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Supplement 5

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SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS

**ITU-T Y.1900-series – Supplement on IPTV
service use cases**

ITU-T Y-series Recommendations – Supplement 5



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Supplement 5 to ITU-T Y-series Recommendations

ITU-T Y.1900-series – Supplement on IPTV service use cases

Summary

This IPTV service use cases supplement provides a list of IPTV use cases that are informative illustrations of how IPTV services can be designed, deployed and operated. From the end-user's perspective, use cases have been categorized by distributed content services, interactive services, communication services, etc.

Source

Supplement 5 to ITU-T Y-series Recommendations was agreed on 22 May 2008 by ITU-T Study Group 13 (2005-2008).

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Supplement 5 to ITU-T Y-series Recommendations

ITU-T Y.1900-series – Supplement on IPTV service use cases

1 Scope

This IPTV service use cases supplement provides a list of IPTV use cases that are informative illustrations of how IPTV services can be designed, deployed and operated. From the end-user's perspective, use cases have been categorized by distributed content services, interactive services, communication services, etc.

2 References

None.

3 Definitions

3.1 Terms defined elsewhere

This supplement uses the following terms defined elsewhere:

3.1.1 network provider [b-ITU-T Q.1290]: The organization that maintains and operates the network components required for IN functionality. A network provider may also take more than one role, e.g., also acting as Service Provider.

3.1.2 service provider [b-ITU-T M.1400]: A general reference to an operator that provides telecommunication services to Customers and other users either on a tariff or contract basis. A Service Provider may or may not operate a network. A Service Provider can optionally be a Customer of another Service Provider.

3.2 Terms defined in this supplement

This supplement defines the following terms:

3.2.1 application provider: The entity providing IPTV-related user applications.

3.2.2 content aggregator: A player in the IPTV service delivery chain whose role is to aggregate content, e.g., forming a TV bouquet composed of several TV channels.

3.2.3 content provider: The entity owning content or being licensed to sell content assets whose role is content delivery.

3.2.4 electronic program guide (EPG): A structured set of data that provides information on available content accessed by end-users.

4 Abbreviations and acronyms

This supplement uses the following abbreviations and acronyms:

A/V	Audio/Video
DVD	Digital Versatile Disk
DVR	Digital Video Recorder
EAN	Emergency Alert Notification
ECC	Electronic Content Guide
ECI	Emergency Communications Information

ECN	Emergency Communications Notification
ECR	Emergency Communications Report
EPG	Electronic Program Guide
FTP	File Transfer Protocol
IM	Instant Messaging
IPPV	Impulse PPV
MoD	Music on Demand
NVoD	Near VoD
OPPV	Order-ahead PPV
PDA	Personal Digital Assistant
PPU	Pay Per Use
PPV	Pay Per View
PVR	Personal Video Recorder
QoS	Quality of Service
SMS	Short Message Service
UCC	User Created Content
VCR	Video Cassette Recorder
VoD	Video on Demand
VoIP	Voice over IP

NOTE – In the context of this supplement, the abbreviation VoD includes video, audio and associated metadata.

5 Conventions

In this supplement, there are no specific conventions.

6 IPTV service descriptions and use cases

This clause provides descriptions and use cases of various IPTV services, which are not exhaustive. It is categorized by their service characteristics from the end-user's perspective.

6.1 Distributed content services

6.1.1 Broadcast services

Broadcast services comprise a one-way transmission of content from one point (the source) to two or more points (the receivers). The end-user has no control over the content or timing of what he or she receives, apart from the ability to select a particular channel.

6.1.1.1 Linear TV

Linear TV is a broadcast service that is the same as the conventional form of television services that are provided by cable, terrestrial and direct-to-the-home satellite operators, where the programme content is transmitted according to a defined schedule and is intended for real-time consumption by the end-user. The service, therefore, provides an essentially continuous stream flowing from the content provider to the terminal device located in the end-user network.

Linear TV includes (but is not necessarily limited to) the following approaches:

- **Linear TV with audio and video:** Audio and video (A/V) signals are broadcasted and distributed to the downlink without end-user control of the broadcast.
- **Audio only:** Audio signals are broadcasted and distributed to the downlink without end-user control of the broadcast.
- **Linear TV with audio, video, and data:** These A/V services are combined with interactive data for the related or supplementary information of A/V programs using bi-directional links. The end-user can watch the downlink A/V stream and can simultaneously access more detailed or value-added information via the uplink.

Figure 6-1 shows an example of a linear TV service with client PVR.

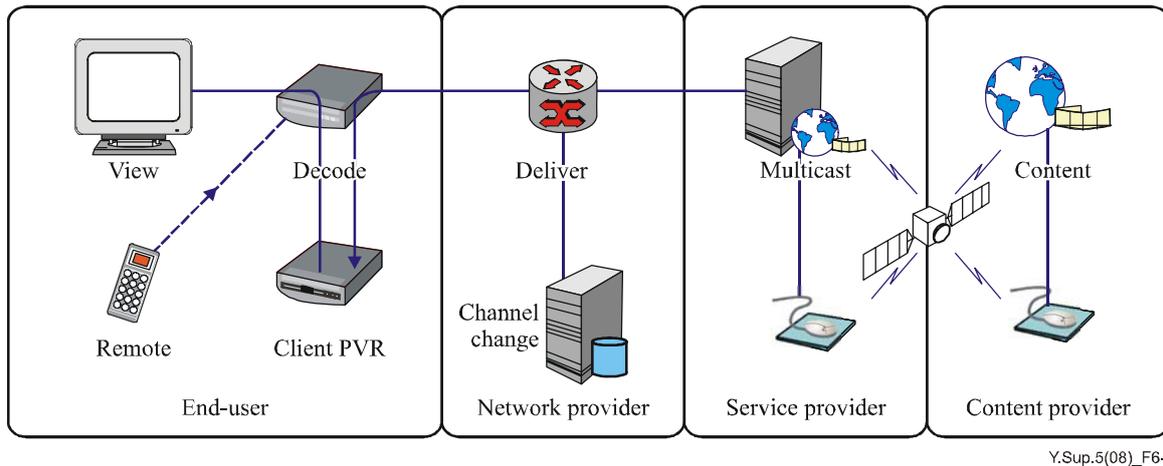


Figure 6-1 – Example of linear TV with client PVR

Figure 6-2 shows a use case of linear TV service.

