Intelligent TV 100. The user interface components 448 might be general components that may be accessed by different applications provided in the application framework 412. The user interface components 448 may be accessed to provide for panels and silos as

described in conjunction with Fig. 5.

The applications layer 416 can both contain and execute applications associated with the Intelligent TV 100. Applications layer 416 may include one or more of, but is not limited to, a live TV application 452, a video on demand application 456, a media center application 460, an application center application 464, and a user interface application 468. The live TV application 452 can provide live TV over different signal sources. For example, the live TV application 452 can provide TV from input from cable television, over air broadcasts, from satellite services, or other types of live TV services. Live TV application 452 may then present the multimedia presentation or video and audio presentation of the live television signal over the display of the Intelligent TV 100.

The video on demand application 456 can provide for video from different storage sources. Unlike Live TV application 452, video on demand 456 provides for display of videos that are accessed from some memory source. The sources of the video on demand can be associated with users or with the Intelligent TV or some other type of service. For example, the video on demand 456 may be provided from an iTunes library stored in a cloud, from a local disc storage that contains stored video programs, or from some other source.

The media center application 460 can provide applications for different types of media presentation. For example, the media center 460 can provide for displaying pictures or audio that is different from, but still accessible by the user and different from live TV or video on demand. The media center 460 allows for the access of different sources to obtain the media in the display of such media on the Intelligent TV 100.

The application center 464 allows for the provision, storage and use of applications. An application can be a game, a productivity application, or some other application generally associated with computer systems or other devices, but may be operated within the Intelligent TV. An application center 464 may obtain these applications from different sources, store them locally and then execute those types of applications for the user on the Intelligent TV 100.

User interface application 468 provides for the specific user interfaces associated with the Intelligent TV 100. These user interfaces can include the silos and panels that are described in Fig. 5. An embodiment of the user interface software 500 is shown in Fig. 5.

Here the application framework 412 contains one or more code components which help control the user interface events while one or more applications in the applications layer 416 affects the user interface use for the Intelligent TV 100. The application framework 412 can include a silo transition controller 504 and/or an input event dispatcher 508. There may be more or fewer code components in the application framework 412 than those shown in Fig. 5. The silo transition controller 504 contains the code and language that manages the transitions between one or more silos. A silo can be a vertical user interface feature on the Intelligent TV that contains information for user. The transition controller 504 can manage the changes between two silos when an event occurs in the user interface. The input event dispatcher 508 can receive user interface events that may be received from the operating system and provided to the input event dispatcher 508. These events can include selections of buttons on a remote control or on the TV or other types of user interface inputs. The input event dispatcher 508 may then send these events to a silo manager 532 or panel manager 536 depending on the type of the event. The silo transition controller 504 can interface with the silo manager 532 to affect changes in the silos.

The applications layer 416 can include a user interface application 468 and/or a silo application 512. The applications layer 416 can include more or fewer user interface applications as necessary to control the user interface of the Intelligent TV 100 than those shown in Fig. 5. The user interface application 468 can include a silo manager 532, a panel manager 536, and one or more types of panels 516-528. The silo manager 532 manages the display and/or features of silos. The silo manager 532 can receive or send information from the silo transition controller 504 or the input event dispatcher 508 to change the silos displayed and/or to determine types of input received in the silos.

A panel manager 536 is operable to display panels in the user interface to manage transitions between those panels or to affect user interface inputs received in the panel. The panel manager 536 may thus be in communication with different user interface panels such as a global panel 516, a volume panel 520, a settings panel 524, and/or a notification panel 528. The panel manager 536 can display these types of panels depending on the inputs received from the input event dispatcher 508. The global panel 516 may include information that is associated with the home screen or top level hierarchal information for the user. A volume

panel 520 may display information about an audio volume control or other settings for volume. A settings panel 524 can include information displayed about the settings of the audio or video, or other settable characteristics of the Intelligent TV 100. A notification panel 528 can provide information about notifications to a user. These notifications can be associated with information, such as, video on demand displays, favorites, currently provided programs, or other information. Notifications can be associated with the media or with some type of setting, or operation or the Intelligent TV 100. The panel manager 536 may be in communication with the panel controller 552 of the silo application 512.

The panel controller 552 may operate to control portions of the panels of the types described previously. Thus, the panel controller 552 may be in communication with a top panel application 540, an application panel 544, and/or bottom panel 548. These types of panels may be differently displayed in the user interface of the Intelligent TV 100. The panel control thus may be based on the configuration of the system or the type of display being used currently, put the types of panels 516-528 into a certain display orientation governed by the top panel application 540, application panel 544, or bottom panel application 548.

An embodiment of the data service 432 and the operation of the data management is shown in Fig. 6. The data management 600 can include one or more code components that are associated with different types of data. For example, there may be code components within the data service 432 that execute and are associated with video on demand, the electronic program guide, or media data. There may be more or fewer types of data service 432 components than those shown in Fig. 6. Each of the different types of data may include a data model 604-612. The data models govern what information is to be stored and how that information will be stored by the data service. Thus, the data model can govern regardless of where the data comes from, how the data will be received or managed within the Intelligent TV system. Thus, the data model 604, 608, and/or 612, can provide a translation ability or affect the ability to translate data from one form to another to be used by the Intelligent TV 100.

The different types of data services (video on demand, electronic programming guide, media) each have a data subservice 620, 624, and/or 628 that is in communication with one or

more internal and/or external content providers 616. The data subservices 620, 624, and 628 that communicate with the content providers 616 to obtain data that may then be stored in databases 632, 636, and 640. The subservices 620, 624, and 628 may communicate with and initiate or enable one or more source plug-ins 644, 648, and 652 to communicate with the content provider. For each content provider 616, there may be a different source plug-in 644, 648, and 652. Thus, if there is more than one source of content for the data, each of the data subservices 620, 624, and 628 may determine and then enable or initiate a different source plug-in 644, 648, and/or 652. The content providers 616 may also provide information to a resource arbitrator 656 and/or thumbnail cache manager 660. The resource arbitrator 656 may operate to communicate with resources 664 that are external to the data service 432. Thus, the resource arbitrator 656 may communicate with cloud based storage, network based storage, or other types of external storage in the resources 664. This information may then be provided through the content provider module 616 to the data subservices 620, 624, 628. Likewise, a thumbnail cache manager 660 may obtain thumbnail information from one of the data subservices 620, 624, 628 and store that information in the thumbnails database 668. Further, the thumbnail cache manager 660 may extract or retrieve that information from the thumbnails database 668 to provide to one of the data subservices 620, 624, 628.

An exemplary content aggregation architecture 1300 is shown in Fig. 13. The architecture can include a user interface layer 1304 and a content aggregation layer 1308. The user interface layer 1304 may include a TV application 1312, media player 1316, and application(s) 1320. The TV application 1312 enables the viewer to view channels received via an appropriate transmission medium, such as cable, satellite, and/or the Internet. The media player 1316 views other types of media received via an appropriate transmission medium, such as the Internet. The application(s) 1320 include other TV-related (pre-installed) applications, such as content viewing, content searching, device viewing, and setup algorithms, and coordinates with the media player 1316 to provide information to the viewer.

The content source layer 1308 includes, as data services, a content source service 1328, a content aggregation service 1332 and a content presentation service 1336. The content

source service 1328 can manage content source investigators, including local and/or network file system(s), digital network device manager (which discovers handheld and non-handheld devices (e.g., digital media servers, players, renderers, controllers, printers, uploaders, downloaders, network connectivity functions, and interoperability units) by known techniques, such as a multicast universal plug and play or UPnP discovery techniques, and, for each discovered device, retrieves, parses, and encodes device descriptors, notifies the content source service of the newly discovered device, and provides information, such as an index, on previously discovered devices), Internet Protocol Television or IPTV, digital television or DTV (including high definition and enhanced TV), third party services (such as those referenced above), and applications (such as Android applications).

Content source investigators can track content sources and are typically configured as binaries. The content source service 1328 starts content source investigators and maintains open and persistent channels for communications. The communications include query or command and response pairs. The content aggregation service 1332 can manage content metadata fetchers, such as for video, audio, and/or picture metadata. The content presentation service 1336 may provide interfaces to the content index 1340, such as an Android application interface and digital device interfaces.

The content source service 1328 can send and receive communications 1344 to and from the content aggregation service 1332. The communications can include notifications regarding new and removed digital devices and/or content and search queries and results. The content aggregation service 1332 can send and receive communications 1348 to and from the content presentation service 1336 including device and/or content lookup notifications, content-of-interest advisories and notifications, and search queries and results.

When a search is performed, particularly when the user is searching or browsing content, a user request may be received from the user interface layer 1300, by the content presentation service 1336, which responsively opens a socket and sends the request to the content aggregation service 1332. The content aggregation service 1332 first returns results from the local database 1340. The local database 1340 includes an index or data model and indexed metadata. The content source service 1328 further issues search and browse requests for all content source investigators and other data management systems. The

results are forwarded to the content aggregation service 1332, which updates the database 1340 to reflect the further search results and provides the original content aggregation database search results and the data updates, reflecting the additional content source service search results, over the previously opened socket to the content presentation service 1336. The content presentation service 1336 then provides the results to one or more components in the user interface layer 1300 for presentation to the viewer. When the search session is over (e.g., the search session is terminated by the user or by an action associated with user), the user interface layer 1300 disconnects the socket. As shown, media can be provided directly by the content aggregation service 1332 to the media player 1316 for presentation to the user.

Remote Control:

A handheld remote control can be provided to enable user interaction with the Intelligent TV 100. An exemplary handheld remote control is shown in Figs. 7-9. The remote control 700 can include one or more of, but is not limited to, top, side and bottom housings 704, 708, and 712, an (on/off) power button 716, an input source button 720 (to select input source such as Live TV, video on demand, media center, application center, high definition multimedia interface or HDMI, component or COMP, audio/Video or A/V, digital or analog television or DTV/ATV, and video graphics array (VGA)), a (volume) mute button 724, a Live TV button 728 (to activate or select the Live TV silo), a video on demand (VOD) button 732 (to activate or select the video on demand silo), a media center button 736 (to activate or select the media center application or silo, which access various types of media such as music, TV programming, videos, and the like), an application center button 740 (to activate or select the application center application or silo), a global panel button 744, an application panel button 748, a back button 752 (to select a prior user operation or Intelligent TV state and/or navigate up a hierarchy of any displayed image or object(s) (in which case the back button 752 does not navigate within application panels or across application silos), a play button 756 (to play or pause media), a D-pad 760 (which includes north, east, west, and south directional arrows to navigate among displayed images and/or move between levels of an application's or object's hierarchy such as application view navigation, panel navigation, and collection navigation), an OK (or select) button 764 (to select a highlighted displayed image (such as displayed speed control, rewind, forward, play, and pause objects and/or objects on menu

bar or in a menu box) and/or navigate down a hierarchy of any displayed image or object(s)), a rocker-type volume-up and volume-down button 768 (to adjust the volume), a menu/guide button 772 (to select for display a menu or guide of programming), a 0-9 (number) button 776 (to display a number pad on the TV screen), a settings button 780 (which launches an application to access current and change TV settings (such as channel settings and settings used to adjust picture and sound effects (e.g., image mode (e.g., standard, playground, game, cinema, concert, and studio), brightness, contrast, saturation, color temperature, energy savings, 3D noise reduction, hue, sharpness, zoom mode (e.g., full screen, standard, smart zoom, and dot-to-dot), picture position, 3D mode, for picture, and sound retrieval system or SRS TruSurround, sound mode (e.g., standard, live 1, live 2, theatre, music, speech, user equalizer mode, Left/Right speaker balance, auto volume control, Sony/Philips Interconnect Format or S/PDIF (off, auto, pulse code modulation or PCM) for sound) and system settings (such as system (e.g., selected language for graphical user interface, user geographical and/or geopolitical location information, input method, area settings, and sleep time), network (e.g., WiFi, WiFi hotspot, WiFi direct, Point-to-Point Protocol over Ethernet or PPPoE (asymmetric digital subscriber line or ADSL), Ethernet) settings (e.g., enabled and disabled and selected and non-selected) and information (e.g., network information (e.g., electronic address such as Internet Protocol or IP address, subnet mask, gateway, domain name server information, domain name, Media Access Control or MAC address, service set identification or SSID, security information, and password information) and inline status), manage applications (e.g., currently installed applications, currently executing applications, and internal and external computer readable medium usage), and view user information regarding the Intelligent TV 100)), a rocker-type channel-up and channel-down button 784 (to increment or decrement the selected channel), and first, second, third and fourth hotkeys 788, 792, 794, and 796, and/or a moveable joystick 900 on a bottom of the remote control 700. The first, second, third, and fourth hotkeys are generally assigned different colors, which color indexing is depicted as visual indicia on a selected panel to show the currently assigned function, if any, for each hotkey. As can be seen, the actuator layout can provide a highly efficient, satisfactory, and easily usable experience to the end user.

Unlike the functional associations and functions of many of the actuators, those of some

of the actuators are not readily apparent. A number of examples will now be discussed by way of illustration.

The media center button 736, when selected, can provide information regarding music, videos, photographs, collections or groupings of music, videos, and/or photographs, and internal and external computational devices (such as personal computers, laptops, tablet computers, wireless phones, removable computer readable media, and the like), which can be grouped in a selected manner (such as favorites, most recently viewed, most watched or viewed, and most recently added). The information can includes previews (which can include selected portions of the media content, duration, file size, date created, date last watched, times watched or viewed, and audio and/or video format information).

The application center button 740, when selected, may provide information regarding pre-installed and downloaded applications. Unlike downloaded applications, pre-installed applications cannot be removed by the user or manually updated. Exemplary pre-installed applications include web browser, settings control, and content search algorithms. By way of illustration, the application center button 740 can provide a scrollable graphical grid of icons (each icon being associated with an application) currently available in the application center.

The global panel button 744, when selected, can provide the user, via one or more panels or windows, with access to one or more of, but not limited to, silos, notifications, a web browser, system settings, and/or information associated therewith. For example, the global panel button 744 can enable the user to determine what external devices are currently connected to and/or disconnected from the Intelligent TV 100, determine what inputs (e.g., HDMI ports) are currently available for connecting to external devices, determine a connection and/or operational status of a selected external device and/or network (e.g., WiFi connected, Ethernet connected, and offline), assign a custom (or user selected) name to each input source, determine what content is currently being offered on Live TV, on demand, the media center, and/or the application center, access vendor messages and notifications to the user (e.g., system and/or application updates are available), activate the Internet browser, and/or access shortcuts on a displayed shortcut bar to more frequently used and desired applications. Common shortcuts are Internet browser (e.g., Internet search engine), system

settings, and notifications. The common types of panels are for information (which is typically information related to a currently displayed image and/or content (e.g., title, date/time, audio/visual indicator, rating, and genre), browse requests, and/or search requests (such as search term field)). Each of the panel types may include a panel navigation bar, detailed information or relevant content to the panel function, operation and/or purpose, and a hotkey bar (defining currently enabled functional associations of hotkeys).

The application panel button 748, when selected, can display an application window or panel. One application panel may be an information panel regarding a selected (pre-installed or previously downloaded) application icon. The information panel can one or more of identify the selected application, provide a description of the functionality (including application developer and/or vendor, version, release, and/or last update date and a category or type of application based on the application's functionality) and user ratings and/or degree of other user downloading of the application (e.g., a star rating assigned based on one or more of the foregoing inputs), provide the option to launch, remove, update, and add to favorites the identified application, and provide a listing of selectable links of other (not yet downloaded) recommended applications that provide similar functionality to the identified application. The latter listing can, in turn, provide a description of the functionality (including application developer and/or vendor, version, release, and/or last update date and a category or type of application based on the application's functionality) and user ratings and/or degree of other user downloading of the application (e.g., a star rating assigned based on one or more of the foregoing inputs).

The functions of the first, second, third, and fourth hotkeys 788, 792, 794, and 796 can change depending on system state, context, and/or, within a selected screen and/or panel, based on a content or currently selected portion of (or relative cursor position on) the screen. Commonly, a currently assigned function of any of the first, second, third, and fourth hotkeys 788, 792, 794, and 796 depends on a currently accessed silo and/or panel (with which the user is currently interacting within the silo). In other words, a first function of one of the first, second, third, and fourth hotkeys 788, 792, 794, and 796 is activated by the respective hotkey in a first system state while a different second function is activated by the respective hotkey in a different second system state. In another example, a third function of one of the

first, second, third, and fourth hotkeys 788, 792, 794, and 796 is activated by the respective hotkey when a user focus (or currently selected cursor position or screen portion) is at a first screen position while a different fourth function is activated by the respective hotkey when a user focus (or currently selected cursor position or screen portion) is at a different second screen position. The first screen position can, for instance, be within an icon while the second screen position is outside of the icon. Hotkey functionality that could be enabled when in the first screen position may be "configure" and "remove" and disabled is "add", and, when in the second position hotkey functionality enabled can be "add" and disabled is "configure" and "remove". Generally, the states of hotkeys can include normal (for enabled actions or functions), disabled (when an action or function is temporarily disabled), pressed (when selected by a user to command an action or function to be performed), and unavailable (when no association between the hotkey and an action or function is currently available). While examples of hotkey functions are discussed below, it is to be understood that these are not intended to be exhaustive or limiting examples.