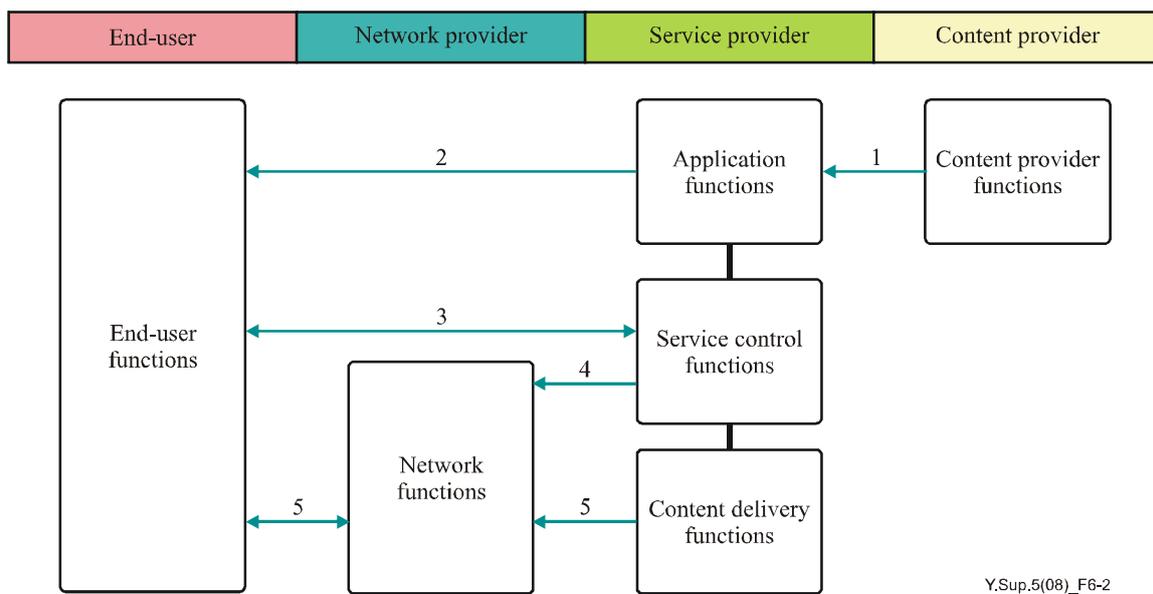


Figure 6-2 – Use case of linear TV

- 1) Contents (video, audio, data, etc.) with related metadata and content protection (CP) data are produced and managed by the content provider, and are delivered to the service provider.
- 2) The service provider then formats the data prepared by the content provider into IP packets, and controls the program schedule and distribution. Then, the scheduled channel information is provided to the end-users, indicating the content is ready for consumption.
- 3) When an end-user wants to access the linear TV service or selects a channel, the request is sent to the service provider. This procedure may include service negotiation (e.g., QoS, price, etc.) and service availability confirmation procedures.
- 4) If the end-user is granted access to the linear TV service, the service provider interacts with the network provider to transmit the requested content. This procedure may include reserving and allocating network resources to guarantee the contracted service level.
- 5) Upon completion of step 4, the service provider supplies channel access information (e.g., the multicast address assigned to the requested channel) to the end-user. Then he or she can access and watch the channel.

6.1.1.2 Linear TV with trick mode

Linear TV with trick mode enables the end-user to pause linear TV. For the ability to skip content and for other capabilities (e.g., instant replay), the use of PVR is required. The personal video recorder (PVR) provides capability of end-user-controlled electronic device that records Linear TV and stores it in a digital storage facility, either in stand-alone set-top boxes or in the network. This capability can support "time-shifting", "trick modes", and complementary convenience functions, such as programming and remote control by PDA, networked PC, or web browser.

Figure 6-3 shows a use case of a linear TV service with trick mode:

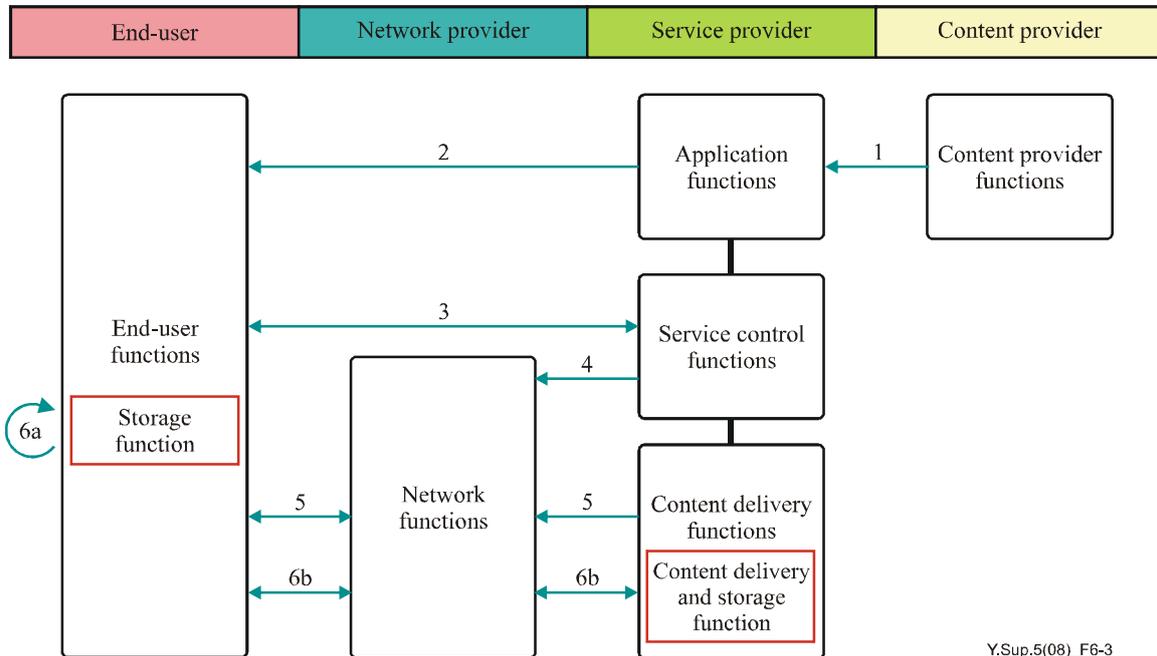


Figure 6-3 – Use case of linear TV with trick mode

Steps 1 to 5 are the same as those depicted in Figure 6-2.

- 6a) When the end-user's IPTV terminal has its own storage capability and the end-user requests any trick mode function, the programmed content is recorded by the storage function and may be displayed later according to the end-user's selection or the constraints provided by the content protection metadata.
- 6b) If the end-user requests the trick mode service without any local storage capability (e.g., embedded in his or her IPTV terminal), then the programmed content is recorded in the storage facility managed by the service provider. The selected content can then be displayed later by the end-user, according to the constraints provided by the content protection metadata.

6.1.1.3 Pay per view

Pay per view (PPV) is a streaming service where end-users can purchase events or programs to be seen on IPTV terminal device. The user can buy the PPV service, e.g., via an on-screen guide, a telephone, or through the Internet, and see the brought events or programs at any time within the expiration date.

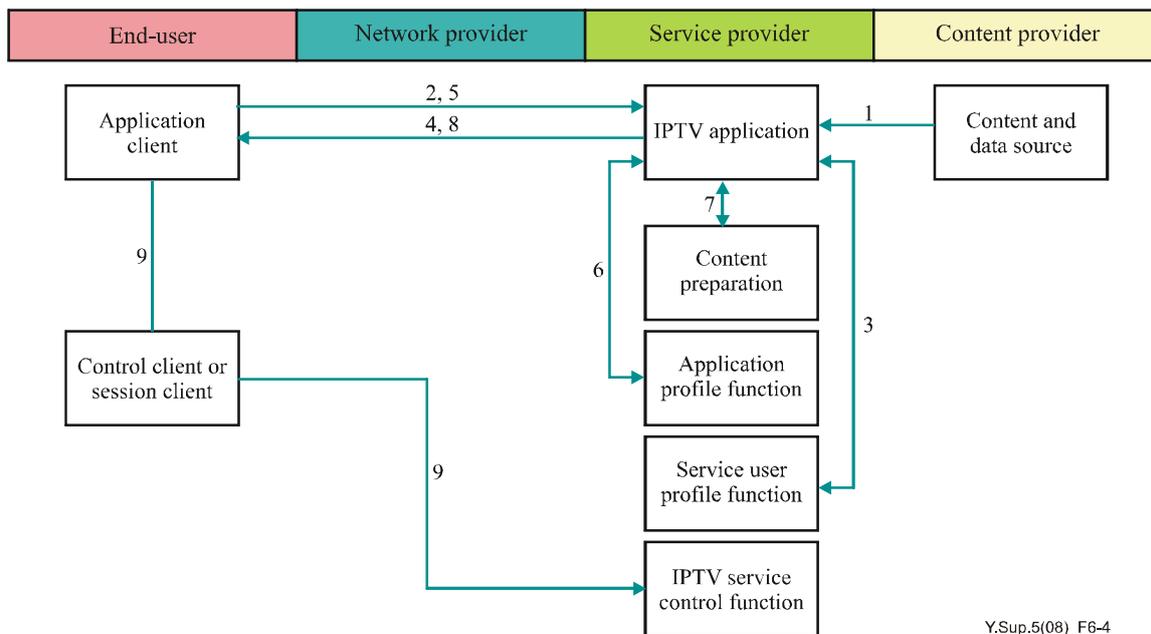
- Order-ahead PPV (OPPV): The ability to order PPV programming ahead of time.
- Impulse PPV (IPPV): The ability to order PPV programming impulsively.

6.1.1.4 Electronic program guide (EPG)

An electronic program guide (EPG) is an on-screen guide to scheduled programs. It contains additional descriptive information, and enables a viewer to navigate, select and discover content by time, title, channel, genre, etc., by using a remote control, keyboard, touchpad or even phone keypad. Generally, an EPG can be displayed in several layouts, such as mosaic EPG, box EPG, text EPG, mini EPG, tree EPG, etc., possibly depending on the service provider's business model.

Traditionally, in broadcast services, EPG service has been provided to enable end-users to easily browse television or live video content listings in an effort to easily find and select television content to view and/or record. According to today's typical use of the EPG service, an EPG is an on-screen guide used to display scheduled broadcast television programs, allowing a viewer to navigate, select, and discover content by time, title, channel, genre, etc. In the future, IPTV services will support an EPG that will display all available content. In other service offerings detailed in this supplement, an EPG is not relevant. On-demand services may use some form of content catalogue to enable easy browsing and selection of content, but this is not live content and an EPG would not be used in this "catalogue" type of scenario. Also, an EPG may be an end-user interactive service, but it is not a bidirectional interactive service for end-user interaction with a server or headend.

Figure 6-4 shows a use case of EPG service.



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Figure 6-4 – Use case of EPG

- 1) The content provider delivers the content to the service provider.
- 2) The end-user turns on the user terminal.
- 3) The service provider's IPTV application retrieves the available service list for the user according to the service user profile.
- 4) The IPTV application delivers the list of available services and content to the end-user terminal.
- 5) The end-user selects one of the available services, such as broadcast services, on-demand services, etc. The end-user can search for certain programs and content using specific criteria, such as genre, channel number, etc. In a search service case, steps 5, 7 and 8 are repeated until the user finds the desired programs and content.
- 6) To provide personalized information to the user, the IPTV application retrieves the preferred program and content information (i.e., genre, channel, etc.) through the application profile function. The end-user's preferences may be derived from the history of the programs and content which the user frequently chooses.
- 7) The IPTV application retrieves through the content preparation function the content metadata based on the program and content information preferred by the user or the search conditions of the user.
- 8) The IPTV application generates an EPG screen, including the scheduled service program and content lists, using the preferred program and content information or the search condition as well as the retrieved content metadata. Finally, it delivers the EPG screen to the end-user's terminal.
- 9) The end-user selects content from the EPG screen received from the IPTV application. Once the content has been selected, it is provisioned by the IPTV service control function.

6.1.1.5 Personal broadcast service

The personal broadcast service provides the end-user with a way to advertise personal content (possibly including scheduling information) so that other end-users can access such content. This service makes the IPTV end-user a content provider. The service provider is responsible for relaying session information between the broadcasting end-user and the receiving end-users,

possibly assuming some access control functions so as to ensure that a given end-user is entitled to broadcast his or her personal content.