The first hotkey 788, when selected in a first system state, can enable the user to assign, change, or edit a name of an input source. It is typically enabled only when the input source of HDMI, Comp/YPbPr (e.g., component video cables), video output, and VGA is in focus. When selected in a second system state, the first hotkey 788 can return the user to a top of a scrollable collection of objects, such as application icons.

The second hotkey 792 may show all or less. In other words, the hotkey 792 can allow the user to show all inputs, including the unconnected/undetected ones and to hide the unconnected/undetected inputs, e.g., to expand and collapse the silo/input list. Each input source can have one of two states, namely connected/detected and unconnected/undetected. Some input sources, including Live TV, video on demand, media center, and application center are always connected/detected.

The moveable joystick 900 on the bottom of the remote control 700, when manipulated, can cause a displayed image on the Intelligent TV 100 screen to be displaced a proportional amount. In other words, the displayed image is displaced substantially simultaneously with displacement of the joystick 900 within the joystick aperture 904 in the bottom housing 712 of the remote control. As shown in Figs. 9B-C, the joystick 900 moves or slides between

forward and reverse positions. Releasing the joystick 900 causes the joystick 900 to return to the center position of Fig. 9A, and the window to move or slide upwardly (when the joystick is released from the joystick position of Fig. 9B) or downwardly (when the joystick is released from the joystick position of Fig. 9C) until it disappears from view as shown in Fig. 11A . The effect on the screen of the Intelligent TV 100 is shown in Figs. 11A-C. In Fig. 11A, video content, such as TV programming, a video, movie, and the like, is being displayed by front surface of the screen 212. In Fig, 11B, the joystick 900 is moved or slid to the upper position of Fig. 9B, and a drop down window or panel 1100 moves or slides down (at the substantially the same rate of joystick 900 movement) at the top of the screen 212. In Fig, 11C, the joystick 900 is moved or slid to the lower position of Fig. 9C, and a drop up window or panel 1100 moves or slides up (at the substantially the same rate of joystick 900 movement) at the bottom of the screen 212. The window 1100 partially covers the video content appearing on the remainder of the screen 212 and/or causes a portion of the screen 212 displaying video content to move and/or compress up or down the height of the window 1100.

The window 1100 can include one or more of information (which is typically information related to a currently displayed image and/or content (e.g., panel navigation bar, detailed information (e.g., title, date/time, audio/visual indicator, rating, and genre), and hotkey bar (defining current functional associations of hotkeys)), browse requests, and/or search requests. Commonly, the window 1100 includes suitable information about the content (such as name, duration, and/or remaining viewing duration of content), settings information, TV or system control information, application (activation) icons (such as for pre-installed and/or downloaded applications such as application center, media center and Web browser), and/or information about input source(s), When the joystick 900 is in either the forward or reverse position, the user can select an actuator on the front of the remote control, such as the OK button 764, and be taken, by displayed images on the screen 212, to another location in the user interface, such as a desktop. This process can be done in an nonintrusive manner and without affecting the flow of content that is pushed up or down. The joystick 900 could be moved, additionally or differently, from side-to-side to cause the window to appear at the left or right edge of the screen 212.

An alternative actuator configuration is shown in Fig. 10. The actuators are substantially the same as those of Figs. 7-9 except that the social network button 1000, when selected, can automatically select content and publish, via a social network service or other social media, the content to a social network or online community. User or viewer comments and/or other messages can be included in the outbound message. For example, all or one or frames or portions of media content (such as a video, music, a photograph, a picture, or text) can be provided automatically to a predetermined or selected group of people via Linked-In™, Myspace™, Twitter™, YouTube™, DailyMotion™, Facebook™, Google+™, or Second Life™. The user, upon activating the button 1000 could, in response, select a social forum or media upon which the selected content (which is the content displayed to the user when the social network button 1000 is activated) is to be posted and/or a predetermined group within that social media to which the content is to be posted. Alternatively, these selections could be preconfigured or preselected by the user.

The social network button can also be used to "turn up" or "turn down" a social volume visualization. The Intelligent TV 100 can create dynamically a visualization of aggregated connections (and inbound and/or outbound messages) from a variety of social networks. The aggregation (and inbound and outbound messages) can be depicted graphically on the screen as a volume of connections to influence the viewer user. With a social volume visualization, selected contents of each linked social network profile of a social contact (and inbound and/or outbound messages from or to the linked social network contact and/or current activity of the social contact (such as watching the same programming or content the viewer is currently watching) can be presented in a separate tile (or visually displayed object). The size of the tile can be related to any number of criteria, including a relationship of the linked social contact (e.g., a relative degree of importance or type of relationship can determine the relative size of the tile, a degree of influence of the linked social contact to the current viewer, a geographic proximity of the linked social contact to the current viewer, a degree to which the currently provided media content is of interest to both the viewer and linked social contact (e.g., both parties enjoy war movies, murder mysteries, musicals, comedies, and the like), an assigned ranking of the linked viewer by the viewer, a type of social network type linking the viewer with the linked social contact, a current activity of the

social network contact (e.g., currently watching the same content that the viewer is currently watching), a current online or offline status of the linked social contact, and a social network grouping type or category to which both the viewer and linked social contact belong (e.g., work contact, best friend, family member, etc.).

The viewer can designate a portion of the screen to depict the social network aggregation. By turning the social volume up (+) or down (-), the viewer can increase the size and/or numbers of linked contact tiles provided to the viewer. In other words, by increasing the social volume the viewer can view, access, and/or push more social content from those of his or her social networks associated with him or her in a memory of the Intelligent TV. By decreasing the social volume, the viewer can view, access, and/or push less social content from his or her associated social networks. By selecting the mute button 724, the viewer can stop or pause any interactivity with his or her associated social networks (e.g., inbound or outbound messages). Social volume and/or mute can be separated into two (or more) volume settings for outbound and inbound social network activity. By way of illustration, a first volume setting, control, and/or button can control the volume for outbound social network activity (e.g., outbound social messages) while a second (different) volume setting, control, and/or button can control the volume for inbound social network activity (e.g., inbound social messages). By way of further illustration, a first mute setting, control, and/or button can stop or pause outbound social network activity (e.g., outbound social messages) while a second (different) mute setting, control, and/or button can stop or pause inbound social network activity (e.g., inbound social messages).

A functional block diagram of the remote control is shown in Fig. 12. The remote control 700 includes a controller 1208 to control and supervise remote control operations, optional wireless (RF) transceiver 1224 and antenna 1244 to send and receive wireless signals to and from the Intelligent TV 100 and other external components, optional infrared emitter 1228 to emit infrared signals to the Intelligent TV 100, optional light emitting diode or LED driver 1232 to control LED operation to provide video-enabled feedback to the user, actuators 1220 (including the various buttons and other actuators discussed above in connection with Figs. 7 and 10), and joystick 900, all interconnected via a bus 1248. An on board power source 1200 and power management module 1204 provide power to each of

these components via power circuitry 1240. The infrared emitter 1228 and receiver (not shown) on the Intelligent TV system 100 can be used to determine a displayed object illuminated by the infrared signal and therefore adjust the displayed image, for example to indicate a focus of the user (e.g., illuminate a displayed object or show cursor position relative to displayed objects on the screen) and to determine and activate a desired command of the user. This can be done by tracking a position of the remote control in relation to infrared tracking reference points (e.g., a sensor bar or infrared LED's) positioned on or adjacent to the screen of the Intelligent TV 100. Motion tracking can further be augmented using position information received from a multi-axis gyroscope and/or accelerometer on board the remote control (not shown).

Fig. 14 is a block diagram of an embodiment of a program management and reminder system. Intelligent TV 100 contains, inter alia, processor 364, data storage 314 and network connection 1402. As illustrated with respect to Fig. 1A, network connection 104 is variously embodied and may include interfaces to wired 108 or wireless 112 means to connect, via network 132, to EPG 136.

In one embodiment, EPG 136 is accessed from a remote source for downloading a number of channels 1404 to intelligent TV 100. Processor 364 may then perform a number of operations on the programming data and utilize data storage 314 for the storage of EPG 136 data or portions or derivatives thereof.

Fig. 15 illustrates one embodiment of a channel 1404A displayed on intelligent TV 100. Channel 1404A further comprises a number of programs 1502. In a further embodiment, programs 1502 are arranged in order of presentation time. In another embodiment, programs 1502 are arranged in alphabetical order. Ones of programs 1502 may represent identical programming content, individual programs of a series, or distinct programs.

In other embodiments, intelligent TV 100 displays a number of channels 1404A-1404n (only channel 1404A is shown for clarity). In one embodiment, intelligent TV scrolls channels 1404 vertically and programs 1502 horizontally.

In one embodiment, a user has selected one particular program – program 2 (1502B) – for further interaction.

Figs. 16A-16B illustrate one set of interactions upon a particular program, such as

program 2 (1502B) of Fig. 15. Dialog 1602 displays on intelligent TV 100. For the purposes of avoiding undue complexity, Figs. 16A-16B are discussed herein with reference to a user selecting program 2 (1502B). However, it should be noted that substantially any programs 1502, on any channel 1404, may be selected and processed as contemplated in the embodiments herein. Toggle buttons 1604, 1608 and 1612 provide on/off, set/clear, or other operations with associated operation descriptions 1606, 1610, and 16014 respectively.

In one embodiment, as illustrated by Fig. 16A, program 2 (1502B) is selected. Program 2 (1502B) is a program to be presented and/or is being presented on channel 1 (1404A). In one embodiment, program 2 (1502B) is not a favorite or a reminder and channel 1 (1404A) is not a favorite. Fig. 16A then displays to provide the user with the option of setting toggle button 1604A, 1608, 1612 to set channel 1 (1404A) as a favorite, program 2 (1502B) as a favorite, or program 2 (1502B) as a reminder. Optionally, cancel button 1616 may be used to terminate dialog 1602 without change. As a further option, save button 1618 terminates dialog 1602 and preserves any changes made. In a further option, save and cancel operations are provide by user interaction with remote control 700.

Upon the user selecting toggle button 1604A, button 1604B reflects in the input as set and, as illustrated in Fig. 16B, is now operable to be selected to clear channel 1 (1404A) as a reminder. In other embodiments, the user selecting toggle button 1608 and/or 1612 toggles settings for program 2 (1502B) as a favorite and setting program 2 (1502) as a reminder, respectively.

In another embodiment, channels and programs identified as favorites and/or programs with an associated reminder are tagged with an icon for ready identification of such within the programming display or other display.

Fig. 17 illustrates flowchart 1700 providing one embodiment of a process for managing favorites and reminders. Step 1702 begins with presentation of a programming guide, such as EPG 136 on intelligent TV 100. Step 1704 receives a selection upon a program and/or channel 1704. Ste p 1706 determines if the selection is associated with a favorite or a reminder. If step 1706 determines the selection is associated with a reminder, processing continues with steps illustrated in Fig. 17B. If step 1706 determines the selection is associated with reminders, processing continues with step 1708, which stores the reminder, such as in

data storage 314.

Step 1710 searches the programming guide for matches. Searching step 1710 may be performed periodically, upon request, and/or upon receiving a signal indicating updated programming information is available. The user is then presented with a display by step 1712.

The display opened in step 1712 is closed upon step 1714 determining a "close" event occurred. A close event include, but is not limited to, a timeout, whereby a certain amount of time has lapsed without any user input or without a specific user input. A "cancel" or "exit" button is pressed on remote 700 or a "cancel" button is selected on a dialog, such as illustrated by cancel button 1616. If a close event is detected, processing continues to step 1716 to close the dialog otherwise processing continues to 1712 and the dialog is continued to be displayed.

Fig. 17B continues processing from step 1706 determining the selection is for favorites. Step 1717 presents a second dialog to a user. In one embodiment, the second dialog solicits a user selection of the channel or the program to receive "favorite" status. Step 1722 determines if the response is for a program or a channel. If channel, processing continues to step 1726 to set the channel as a favorite. If program, processing continues to step 1724 to set the program as the favorite.

Fig. 18 illustrates one embodiment of reminder dialog 1802. Various rules may be implemented to display reminders. In the embodiment illustrated program 1 (1806) and program 2 (1810) have a reminder set and are each beginning at the same, or substantially the same, time. The user is presented with options within dialog 1802 and provided the opportunity to select program 1 by selecting button 1804 or program 2 by selecting button 1808. If the user does not make any selection within a period of time, such as by the time the program starts or within 5 minutes after the program begins, dialog 1802 may close without any further action by the user. If the user does select button 1804 or 1808, intelligent TV 100 presents the program to the user and closes dialog 1802. In a further embodiment, dialog 1802 may be displayed for an additional time after intelligent TV 100 is powered on. For example, dialog 1802 may be displayed within 10 minutes of a program beginning, for which a reminder is set, upon intelligent TV being powered on.

In another embodiment, additional programs have associated reminders and dialog 1802 presents a portion of the programs is a scrollable format.

The exemplary systems and methods of this disclosure have been described in relation to managing favorites or reminders. However, to avoid unnecessarily obscuring the present disclosure, the preceding description omits a number of known structures and devices. This omission is not to be construed as a limitation of the scopes of the claims. Specific details are set forth to provide an understanding of the present disclosure. It should however be appreciated that the present disclosure may be practiced in a variety of ways beyond the specific detail set forth herein.

Furthermore, while the exemplary aspects, embodiments, and/or configurations illustrated herein show the various components of the system collocated, certain components of the system can be located remotely, at distant portions of a distributed network, such as a LAN and/or the Internet, or within a dedicated system. Thus, it should be appreciated, that the components of the system can be combined in to one or more devices, such as an entertainment system or collocated on a particular node of a distributed network, such as an analog and/or digital telecommunications network, a packet-switch network, or a circuit-switched network. It will be appreciated from the preceding description, and for reasons of computational efficiency, that the components of the system can be arranged at any location within a distributed network of components without affecting the operation of the system. For example, the various components can be located in a switch such as a PBX and media server, gateway, in one or more communications devices, at one or more users' premises, or some combination thereof. Similarly, one or more functional portions of the system could be distributed between a telecommunications device(s) and an associated computing device.

Furthermore, it should be appreciated that the various links connecting the elements can be wired or wireless links, or any combination thereof, or any other known or later developed element(s) that is capable of supplying and/or communicating data to and from the connected elements. These wired or wireless links can also be secure links and may be capable of communicating encrypted information. Transmission media used as links, for example, can be any suitable carrier for electrical signals, including coaxial cables, copper wire and fiber

optics, and may take the form of acoustic or light waves, such as those generated during radio-wave and infra-red data communications.

Also, while the flowcharts have been discussed and illustrated in relation to a particular sequence of events, it should be appreciated that changes, additions, and omissions to this sequence can occur without materially affecting the operation of the disclosed embodiments, configuration, and aspects.

A number of variations and modifications of the disclosure can be used. It would be possible to provide for some features of the disclosure without providing others.

For example in one alternative embodiment, a non-modal window is provided for setting and managing favorites and reminders.

In another alternative embodiment, the non-modal window is external to intelligent TV 100.

In yet another embodiment, the systems and methods of this disclosure can be implemented in conjunction with a special purpose computer, a programmed microprocessor or microcontroller and peripheral integrated circuit element(s), an ASIC or other integrated circuit, a digital signal processor, a hard-wired electronic or logic circuit such as discrete element circuit, a programmable logic device or gate array such as PLD, PLA, FPGA, PAL, special purpose computer, any comparable means, or the like. In general, any device(s) or means capable of implementing the methodology illustrated herein can be used to implement the various aspects of this disclosure. Exemplary hardware that can be used for the disclosed embodiments, configurations and aspects includes computers, handheld devices, telephones (e.g., cellular, Internet enabled, digital, analog, hybrids, and others), and other hardware known in the art. Some of these devices include processors (e.g., a single or multiple microprocessors), memory, nonvolatile storage, input devices, and output devices. Furthermore, alternative software implementations including, but not limited to, distributed processing or component/object distributed processing, parallel processing, or virtual machine processing can also be constructed to implement the methods described herein.

In yet another embodiment, the disclosed methods may be readily implemented in conjunction with software using object or object-oriented software development environments that provide portable source code that can be used on a variety of computer or

workstation platforms. Alternatively, the disclosed system may be implemented partially or fully in hardware using standard logic circuits or VLSI design. Whether software or hardware is used to implement the systems in accordance with this disclosure is dependent on the speed and/or efficiency requirements of the system, the particular function, and the particular software or hardware systems or microprocessor or microcomputer systems being utilized.

In yet another embodiment, the disclosed methods may be partially implemented in software that can be stored on a storage medium, executed on programmed general-purpose computer with the cooperation of a controller and memory, a special purpose computer, a microprocessor, or the like. In these instances, the systems and methods of this disclosure can be implemented as program embedded on personal computer such as an applet, JAVA® or CGI script, as a resource residing on a server or computer workstation, as a routine embedded in a dedicated measurement system, system component, or the like. The system can also be implemented by physically incorporating the system and/or method into a software and/or hardware system.