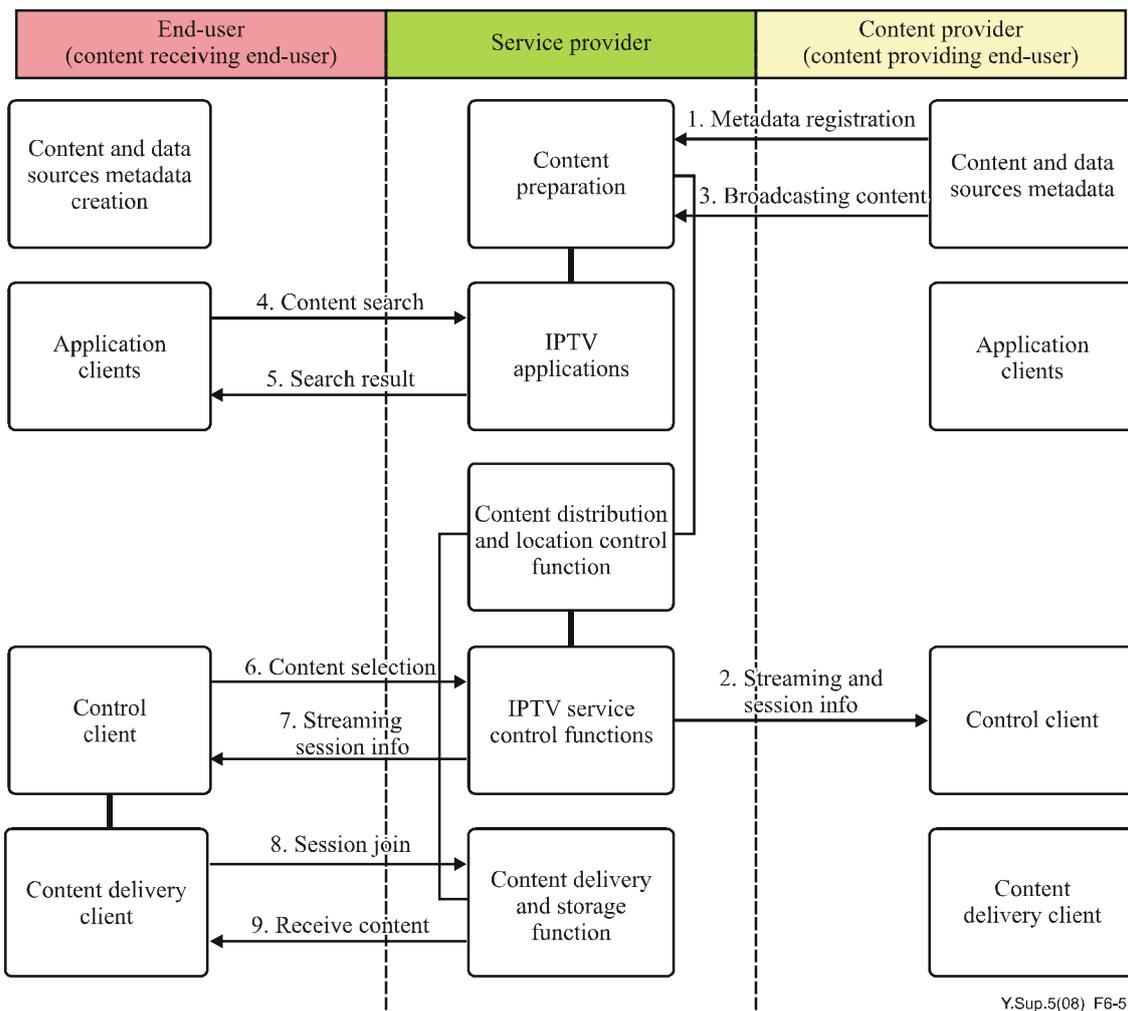


Figure 6-5 – Use case of personal broadcast service

- 1) Metadata registration:** The content providing end-user prepares information about the content and broadcasts and registers it in the metadata distribution server. This can be done by uploading a generated metadata file (e.g., by means of some authoring tools). The metadata may contain source information, such as client ID, content ID, and other content-related information.
- 2) Streaming and session info:** Once the content providing end-user registers the metadata to the service provider, the service provider may allocate some network resources for the streaming (e.g., bandwidth, multicast address) and then give this network resources information back to the content providing end-user.
- 3) Broadcast content:** The content providing end-user sends the corresponding content stream to service provider, possibly using one-to-many group communication schemes (multicast) or one-one communication flows (unicast).
- 4) Content search:** The receiving client makes a search (e.g., with a keyword).
- 5) Search result:** The metadata server responds to this search request and provides a result accordingly.

- 6) **Content selection:** The receiving client may be able to select specific content with the source information provided by the content search result. In this process, service control functions may route sessions and gather charging information.
- 7) **Streaming and session info:** The service provider sends a message which contains the actual content address or session information to the receiving end-user.
- 8) **Session join:** The receiving client requests the content delivery function to join the session with the received session information (including real location).
- 9) **Receive content:** The receiving client receives the content from the content delivery system.

6.1.1.6 Hybrid: Online and off-air TV delivery

An alternative approach for the delivery of linear TV is to enable the end-users' IPTV device to receive the broadcast signal from the broadcaster, e.g., via traditional distribution techniques such as digital satellite TV or terrestrial digital TV. This will then be combined with on-demand content delivered over the network from the network provider.

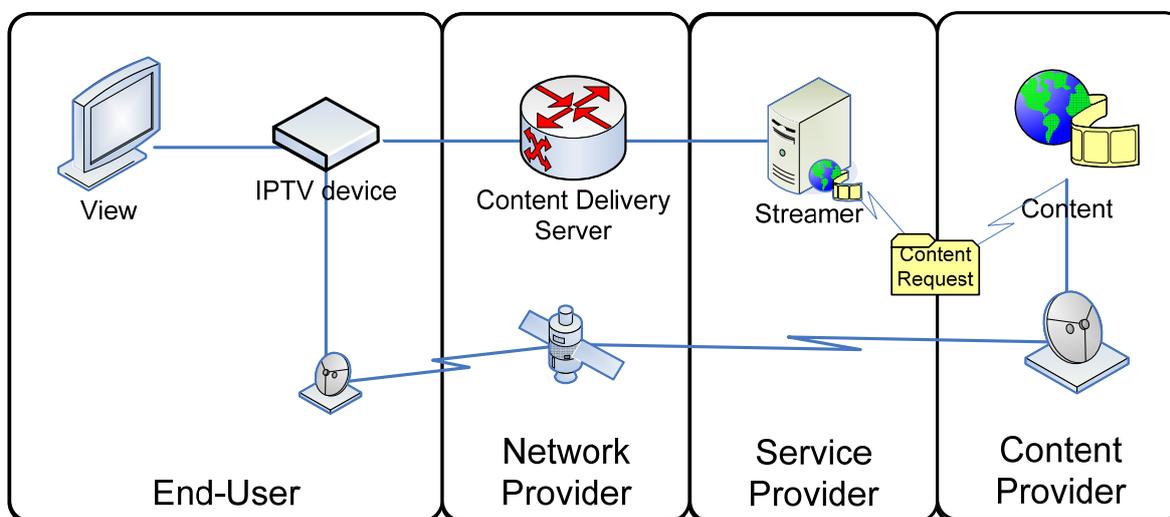


Figure 6-6 – Example of hybrid: Online and off-air TV delivery

6.1.1.7 Linear TV with multi-view service

Linear TV with multi-view is a service that consists of providing scenes with different camera angles. The end-user can select the angle from which he or she would like to watch. For example, when the end-user watches a linear broadcast of a baseball game, he or she can choose to see, the first base, third base, backfield, etc., only what the channel director prefers.

6.1.2 On-demand services

Content prepared and delivered by the content provider for retrieval is received and stored by the service provider. If necessary, transcoding functions can be performed to accommodate the storage device characteristics. The end-user can then select and retrieve such content from storage at any time, according to the constraints provided by the content protection metadata.

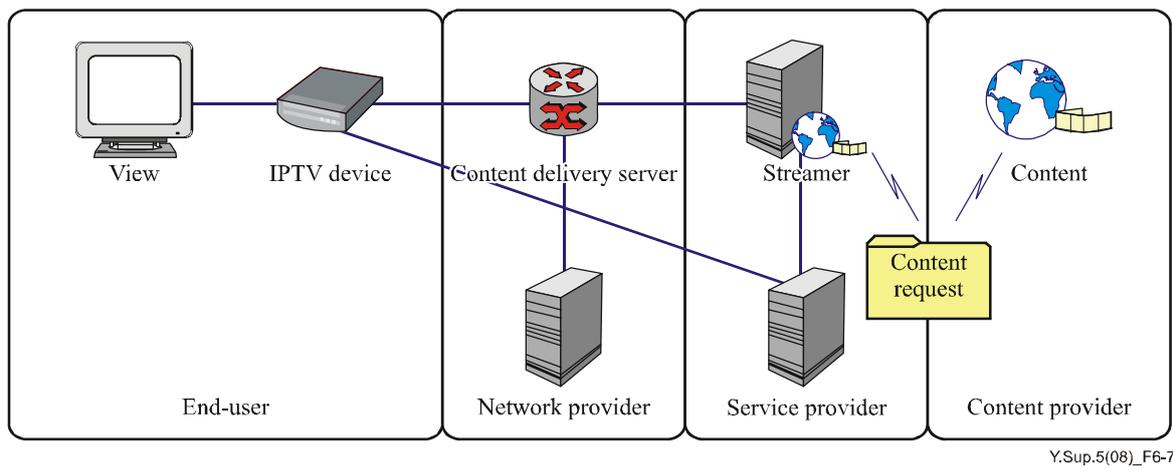


Figure 6-7 – Example of on-demand services

6.1.2.1 Video on demand (VoD)

VoD is a video service that enables the end-users to select and watch video content at any time. The end-user has full control over which program or clips to watch and when to start watching. A use case of VoD is shown in Figure 6-8.

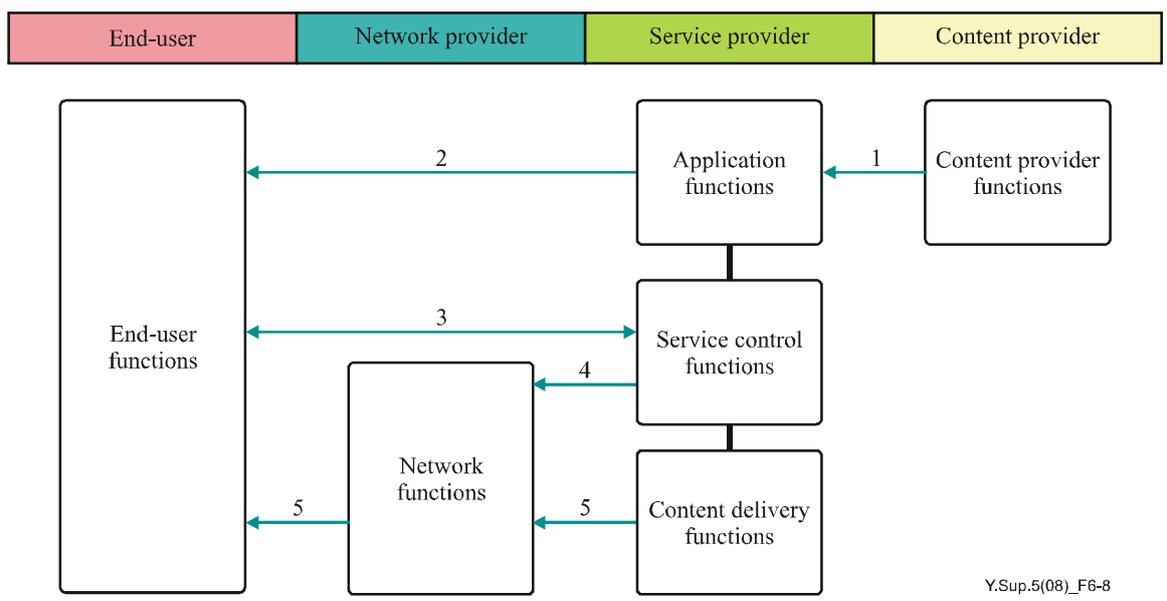


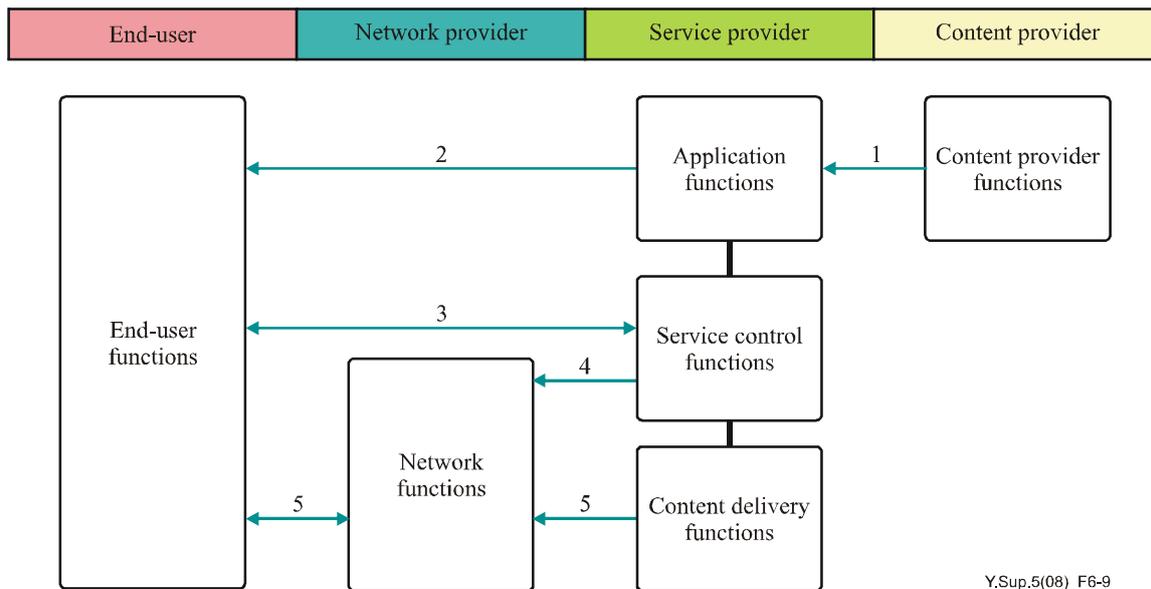
Figure 6-8 – Use case of VoD

- 1) Video content and its metadata and content protection data, produced and managed by the content provider, are delivered to the service provider.
- 2) The service provider prepares the content as per the agreement between the content provider and the service provider.
- 3) When an end-user selects VoD content, the request(s) is sent to the service provider. This procedure may include service negotiation (e.g., QoS, price, packaging option, etc.).
- 4) If the service provider grants the end-user access to the content, it interacts with the network provider to possibly negotiate the conditions of forwarding the content to the end-user. This procedure may include reserving network resources to guarantee the contracted service level.

- 5) Upon completion of step 4, the service provider supplies the content access information (e.g., the multicast address that will be used to forward the content) and the end-user can then receive the video.

6.1.2.2 Near VoD (NVoD)

Near VoD is a video service where a program is broadcasted multiple times at short time offsets (typically 10-20 minutes), providing convenience for end-users. The end-user can watch the program by tuning in at a specific point in time and waiting a maximum of the offset time for the program to start. The end-user has no control over the session except in choosing which program to watch. A use case of near VoD is shown in Figure 6-9.



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Figure 6-9 – Use case of near VoD

- 1) Video content and its metadata and content protection data, produced and managed by the content provider, are delivered to the service provider.
- 2) The service provider prepares the content according to the offset timing, as per the agreement between the content provider and the service provider.
- 3) When an end-user selects near VoD content, the request(s) is sent to the service provider. This procedure may include service negotiation (e.g., QoS, price, packaging option, etc.).
- 4) If the service provider grants the end-user access to the content, it interacts with the network provider to possibly negotiate the conditions of forwarding the content to the end-user. This procedure may include reserving network resources to guarantee the contracted service level.
- 5) Upon completion of step 4, the service provider supplies the content access information (e.g., the multicast address that will be used to forward the content) and the end-user can then receive the video.