Although the present disclosure describes components and functions implemented in the aspects, embodiments, and/or configurations with reference to particular standards and protocols, the aspects, embodiments, and/or configurations are not limited to such standards and protocols. Other similar standards and protocols not mentioned herein are in existence and are considered to be included in the present disclosure. Moreover, the standards and protocols mentioned herein and other similar standards and protocols not mentioned herein are periodically superseded by faster or more effective equivalents having essentially the same functions. Such replacement standards and protocols having the same functions are considered equivalents included in the present disclosure.

The present disclosure, in various aspects, embodiments, and/or configurations, includes components, methods, processes, systems and/or apparatus substantially as depicted and described herein, including various aspects, embodiments, configurations embodiments, subcombinations, and/or subsets thereof. Those of skill in the art will understand how to make and use the disclosed aspects, embodiments, and/or configurations after understanding the present disclosure. The present disclosure, in various aspects, embodiments, and/or

configurations, includes providing devices and processes in the absence of items not depicted and/or described herein or in various aspects, embodiments, and/or configurations hereof, including in the absence of such items as may have been used in previous devices or processes, e.g., for improving performance, achieving ease and\or reducing cost of implementation.

The foregoing discussion has been presented for purposes of illustration and description. The foregoing is not intended to limit the disclosure to the form or forms disclosed herein. In the foregoing Detailed Description for example, various features of the disclosure are grouped together in one or more aspects, embodiments, and/or configurations for the purpose of streamlining the disclosure. The features of the aspects, embodiments, and/or configurations of the disclosure may be combined in alternate aspects, embodiments, and/or configurations other than those discussed above. This method of disclosure is not to be interpreted as reflecting an intention that the claims require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive aspects lie in less than all features of a single foregoing disclosed aspect, embodiment, and/or configuration. Thus, the following claims are hereby incorporated into this Detailed Description, with each claim standing on its own as a separate preferred embodiment of the disclosure.

Moreover, though the description has included description of one or more aspects, embodiments, and/or configurations and certain variations and modifications, other variations, combinations, and modifications are within the scope of the disclosure, e.g., as may be within the skill and knowledge of those in the art, after understanding the present disclosure. It is intended to obtain rights which include alternative aspects, embodiments, and/or configurations to the extent permitted, including alternate, interchangeable and/or equivalent structures, functions, ranges or steps to those claimed, whether or not such alternate, interchangeable and/or equivalent structures, functions, ranges or steps are disclosed herein, and without intending to publicly dedicate any patentable subject matter.

CLAIMS

1. A method, comprising:

presenting, on a television operable to present live television content, a programming guide, the programming guide, further comprising, a number of television channels and a number of programs associated with ones of the number of television channels;

receiving a selection from a user indicating one of (a) a reminder and (b) a favorite;

upon determining the selection indicates the reminder, searching the programming guide for matches between the first selected program and a number of future programs by determining equivalency of name and channel;

upon determining that one of the number of future programs that match the first selected program will begin within a first predetermined time, displaying a reminder dialog; and

removing the reminder dialog upon the reminder dialog receiving one of (a) a second user input selecting the one of the future programs to be presented by the television, (b) the second user input selecting a cancel operation, and (c) a signal indicating the occurrence of no user input within a second predetermined time.

2. The method of claim 1, further comprising, upon the selection indicating the favorite, determining that the input is associated with one of the number of television channels which is not a favorite and one of the number of programs which is not a favorite and presenting, on the television, a dialog soliciting the user to (a) set the one of the number of television channels as the favorite and (b) set the one of the number of programs as the favorite.

3. The method of claim 1, further comprising, upon the selection indicating the favorite, determining that the input is associated with one of the number of television channels which is a favorite and one of the number of programs which is a favorite and presenting, on the television, a dialog soliciting the user to (a) clear the one of the number of television channels as the favorite and (b) set the one of the number of programs as the favorite.

4. The method of claim 1, further comprising, upon the selection indicating the favorite,

determining that the input is associated with one of the number of television channels which is not a favorite and one of the number of programs which is a favorite and presenting, on the television, a dialog soliciting the user to (a) set the one of the number of television channels as the favorite and (b) clear the one of the number of programs as the favorite.

5. The method of claim 1, further comprising, upon the selection indicating the favorite, determining that the input is associated with one of the number of television channels which is a favorite and one of the number of programs which is not a favorite and presenting, on the television, a dialog soliciting the user to (a) clear the one of the number of television channels as the favorite and (b) set the one of the number of programs as the favorite.

6. The method of claim 1, further comprising:

wherein the selection indicates the reminder and the second user input indicates the one of the number of programs to be reminded, searching the programming guide for matches between the second selected program and a number of future programs, a match being determined by commonality of name and channel; and

upon determining that one of the future programs that match the first selected program and second selected program will begin with a first predetermined time, displaying a reminder dialog.

7. The method of claim 6, further comprising:

storing the reminder in a data storage portion of the television; and

upon determining the reminder is in the past, deleting the reminder.

8. The method of claim 1, wherein the match, further comprises, equivalency of time of day.

9. A television, comprising:

a processor to execute instructions;

a data storage to store at least one of data and instructions;

a network interface to receive television content information, the television content information further comprising, a programming guide with a number of television channels and a number of programs associated with ones of the number of television channels; and

whereby the processor is further operable to (a) cause the television to present the programming guide, (b) receive a first user input associated with a first selected program of the number of programs, the first user input indicating a selection of one of (i) a reminder and (ii) a favorite; (c) search the programming guide for matches between the first selected program and a number of future programs by determining equivalency of name and channel; (d) upon determining that one of the number of future programs that match the first selected program will begin within a first predetermined time, display a reminder dialog; and (e) remove the reminder dialog upon the reminder dialog receiving one of (i) a second user input selecting the one of the future programs to be presented by the television, (ii) the second user input selecting a cancel operation, and (iii) a signal indicating the occurrence of no user input within a second predetermined time.

10. The television of claim 9, wherein the processor is further operable to, upon the selection indicating the favorite, determine that the input is associated with one of the number of television channels which is not a favorite and one of the number of programs which is not a favorite, and present a dialog to solicit the user to (a) set the one of the number of television channels as the favorite and (b) set the one of the number of programs as the favorite.

11. The television of claim 9, wherein the processor is further operable to, upon the selection indicating the favorite, determine that the input is associated with one of the number of television channels which is a favorite and one of the number of programs which is not a favorite, and present a dialog to solicit the user to (a) clear the one of the number of television channels as the favorite and (b) set the one of the number of programs as the favorite.

12. The television of claim 9, wherein the processor is further operable to, upon receive the selection indicating the favorite, determine that the input is associated with one of the number of television channels which is not a favorite and one of the number of programs

which is a favorite, and present a dialog to solicit the user to (a) set the one of the number of television channels as the favorite and (b) clear the one of the number of programs as the favorite.

13. The television of claim 9, wherein the processor is further operable to, upon receive the selection indicating the favorite, determine that the input is associated with one of the number of television channels which is a favorite and one of the number of programs which is a favorite, and present a dialog to solicit the user to (a) clear the one of the number of television channels as the favorite and (b) clear the one of the number of programs as the favorite.

14. The television of claim 9, further comprising:

wherein the processor is further operable to determine that the selection indicates a favorite and the second user input indicates the one of the number of programs as the favorite and search the programming guide for matches between the second selected program and a number of future programs, a match being determined by commonality of name and channel; and

determine that one of the future programs that match the first selected program and second selected program will begin with a first predetermined time, displaying a reminder dialog.

15. The television of claim 14, further comprising, the processor being operable to (a) store, in the data storage, the reminder and (b) determine the reminder is in the past and deleting the reminder.

16. A non-transitory medium with instructions that when executed cause a machine to perform:

presenting, on a television operable to present live television content, a programming guide, the programming guide, further comprising, a number of television channels and a number of programs associated with ones of the number of television channels;

receiving a first user input associated with a first selected program of the number of programs, the first user input indicating a selection of one of (a) a reminder and (b) a favorite;

searching the programming guide for matches between the first selected program and a number of future programs by determining equivalency of name and channel;

upon determining that one of the number of future programs that match the first selected program will begin within a first predetermined time, displaying a reminder dialog; and

removing the reminder dialog upon the reminder dialog receiving one of (a) a second user input selecting the one of the future programs to be presented by the television, (b) the second user input selecting a cancel operation, and (c) a signal indicating the occurrence of no user input within a second predetermined time.

17. The instructions of claim 16, further comprising, upon the selection indicating the favorite, determining that the input is associated with one of the number of television channels which is not a favorite and one of the number of programs which is not a favorite and presenting, on the television, a dialog soliciting the user to (a) set the one of the number of television channels as the favorite and (b) set the one of the number of programs as the favorite.

18. The instructions of claim 16, further comprising:

wherein the selection indicates a favorite and the second user input indicates the one of the number of programs as the favorite, searching the programming guide for matches between the second selected program and a number of future programs, a match being determined by commonality of name and channel; and

upon determining that one of the future programs that match the first selected program and second selected program will begin with a first predetermined time, displaying a reminder dialog.

19. The instructions of claim 18, further comprising:

storing the reminder in a data storage portion of the television; and

upon determining the reminder is in the past, deleting the reminder.

20. The instructions of claim 16, wherein the match, further comprises, equivalency of time of day.

5

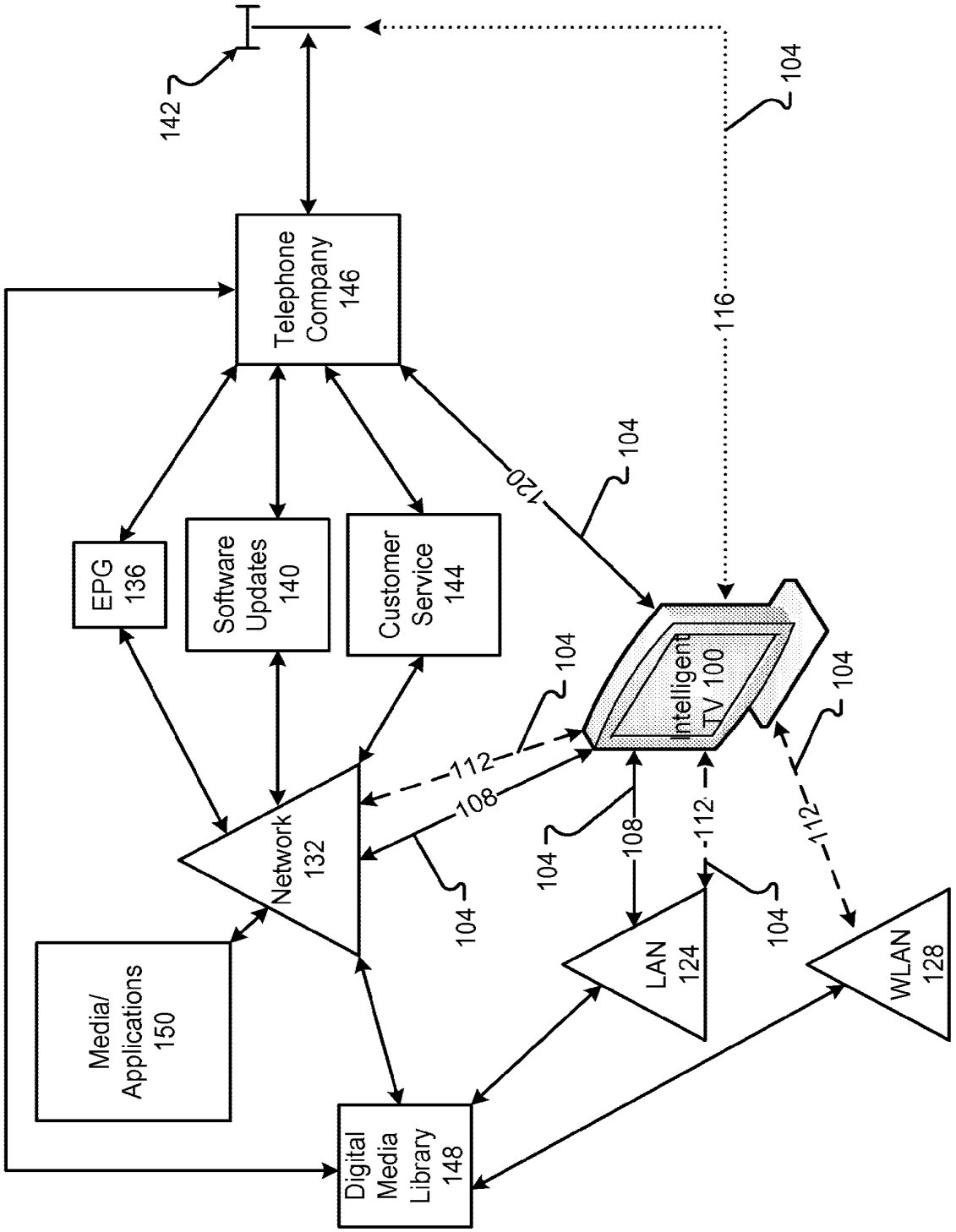

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Telephone Company 146
116
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EPG 136
Software Updates 140
Customer Service 144
104
Intelligent TV 100
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Network 132
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108
112
112
104
104
Media/ Applications 150
LAN 124
WLAN 128
Digital Media Library 148

Fig. 1A

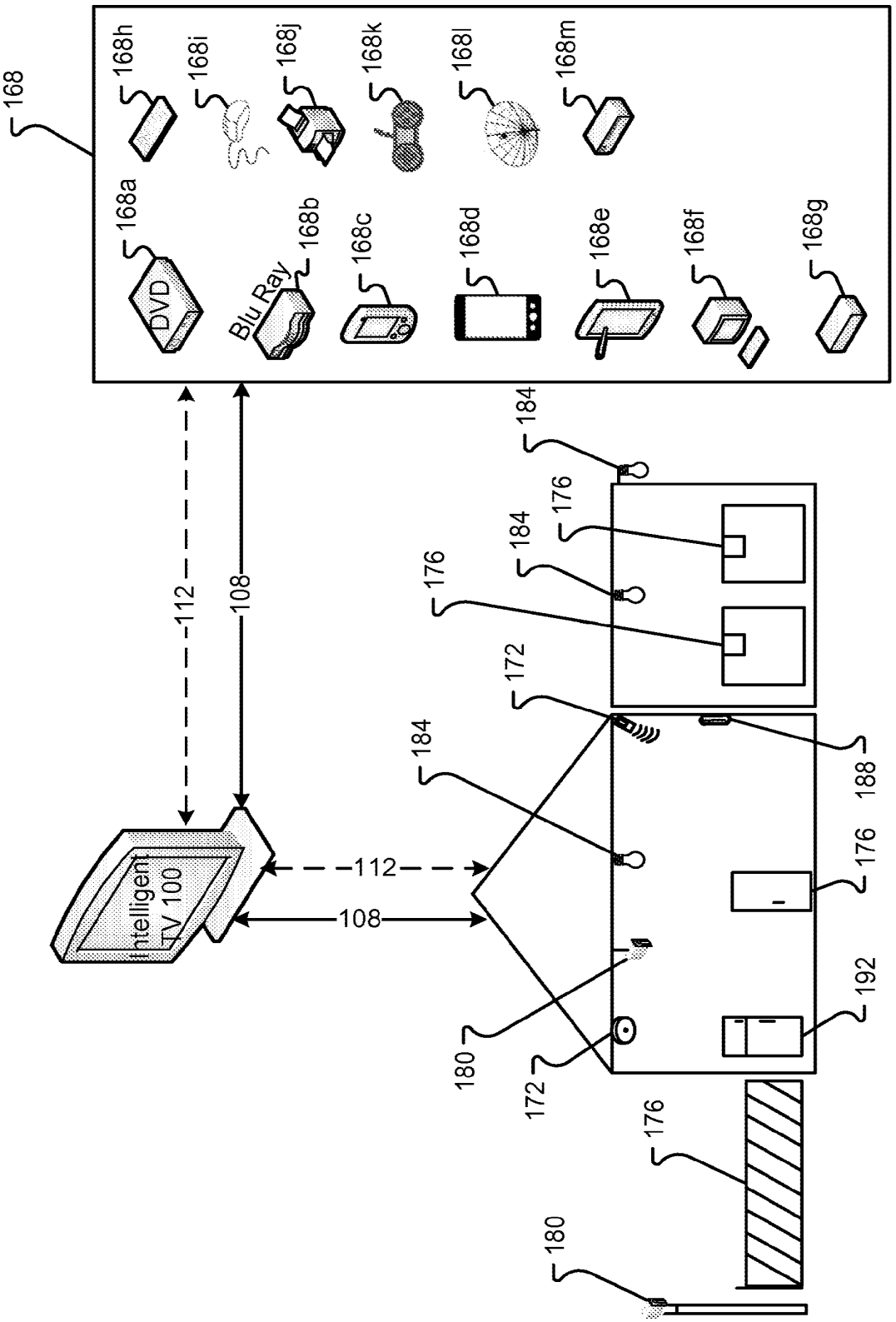

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168h
168i
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168k
168l
168m
168a
DVD
168b
Blu Ray
168c
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168f
168g
112
108
184
176
172
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Intelligent TV 100
180
192