6.1.2.3 Reserved delivery service

There are several cases where reserved delivery service can be used:

- When video delivery cannot be immediately carried out in VoD, following the end-user request, but will be triggered at a later stage by some wake-up mechanisms.
- When an end-user has subscribed to a reserved video delivery service based on some criteria (e.g., the end-user has subscribed for the delivery of new movies from a specific director or with a specific actor, etc.).

- When the service provider offers a network PVR functionality. After an end-user record request, the network PVR waits for the event to be recorded. When the content is available in the network PVR, then in some cases, the content can be delivered to an end-user's equipment without waiting for the end-user request.
- When the service provider, on the basis of known user preferences, decides to download content that is likely to be requested by the end-users to a CPE having recording features in order to avoid later network congestion.
- When the service provider decides to download commercials for insertion at content replay time.

This use case is described in Figure 6-10:

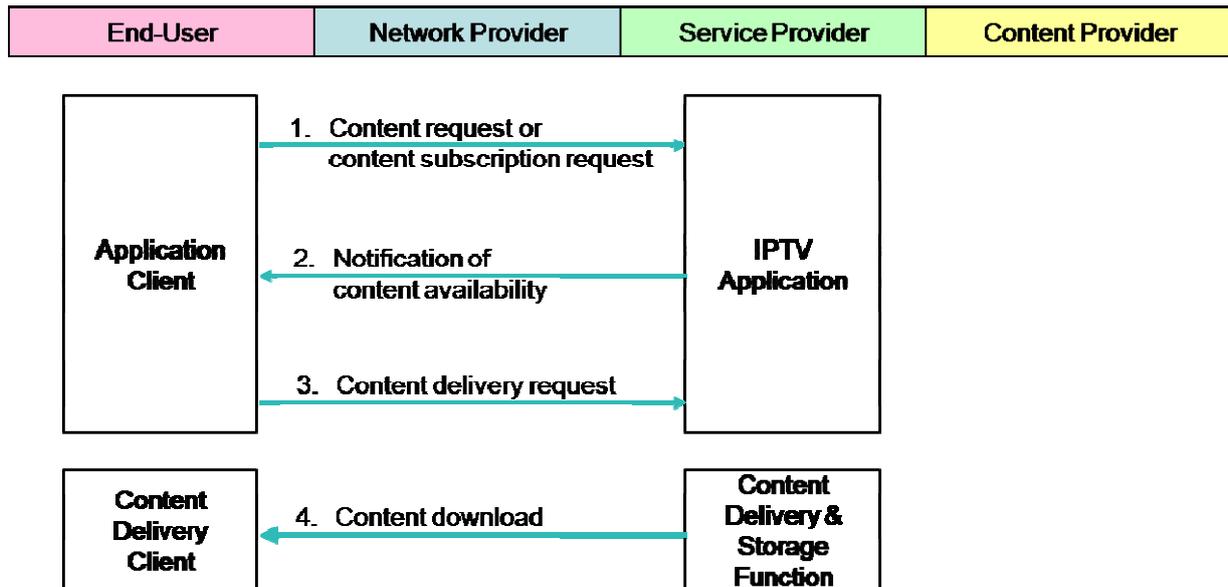


Figure 6-10 – Use case of reserved delivery service

- 1) This use case can start with catalogue browsing and content selection. It can also start with the access to an IPTV portal proposing specific content subscription (e.g., new movies, weekend football best-of, etc.). This step does not exist in the case of content pushed to the terminal device without a prior end-user request. This use case is valid only when terminal devices are provided by the service provider.
- 2) The service provider issues a notification of content availability when content to be delivered to the terminal device is available and possibly depending on other conditions (e.g., server load, subscription rate, etc.).
- 3) The terminal device issues a content delivery request depending on end-user environment conditions (e.g., availability of storage capacity, terminal device activity and load, etc.).
- 4) The content download starts upon reception of the content delivery request. If the request does not follow the notification of content availability, the server conditions might have changed and the server may reject the delivery request, delaying the reissue of another delivery request.

6.1.2.4 On-demand with multi-view service

The on-demand service with multi-view provides various camera angles in addition to the one station view provided by the video on-demand service. The end-user can select the camera angle from which he or she would like to watch. For example, when the end-user watches a baseball game, he or she can choose to see the first base, third base, backfield, etc., not only what is predefined by the channel.

6.1.2.5 Music on demand (MoD)

Music on demand (MoD) is an audio service that enables the end-user to select music or audio content as an interactive enhanced service like VoD (see clause 6.1.2.1).

6.1.3 Advertising services

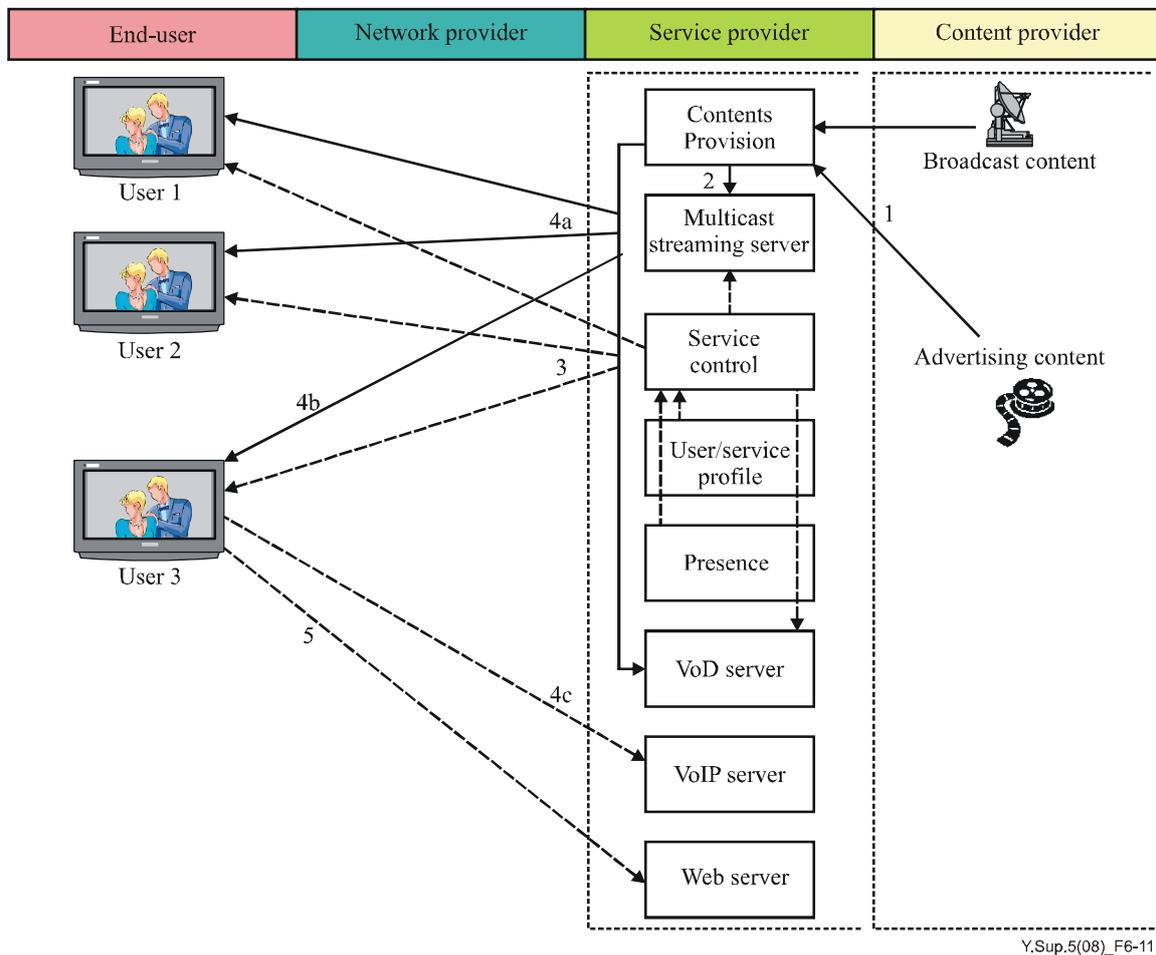


Figure 6-11 – Use case of advertising services

6.1.3.1 Traditional advertising service

Traditional advertising consists of broadcasting commercial advertising or public promotion of goods, services, companies and ideas. Every end-user located in a certain region will receive such advertisements, which are usually inserted into or between A/V programs. Each advertising service can be provided on a national basis or regionally/locally, either in the form of a video clip or within an exclusive channel according to the service type and contract.

Ads are inserted by using an ad insertion system that inserts advertisements in the video stream prior to the video being incorporated by the IPTV acquisition system. This is typically applied to a linear TV service.

Advertising content is created by content providers and delivered to the service provider. An advertisement is inserted into the video stream and delivered to the end-user. The end-user then sees the advertisement while watching the resultant program.

- 1) The content provider produces and manages content for a TV channel program with its metadata and delivers it to the service provider. The advertiser produces advertising content and also delivers it to the service provider.

- 2) The service provider inserts the advertisement in the proper TV channel content stream. The content (including the advertisement) can then be delivered to the end-user by a multicast stream.
- 3) When an end-user triggers or selects the channel service following the channel information, the end-user's IPTV terminal device connects to the broadcast/multicast server through the IPTV control/session client. This procedure may include the exchange of multicast messages as well as service level negotiation for QoS delivery purposes.
- 4a) See Figure 6-11. The end-user's IPTV terminal device receives the channel stream and the end-user can then watch the TV channel program with advertisements.

6.1.3.2 Targeted advertising

Targeted advertising is commercial advertising or public promotion of goods, services, companies and ideas, usually personalized according to the end-user's preferences or centres of interest delivered from the end-user's profile characteristics to match the audience with the campaign objective requirements. Targeted advertisements are defined according to the end-user's preferences, usage history, personal characteristics (biographic and accessibility) and usage environments (terminals, networks and natural environmental characteristics).

Advertisers want to ensure their commercials are only seen in areas where their products or services are available.

End-users want to set a preference to see only specific products or ranges of products depending on their purchasing needs, habits, lifestyle, or interests. On the same basis, they also want to set a preference to block specific products or ranges of products.

- 1) 2) These steps are the same as those in the traditional broadcast advertising service, as depicted in clause 6.1.3.1.
- 3) When a user triggers or selects the channel following the channel information, the service provider's service control function checks the user profile, presence and control to be able to send different advertisement depending on the end-user characteristics (end-user profile and presence). This procedure may include the exchange of multicast messages as well as service level negotiation for QoS delivery purposes.
- 4b) See Figure 6-11. The end-user's IPTV terminal device receives the channel stream with the advertisements included. The end-user can then watch the TV channel program with advertisements.

6.1.3.3 On-demand advertising

On-demand advertising is commercial advertising or public promotion of goods, services, companies and ideas, where the service provider delivers business advertising directory information for the end-user to navigate and select from. After navigating and selecting within the advertisement list, the end-user can watch the selected advertisement.

The IPTV service may also be used to deliver business advertising directory information (e.g., "Yellow Pages" information) regarding available business services. This information may include simple directory listings.

- 1) The advertiser (i.e., content provider) produces advertising content and provides it to the service provider.
- 2) The service provider transmits the received advertisements to the proper storage components. Then, the content list and relevant information are distributed via the network to the end-users.
- 3) An end-user navigates the list and selects an on-demand advertisement.
- 4c) See Figure 6-11. The end-user receives the stream and can watch the advertisement.

6.1.3.4 Advertising message logging

Advertising message logging is a tool used to record information about advertising messages, such as message text and click-times, etc. If necessary, advertising messages can be captured in a log file. An absolute pathname is recommended for the naming of this file because the file opens at the appropriate point for a message to be written to. For convenience and easiness, the advertising message log window can be displayed. It displays information about the logging in the form of a menu. Options on the message log window include:

- 1) View message log information
- 2) Operating record
- 3) Copy a message
- 4) Clear the message log

Message log information includes advertising message text, time, and channel. Some ads relate to interactive advertising services. Purchases can be made by clicking on an icon.

6.1.4 Time-shifting and place-shifting services

– *Time-shifting service*

This is an IPTV service in which subscribers can access and control (pause, rewind, fast forward, etc.) IPTV content without time limitations. Therefore, this service assumes that the IPTV content is saved in a repository for later use.

In a traditional TV service, the time-shifting service has been provided by a recording functionality such as VCR (video cassette recorder). Nowadays, products using hard disk drives instead of tapes and supporting capabilities, such as automatic recording with key words, the name of actor, etc., are becoming more popular, e.g., DVR (digital video recorder) or PVR (personal video recorder).

Note that the content should be stored so that end-users can retrieve it later. PVR devices store the content in a local hard drive. We can call this approach an "end-user-based time-shifting service". However, we can consider some cases in which it is not appropriate to save the content locally. For example, if the IPTV terminal is a PDA, the size of the hard drive is limited. A network-based time-shifting mechanism, such as network PVR (network personal video recorder), is needed for those kinds of cases. In this solution, hard drives are located in the service provider domain as opposed to the end-user's set-top box. In the network-based time-shifting service, the broadcasting traffic is transformed into on-demand traffic and service providers can leverage their existing VOD infrastructure. Subscribers sign up for a specific network-based time-shifting service and storage limits, and the service provider gives end-users access to the IPTV content as it is delivered to the provider's own terminals.

In summary, we can define two types of time-shifting service in IPTV: subscriber-based and network-based.

– *Place-shifting service*

This is an IPTV service in which subscribers can access (pause, rewind, fast forward, etc.) IPTV content without place limitations. That is, the end-user can see his or her subscribed IPTV content anywhere. Place-shifting basically addresses the requirements of end-users who move from one place to another, the former being the place where he or she originally subscribed to the service. This service assumes that an end-user's terminal device can be a mobile phone.