Fig. 1B

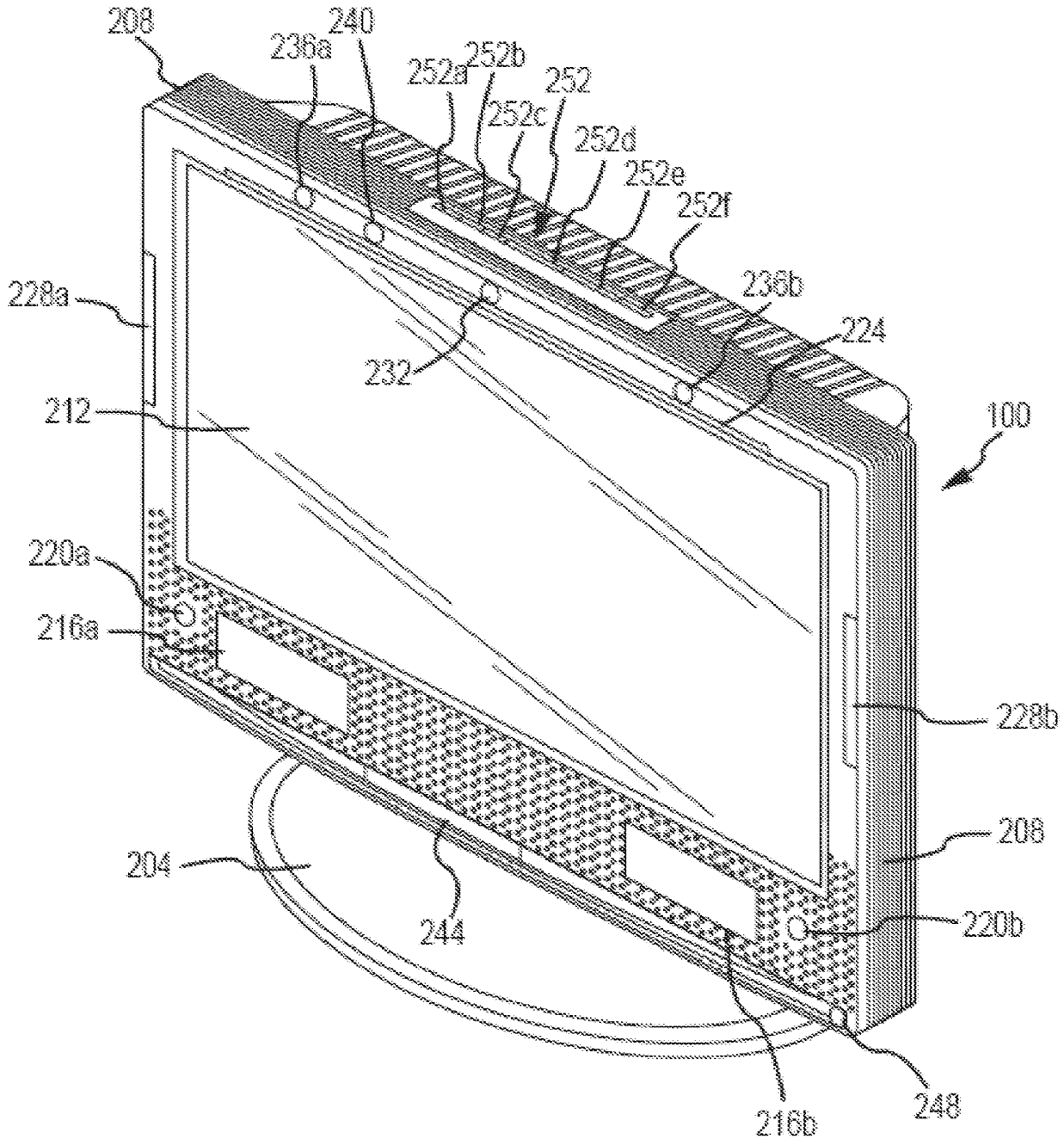

208
240
236a
252a
252b
252
252c
252d
252e
252f
236b
224
228a
232
212
100
220a
216a
228b
208
204
244
220b
248
216b

Fig. 2A

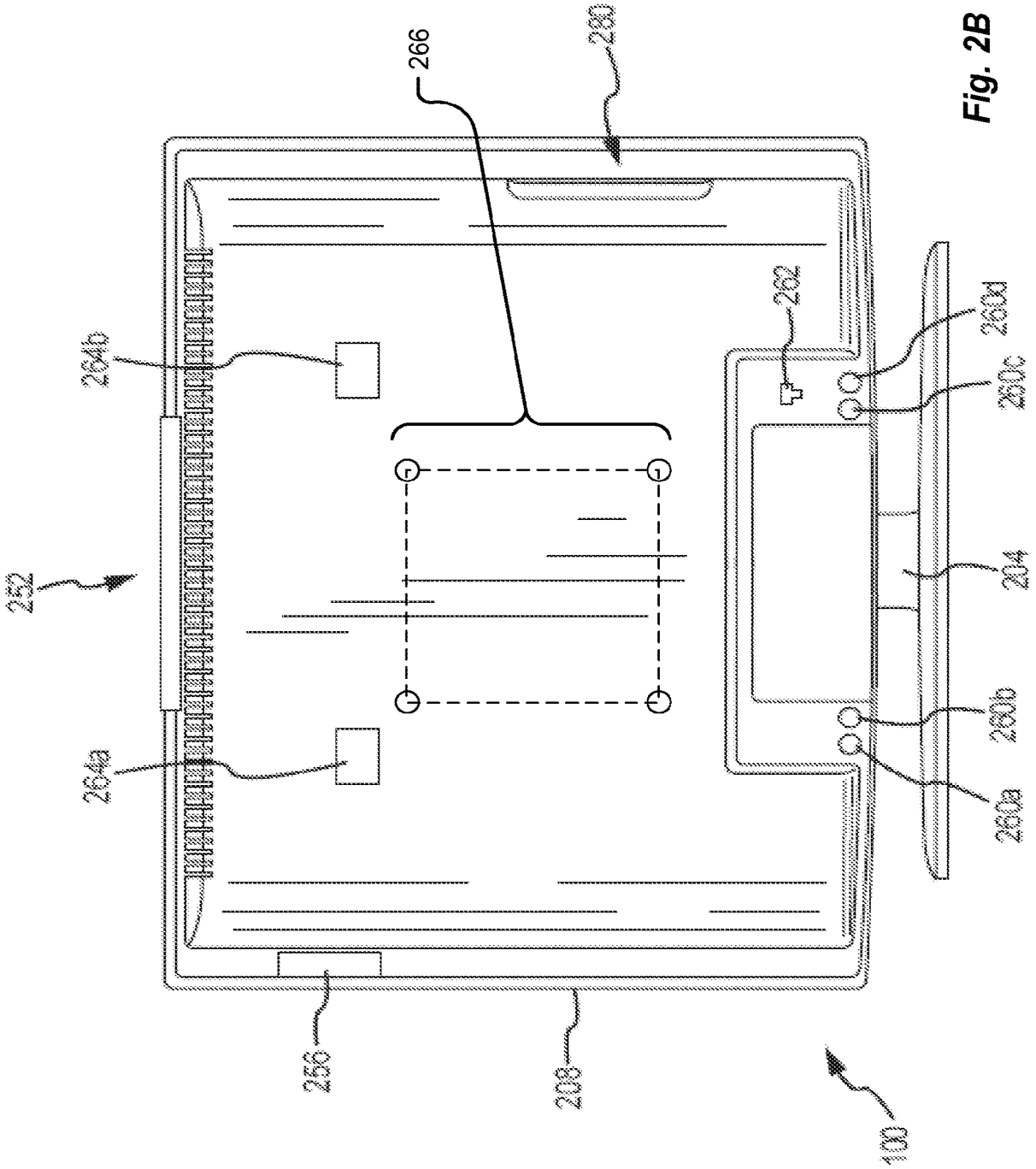


Fig. 2B

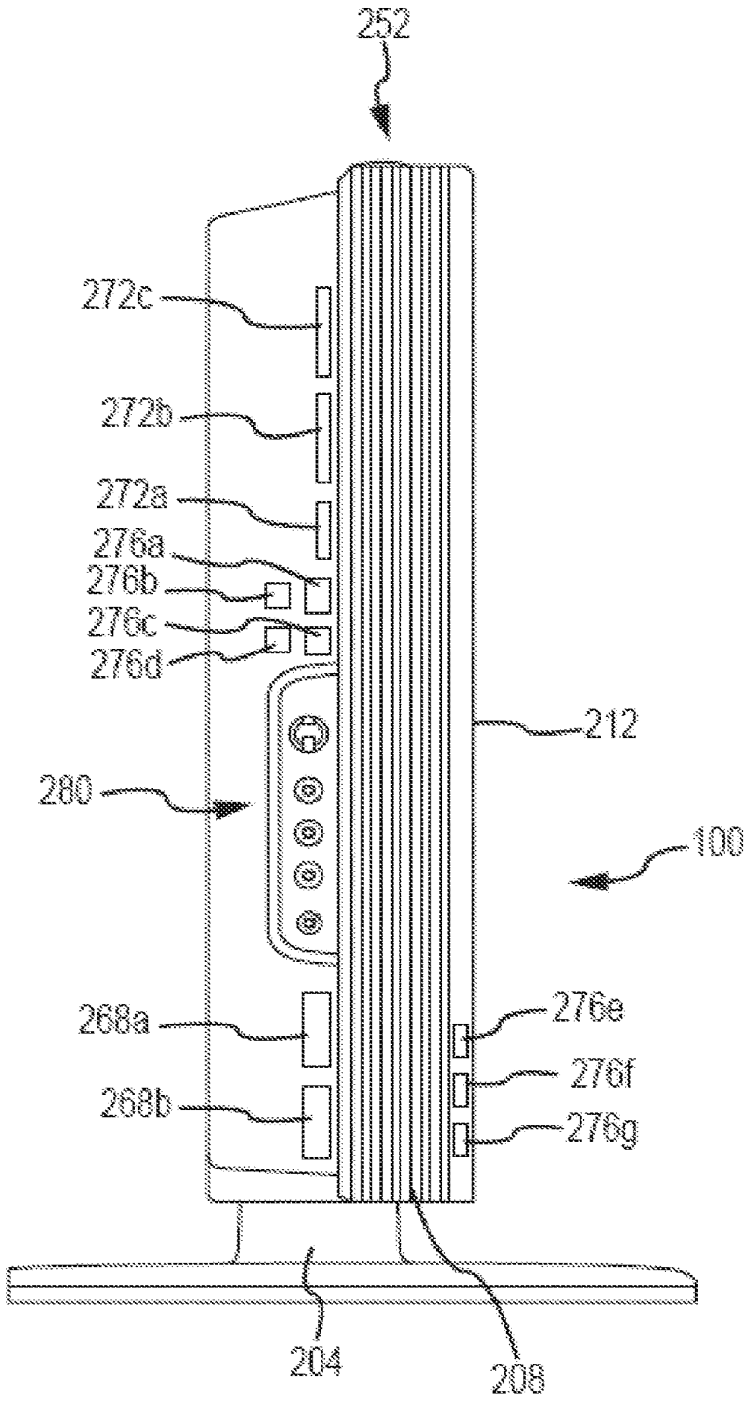

252
272c
272b
272a
276a
276b
276c
276d
212
280
100
268a
268b
276e
276f
276g
204
208

Fig. 2C

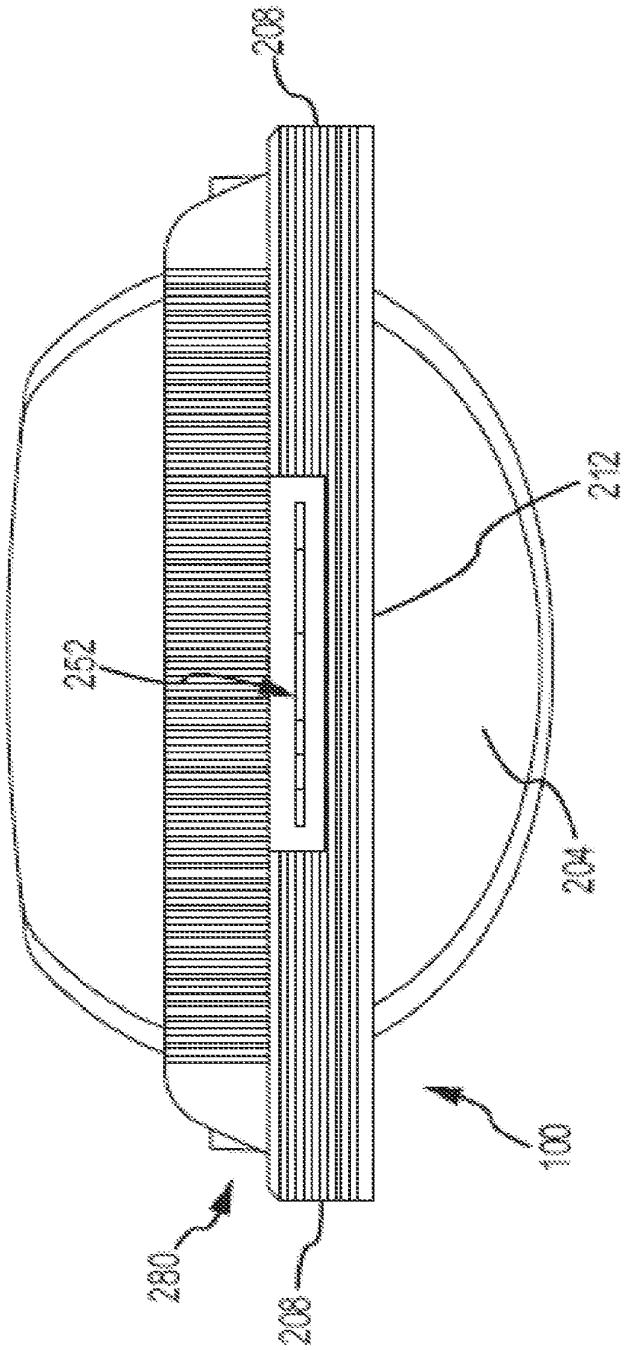


Fig. 2D

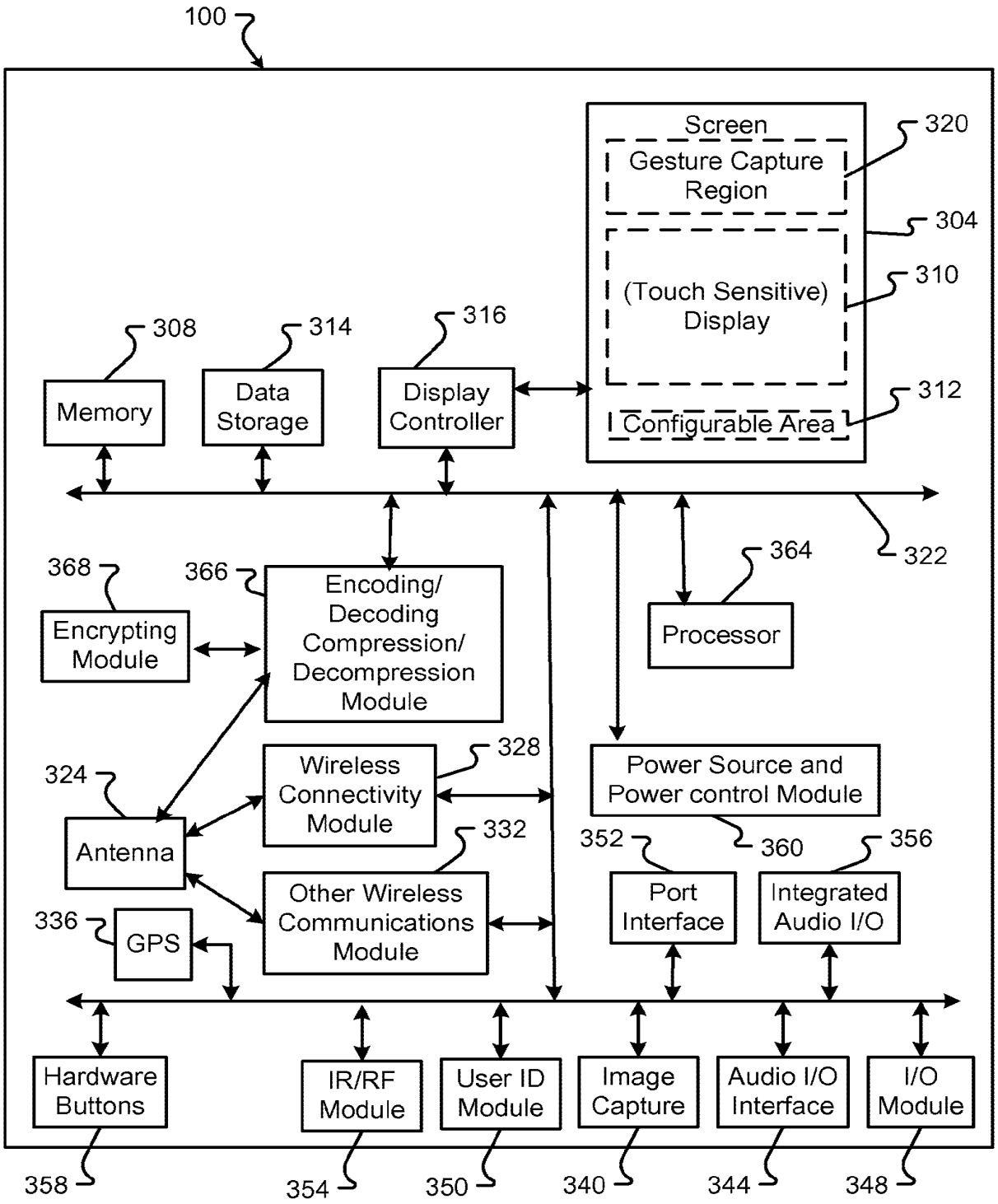

100
Screen
Gesture Capture Region
320
304
(Touch Sensitive) Display
310
312
Configurable Area
308
Memory
314
Data Storage
316
Display Controller
322
364
Processor
368
Encrypting Module
366
Encoding/ Decoding Compression/ Decompression Module
328
Wireless Connectivity Module
324
Antenna
332
Other Wireless Communications Module
336
GPS
Power Source and Power control Module
352
360
356
Port Interface
Integrated Audio I/O
Hardware Buttons
IR/RF Module
User ID Module
Image Capture
Audio I/O Interface
I/O Module
358
354
350
340
344
348

FIG. 3

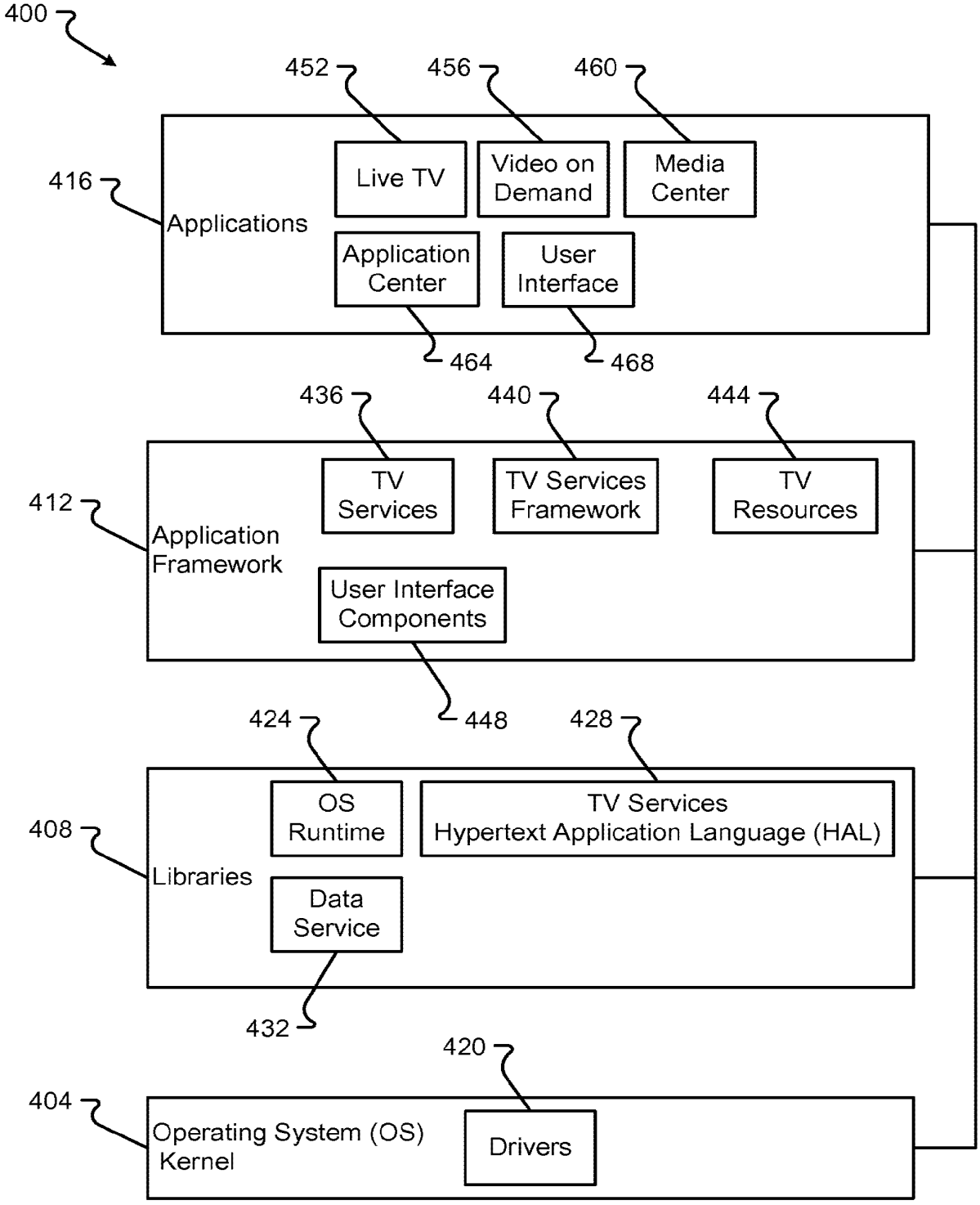

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452
456
460
416
Applications
Live TV
Video on Demand
Media Center
Application Center
User Interface
464
468
436
440
444
412
Application Framework
TV Services
TV Services Framework
TV Resources
User Interface Components
448
424
428
408
Libraries
OS Runtime
TV Services Hypertext Application Language (HAL)
Data Service
432
420
404
Operating System (OS) Kernel
Drivers

FIG. 4

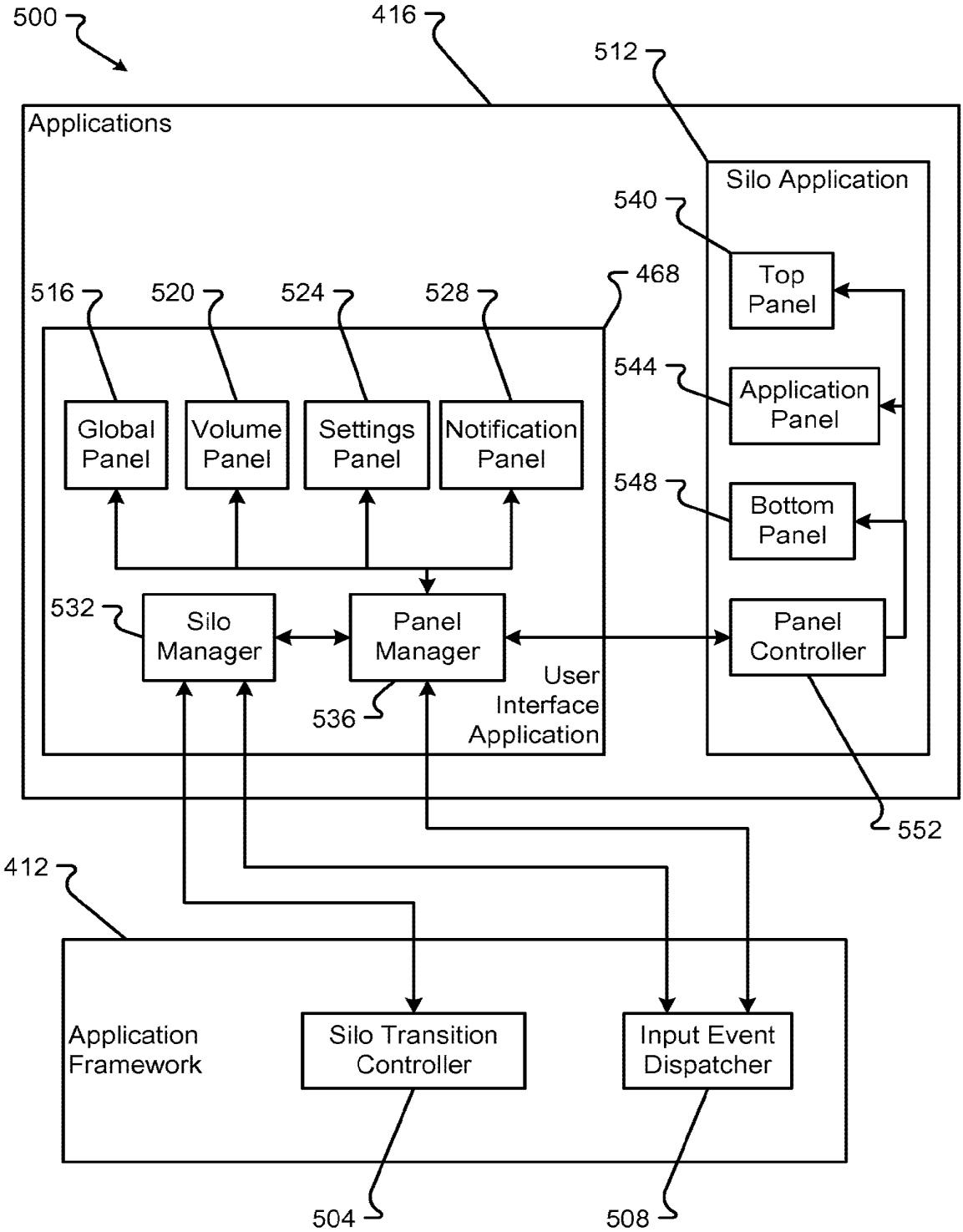

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416
512
Applications
Silo Application
540
Top Panel
468
516
520
524
528
544
Application Panel
Global Panel
Volume Panel
Settings Panel
Notification Panel
548
Bottom Panel
532
Silo Manager
Panel Manager
Panel Controller
User Interface Application
536
552
412
Application Framework
Silo Transition Controller
Input Event Dispatcher
504
508

FIG. 5

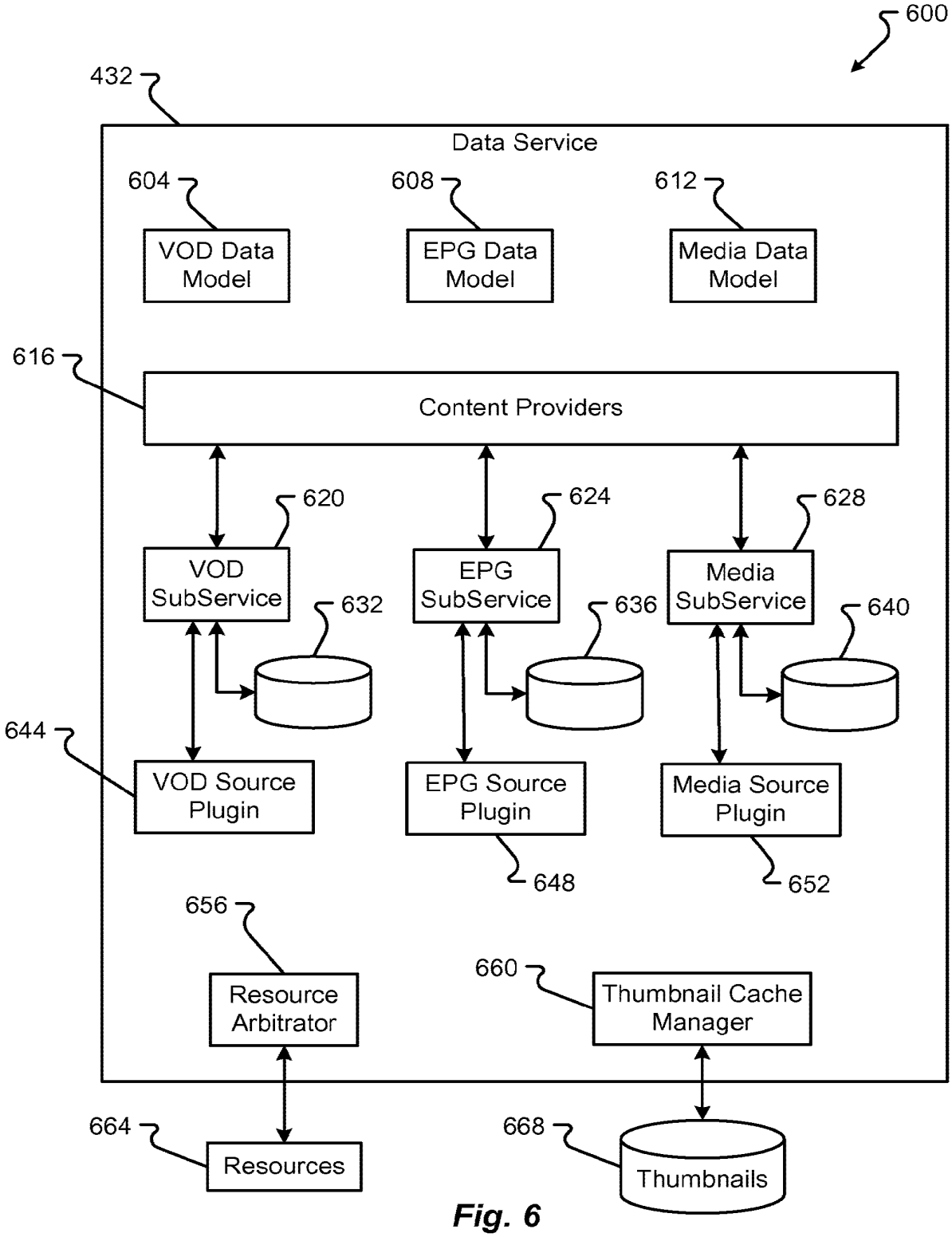

600
432
Data Service
604
VOD Data Model
608
EPG Data Model
612
Media Data Model
616
Content Providers
620
VOD SubService
624
EPG SubService
628
Media SubService
632
636
640
644
VOD Source Plugin
EPG Source Plugin
Media Source Plugin
648
652
656
Resource Arbitrator
660
Thumbnail Cache Manager
664
Resources
668
Thumbnails

Fig. 6

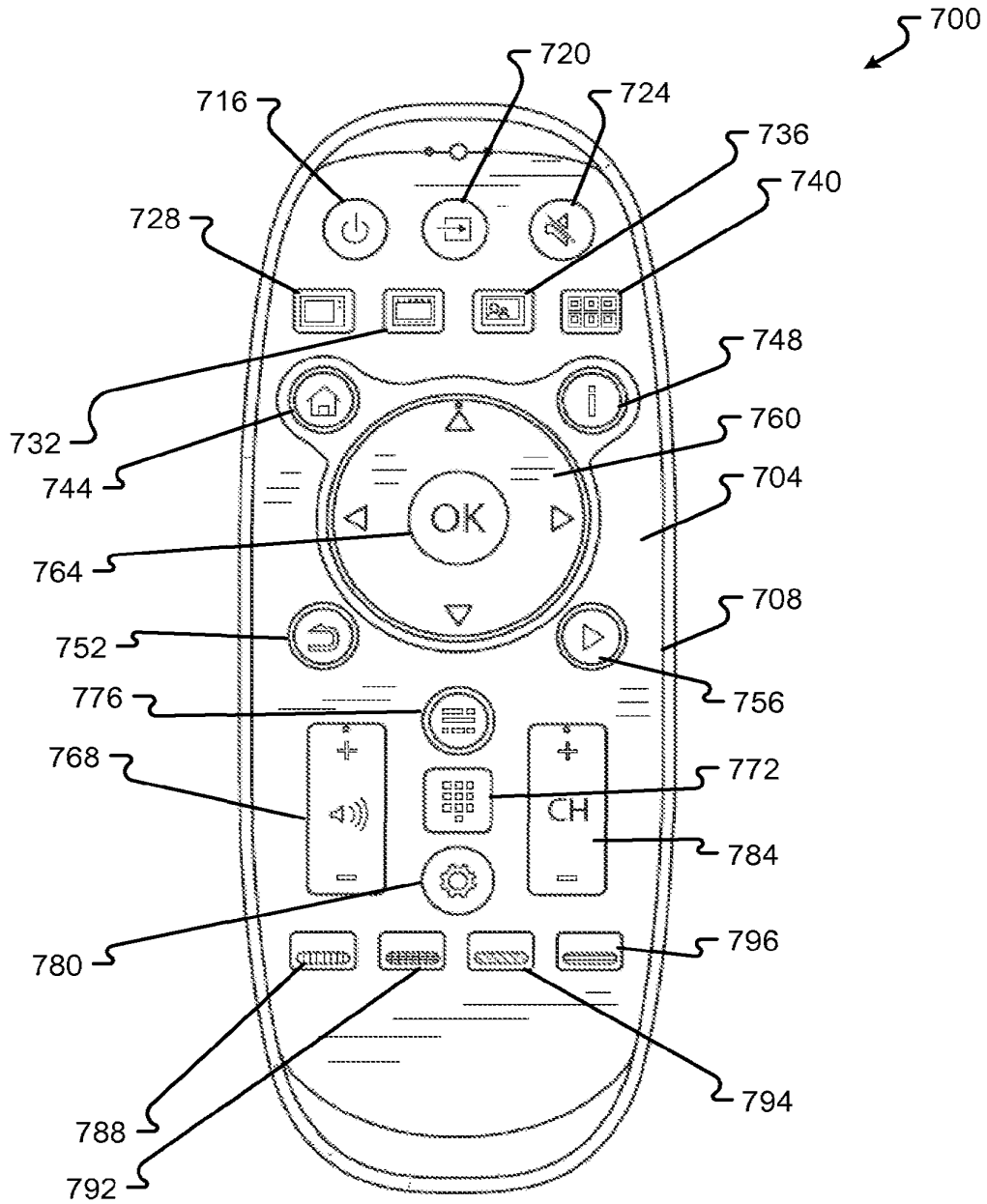

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Fig. 7

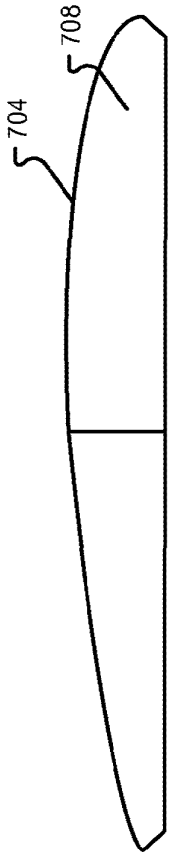


Fig. 8

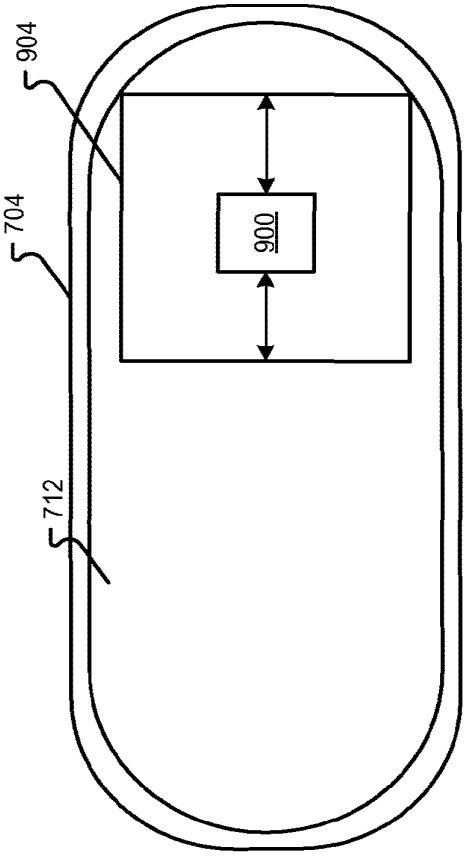


Fig. 9A

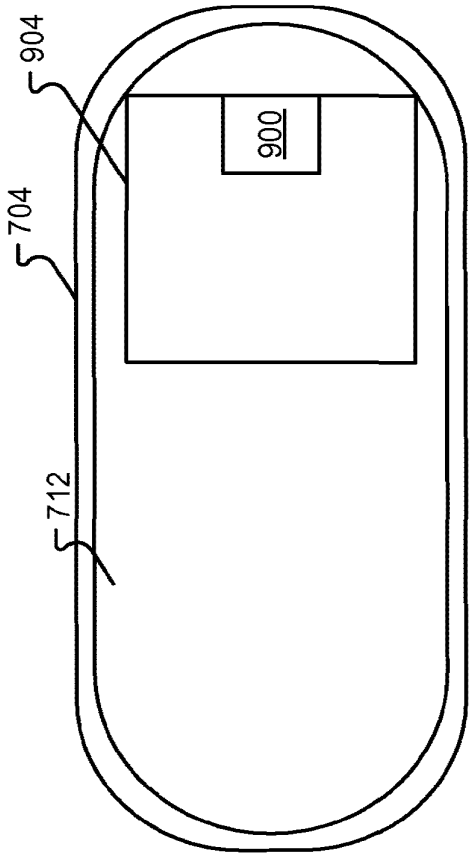


Fig. 9B

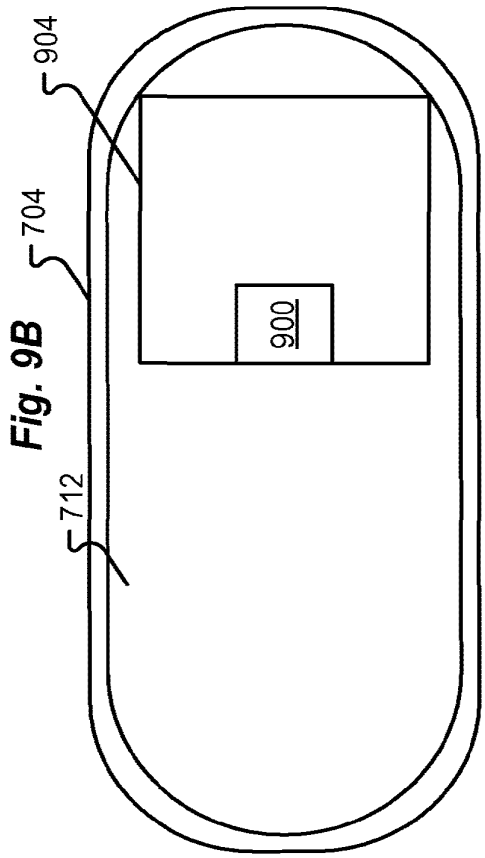


Fig. 9C

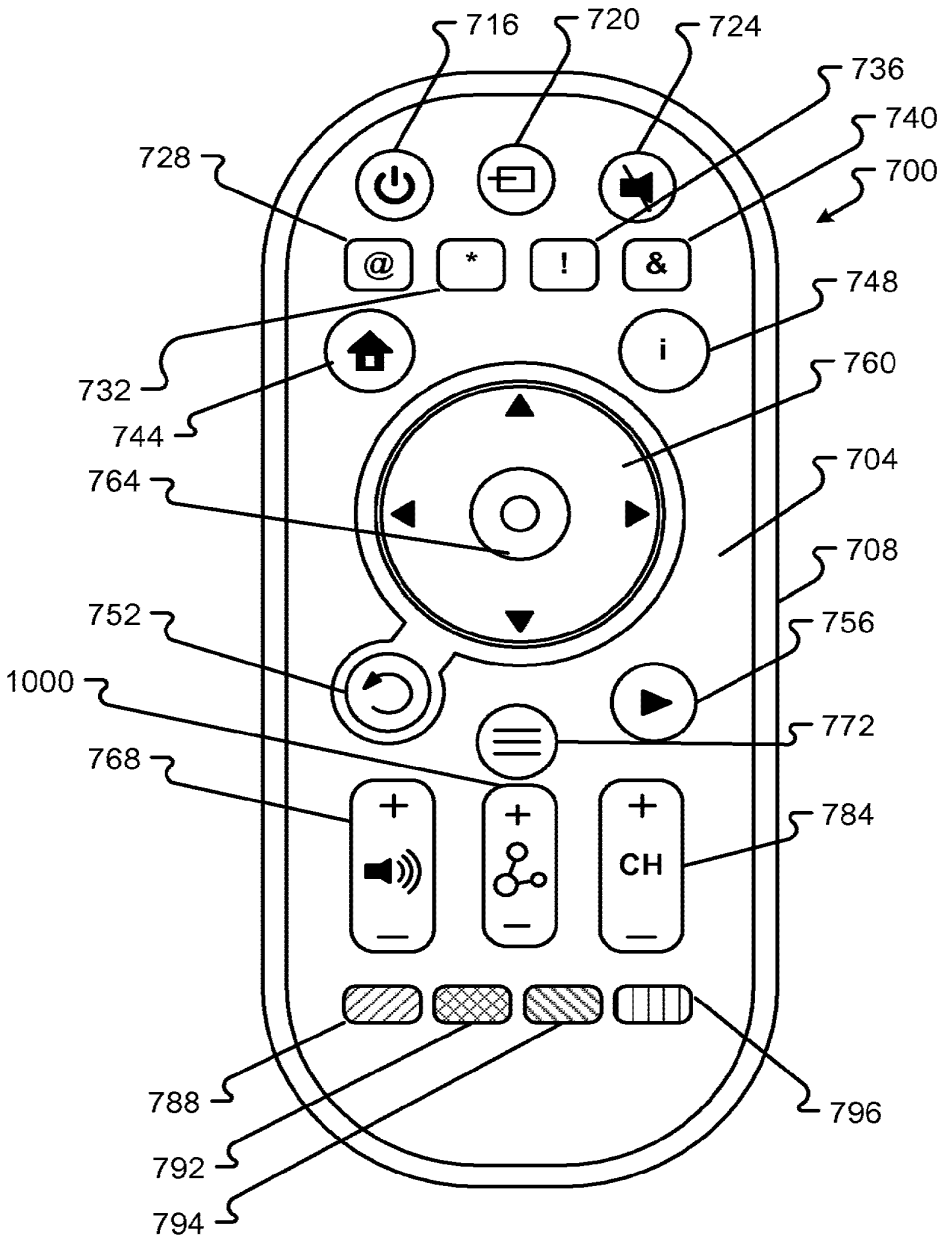

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Fig. 10

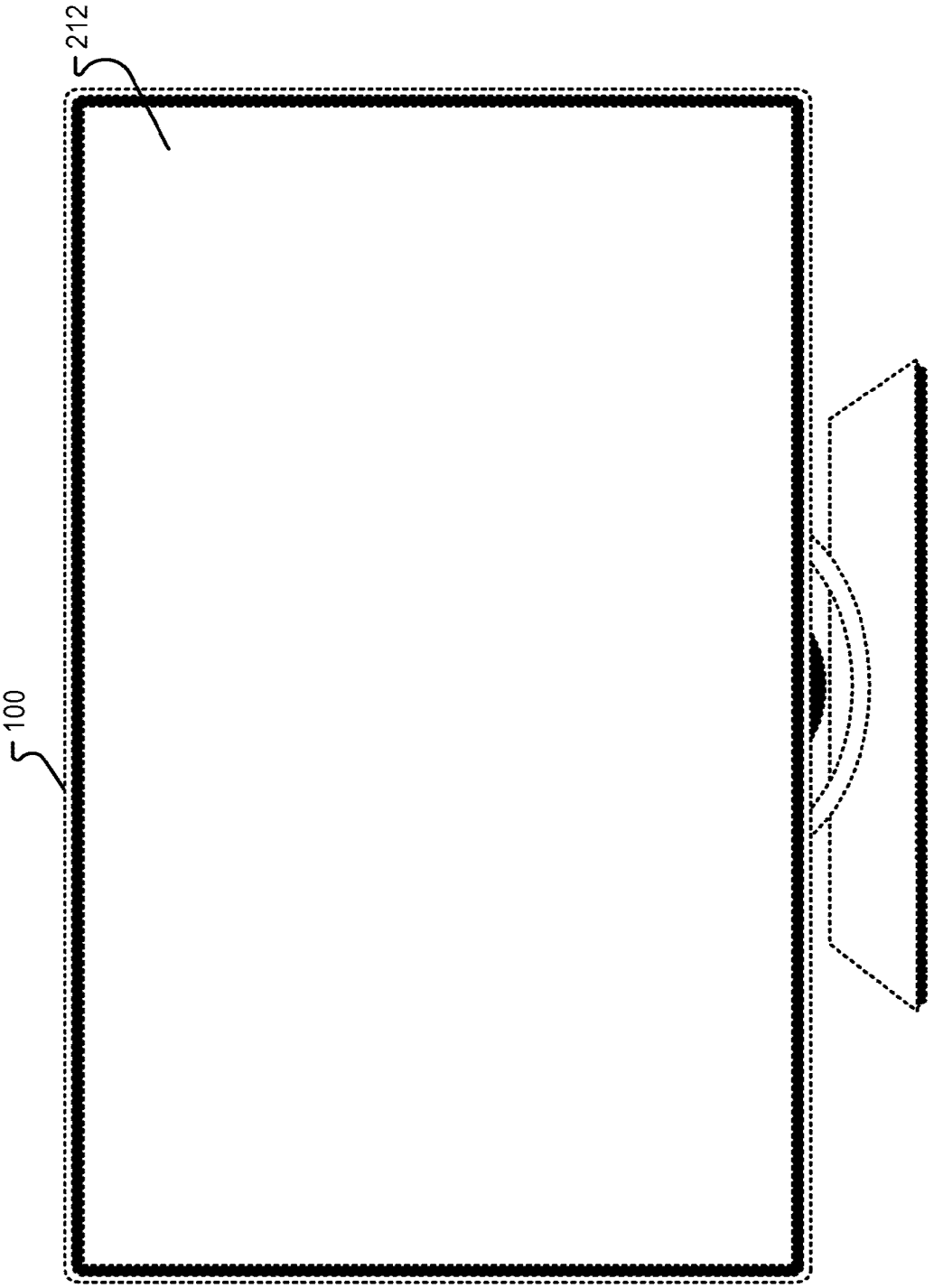


Fig. 11A

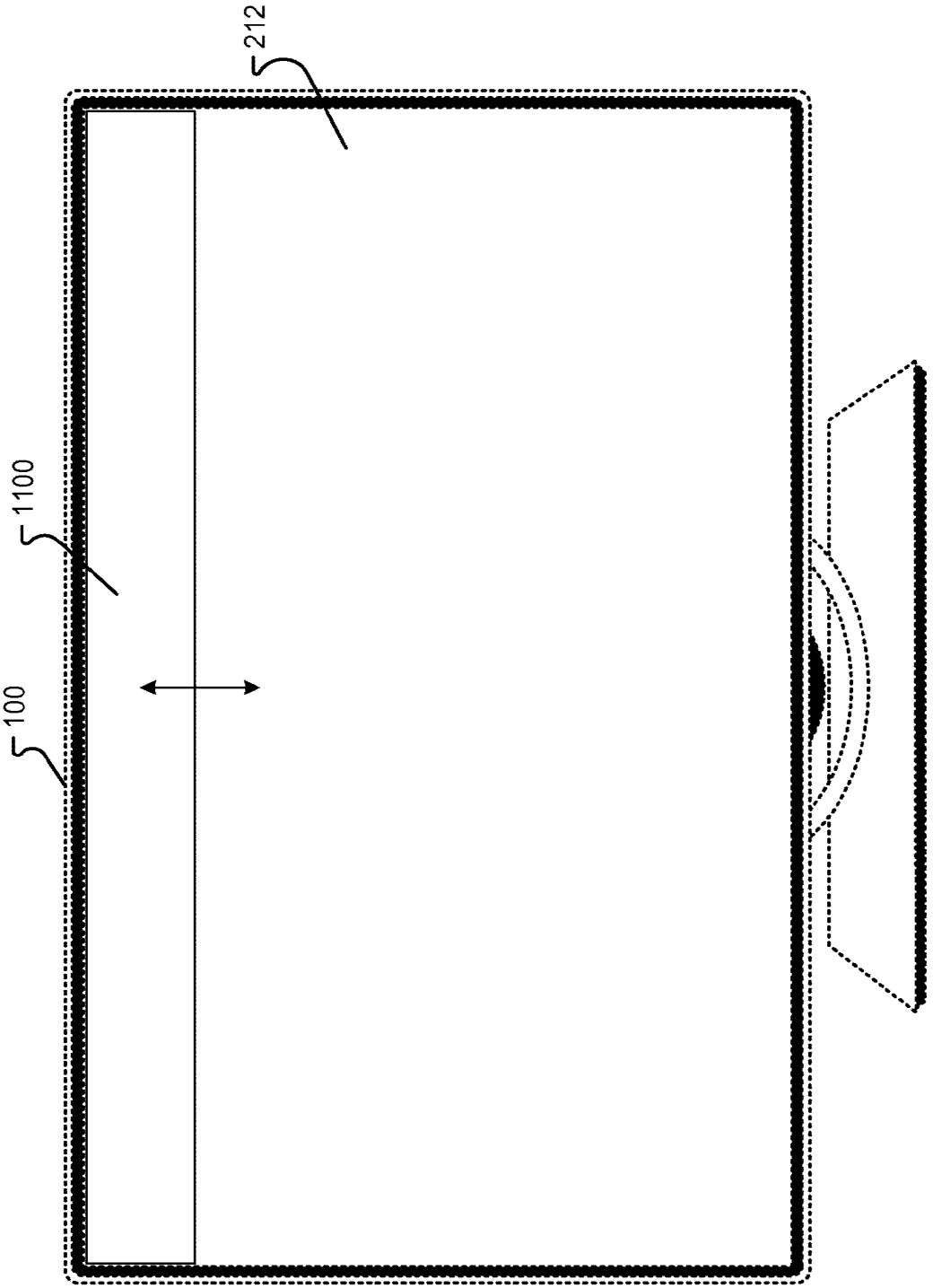


Fig. 11B

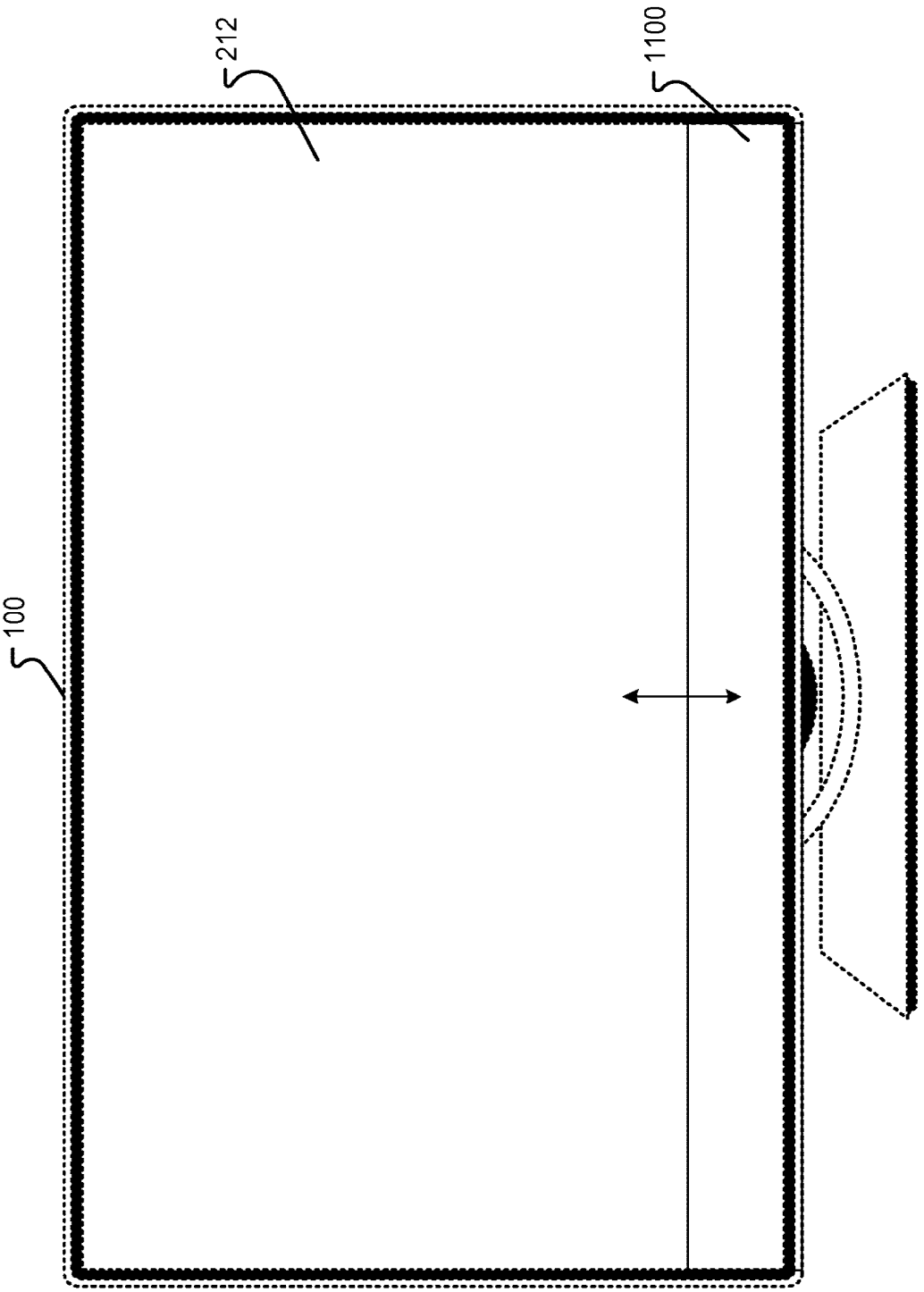


Fig. 11C

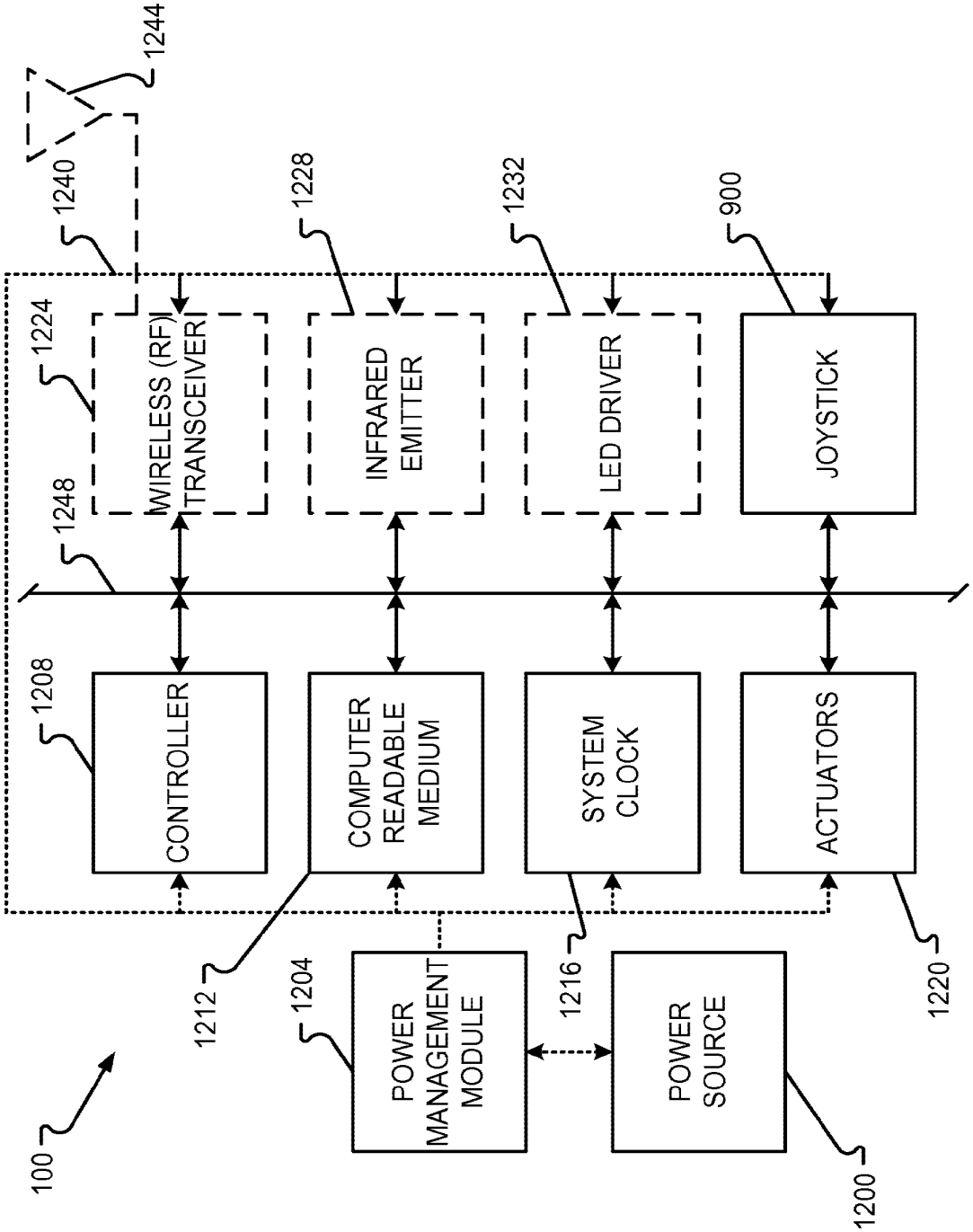

100
1200
POWER SOURCE
1216
1204
POWER MANAGEMENT MODULE
1212
1220
ACTUATORS
SYSTEM CLOCK
COMPUTER READABLE MEDIUM
CONTROLLER
1208
1248
JOYSTICK
LED DRIVER
INFRARED EMITTER
WIRELESS (RF) TRANSCEIVER
1224
1240
1244
1228
1232
900

Fig. 12

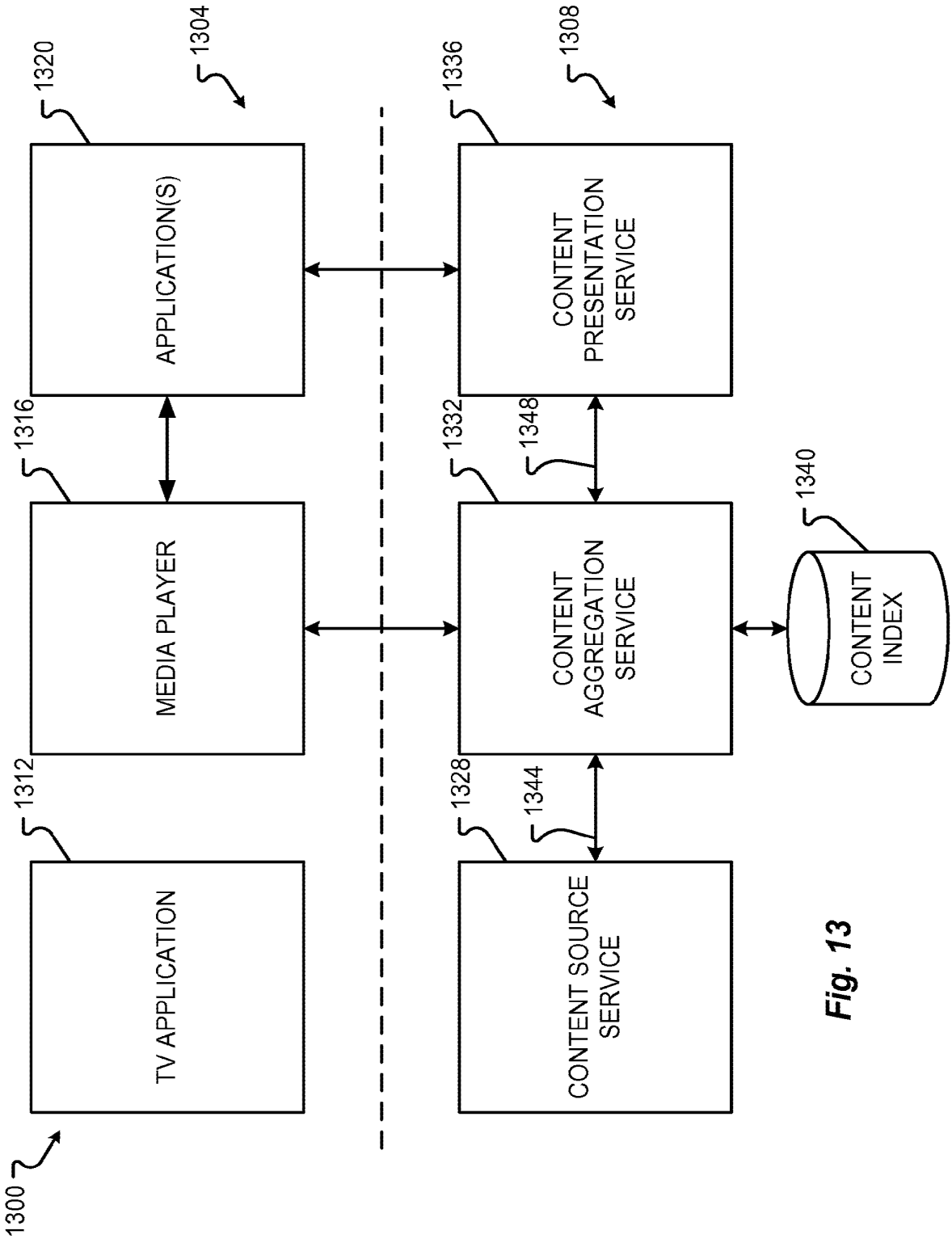

1300
1304
1308
1312
1316
1320
1328
1332
1336
1340
1344
1348
APPLICATION(S)
MEDIA PLAYER
TV APPLICATION
CONTENT PRESENTATION SERVICE
CONTENT AGGREGATION SERVICE
CONTENT SOURCE SERVICE
CONTENT INDEX

Fig. 13

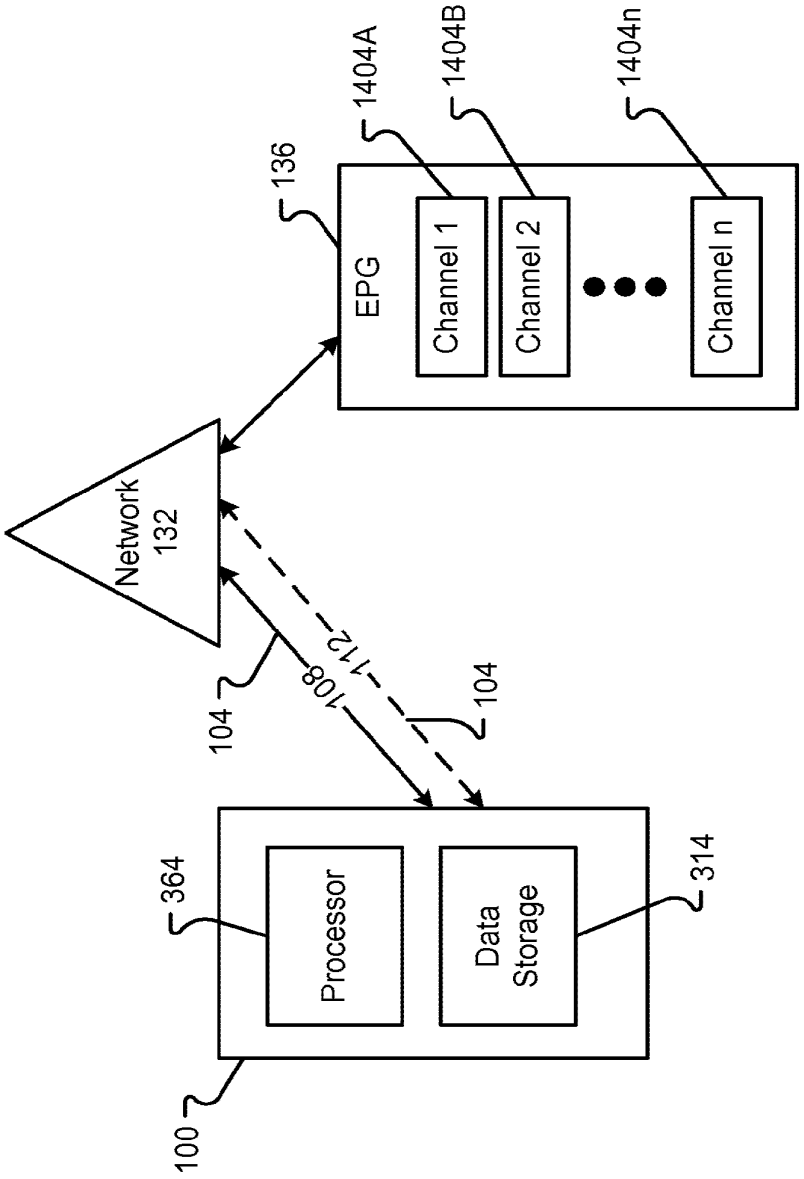

100
364
Processor
Data Storage
314
104
108
112
104
Network 132
136
EPG
Channel 1
Channel 2
Channel n
1404A
1404B
1404n

Fig. 14

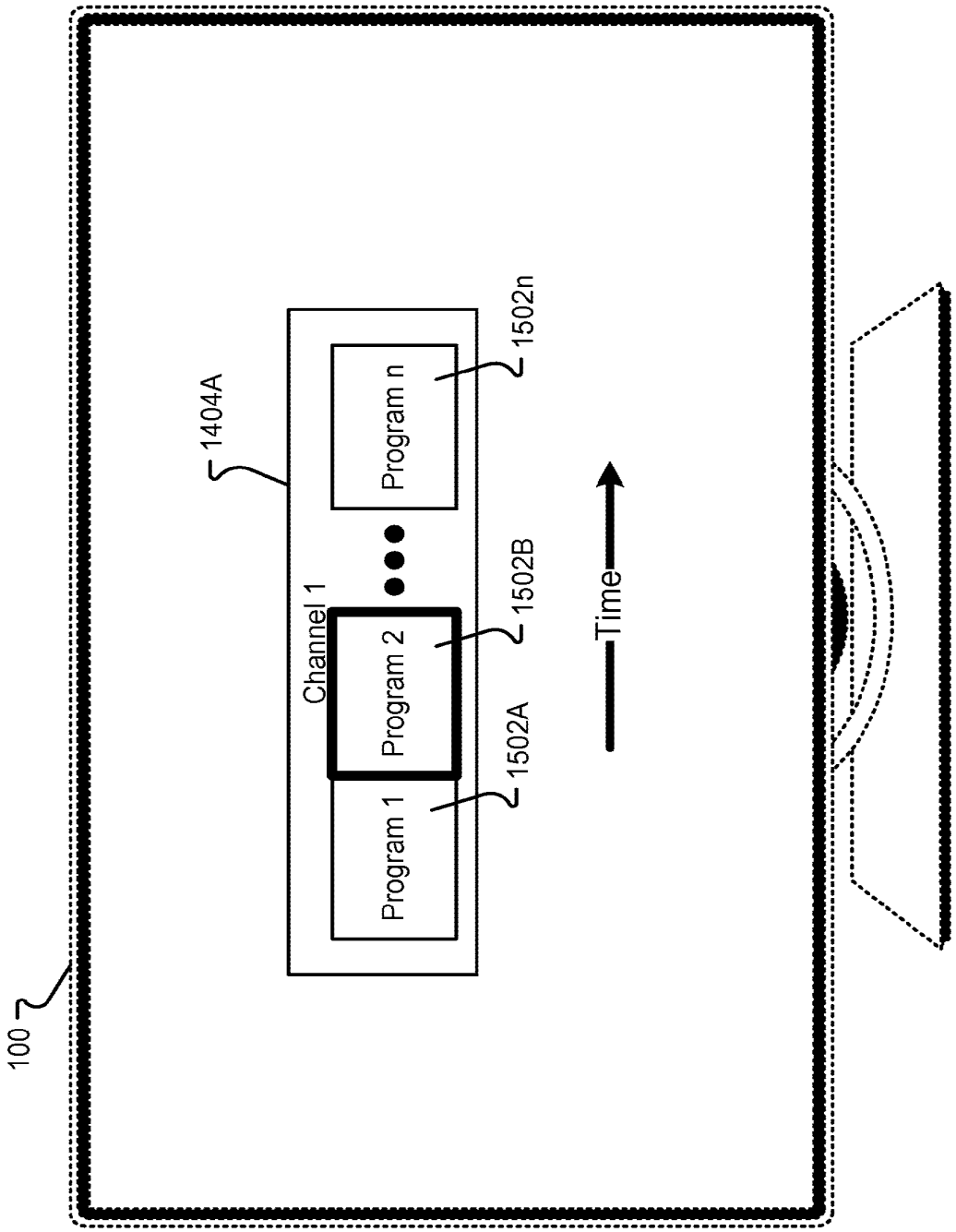

100
1404A
Channel 1
Program 1
Program 2
Program n
1502A
1502B
1502n
Time

Fig. 15

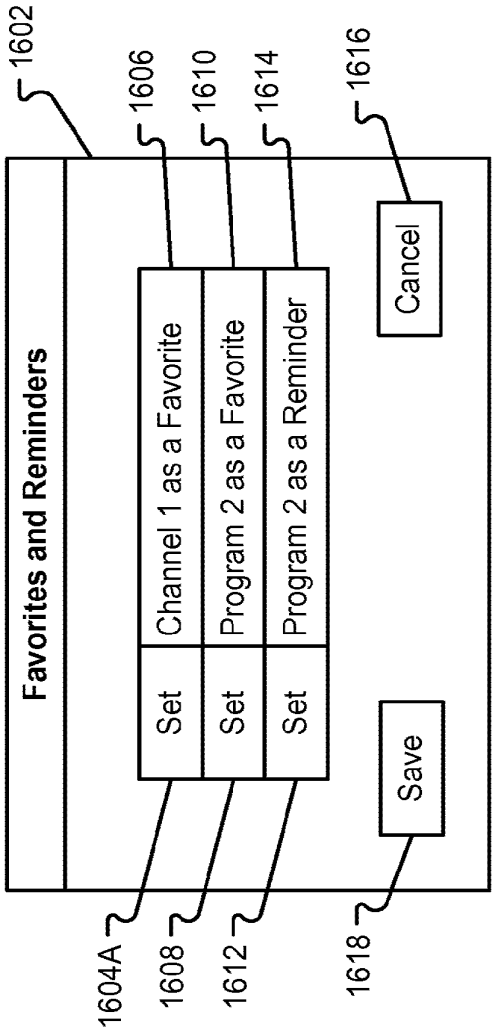


Fig. 16A

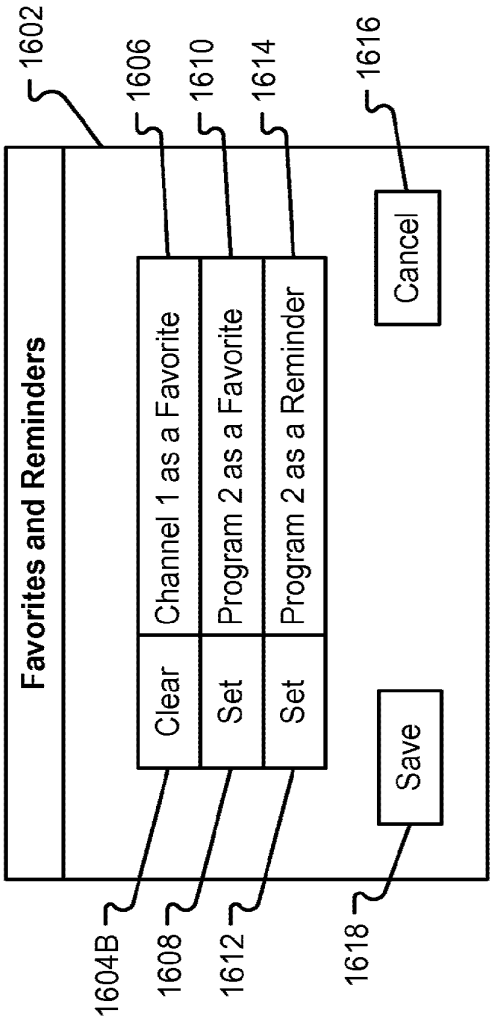


Fig. 16B

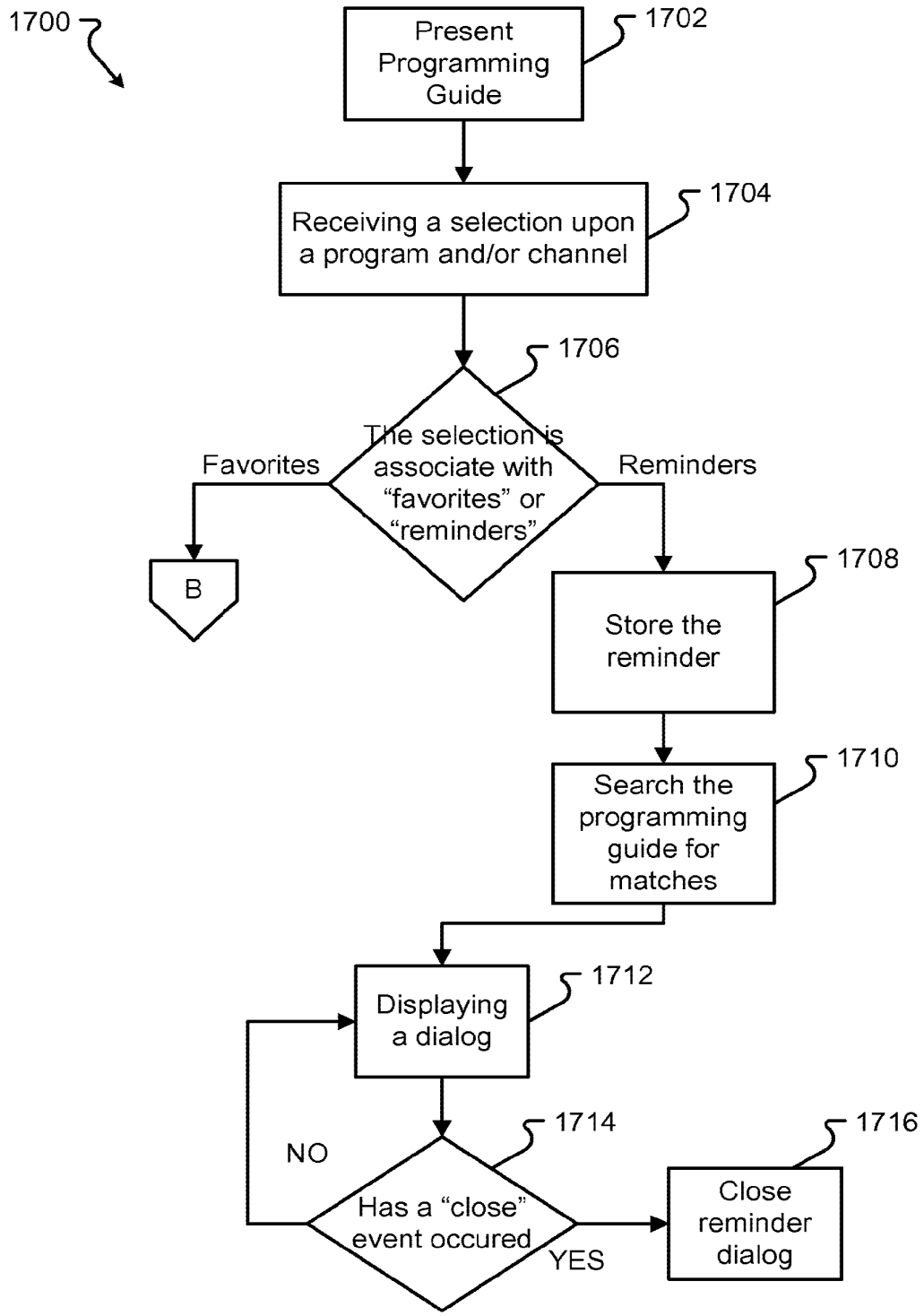

1700
Present Programming Guide
1702
Receiving a selection upon a program and/or channel
1704
1706
The selection is associate with "favorites" or "reminders"
Favorites
Reminders
B
Store the reminder
1708
Search the programming guide for matches
1710
Displaying a dialog
1712
NO
1714
Has a "close" event occured
YES
Close reminder dialog
1716

Fig. 17A

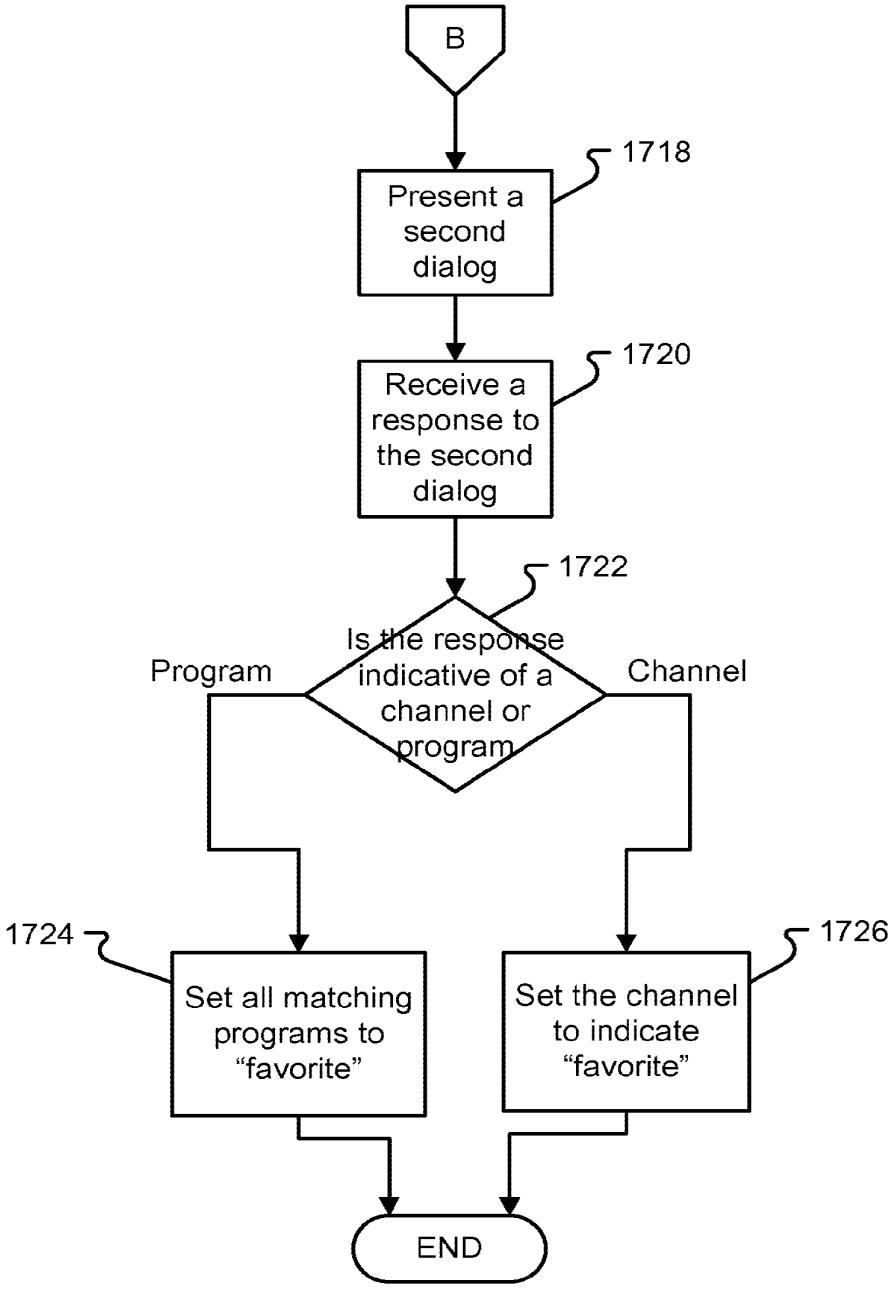

B
1718
Present a second dialog
1720
Receive a response to the second dialog
1722
Is the response indicative of a channel or program
Program
Channel
1724
Set all matching programs to "favorite"
1726
Set the channel to indicate "favorite"
END

Fig. 17B

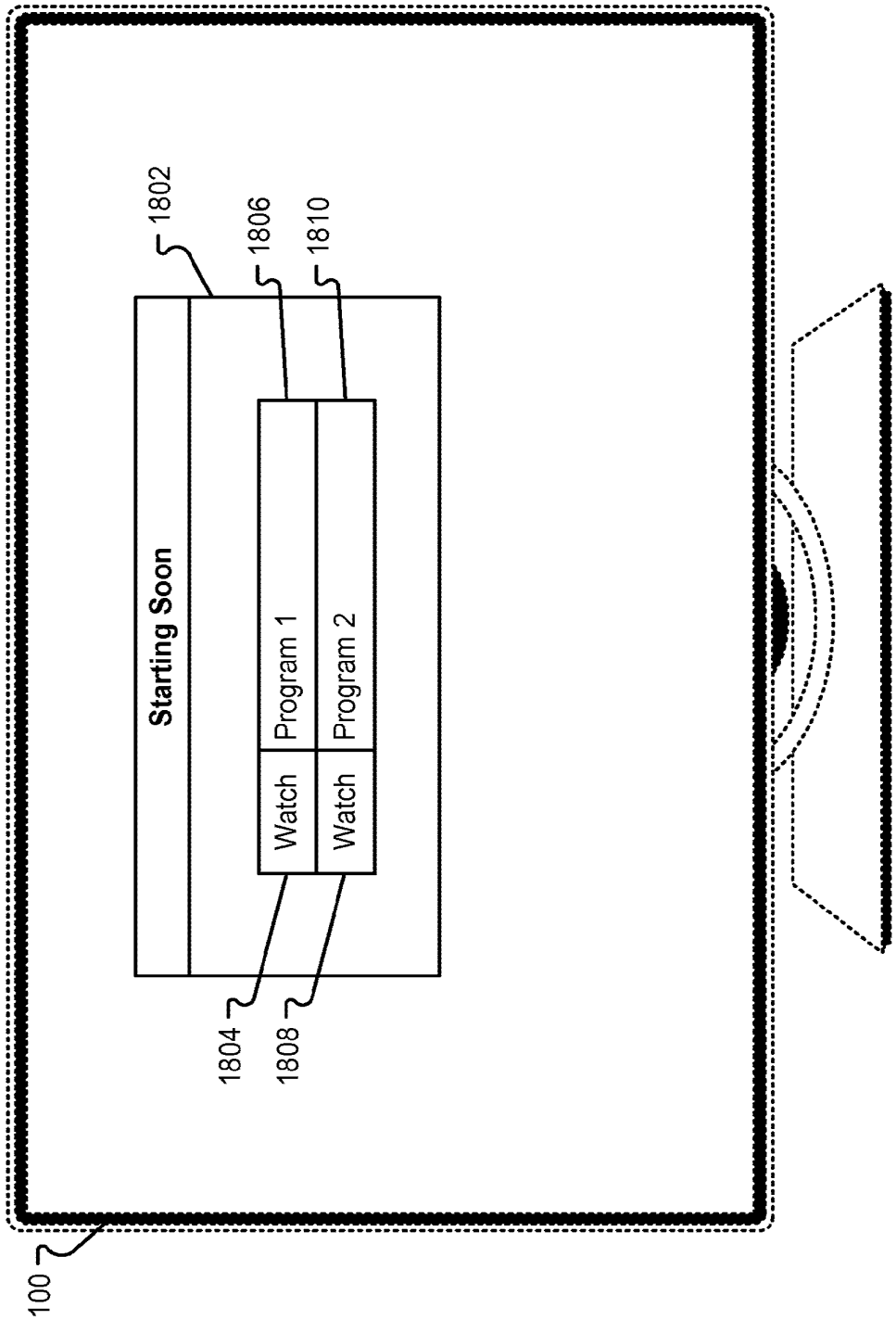

100
1802
1806
1810
Starting Soon
Program 1
Program 2
Watch
Watch
1804
1808

Fig. 18