Depending on who is responsible for redistributing the IPTV traffic, two types of place-shifting service can be defined: subscriber-based place-shifting and network-based place-shifting. In subscriber-based place-shifting, an end-user device redistributes traffic to the current location of the end-user. In network-based place-shifting, the IPTV service provider forwards the IPTV traffic to the current location.

6.1.5 Supplementary content

This is defined as video, audio, textual, graphical, or other forms of content that can be optionally accessed by the user and rendered by the terminal device. It has the following features:

- It only works in conjunction with the main content.
- It is synchronous with the main content.

Examples of use are:

1) *Sub-titles and captions*

These services can be provided as textual or graphical supplementary content. Sub-titles provide a real-time on-screen transcript of dialogue for the purpose of language translation. The sub-titles and the dialogue are in different languages. Captions for hearing impaired people provide a real-time on-screen transcript of the dialogue as well as any sound effects. Different speakers are distinguished, usually by different colours. The captions and the dialogue are in the same language. This service is primarily to assist end-users having hearing difficulties. Ideally, end-users may have some control over the position and size of the presentation of this content.

2) *Audio description*

Primarily intended to assist end-users who are unable to see the video content clearly, this service provides a commentary describing the visual events pertinent to the content. The narrative passages fit between the dialogue and other significant audio content so as not to interfere. Ideally, end-users can control the volume and spatial positioning of the audio or derive it from a separate output.

3) *Sign language interpretation*

This service comes in the form of supplementary video content, usually smaller in image size to that of the main video content. The video shows an interpreter who uses hand gestures and facial expressions to convey the main audio content to sign language and lip readers. Ideally, end-users can control the position, size and background properties (solid or transparent and the colour, if solid). The temporal and spatial quality are sufficient for sign reading and lip reading.

4) *Other services*

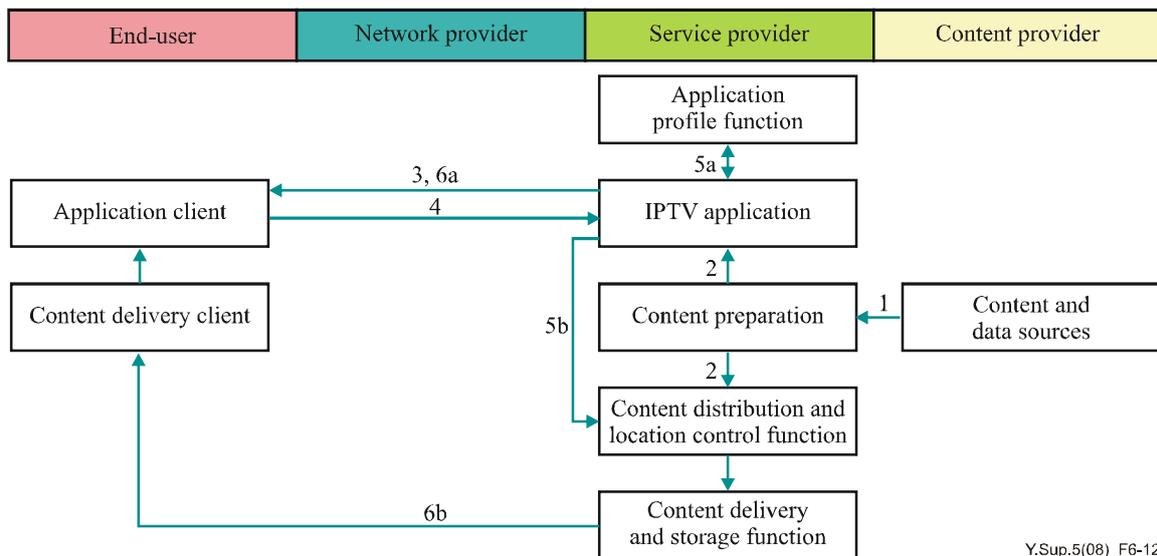
Feature films on DVD frequently offer an alternative audio track that contains a commentary on the film by the director or actors. IPTV systems could provide the same service by means of supplementary audio content. It would also be possible to optionally show the commentators by means of supplementary video content.

News services often have "tickers" of news headlines or financial information in vision. However, different users have different preferences for these information mechanisms, so they may best be provided in the form of selectable and customizable supplementary content. If this was provided in the form of supplementary textual content, terminal devices could render it in alternative formats, such as speech or Braille.

Commentators for sports events could optionally be seen by means of supplementary video content. In fact, the main audio content could be just the 'natural sound' of the sport, with a choice of commentaries available as supplementary audio content.

6.2 Interactive services

Interactive services enable end-users to send various types of requests and receive feedback with interactivity.



Y.Sup.5(08)_F6-12

Figure 6-12 – Interactive IPTV service use cases

- 1) The original content and data are produced and delivered to the content preparation function.
- 2) The content preparation function receives and processes it, then its metadata is delivered to the IPTV application function and its content is delivered to the content delivery and storage function under the control of the content delivery control function.
- 3) When an end-user uses the IPTV terminal device, the updated IPTV service EPG is transmitted based on the end-user's profile.
- 4) When the end-user selects one of the integrated Internet services, the corresponding information is transmitted from the application client to the IPTV application.
- 5a) If the selection includes end-user-specific requests, it is transmitted and processed by the application profile function.
- 5b) If the selection requests more data or content than can be stored in the service provider's storage facility, the request is forwarded to the content delivery and storage function for further processing (e.g., reserving extra storing or buffering capacity, deleting the content and sending a notification to the end-user, etc.).
- 6a) A proper response is provided by the IPTV application.
- 6b) If necessary, the requested content or data are transmitted by the content delivery and storage function under the control of the content delivery control function.

6.2.1 Information services

Information services support various types of content, such as news, weather and traffic forecasts, and advertisements. The end-user can choose content through an independent menu. Examples of the information services are program survey, news, weather, transportation, local community, etc.

6.2.2 Commercial services

Commercial services enable the end-user to purchase goods and use financial services, such as banking, stocks, shopping, ticketing, auctions, etc. For example, a personal banking service enables the end-user to view account balances, review past account activity, pay bills, and transfer money between accounts from the IPTV terminal device.

6.2.3 Entertainment services

Entertainment services are designed to provide content, such as games, karaoke, lottery, blog, and photo albums for the end-user's amusement. Games can be subdivided into single player and multi-player games, depending on the number of players. Moreover, games can be classified into network games and non-network games, depending on the level of interaction. In the case of a photo album, the end-users can view pictures they uploaded or transfer them to other people's IPTV terminal devices, mobile phones, etc.

6.2.4 Learning services

Learning services are instructional services for delivering educational content, e.g., languages, financial skill, etc., to students who are physically located in different geographic areas. Teachers and students can communicate in real time (i.e., both present at the same time) and/or non-real time (i.e., at a time of their own decision using a messaging capability) through video, audio, pictures and text, etc.

6.2.5 Medical services

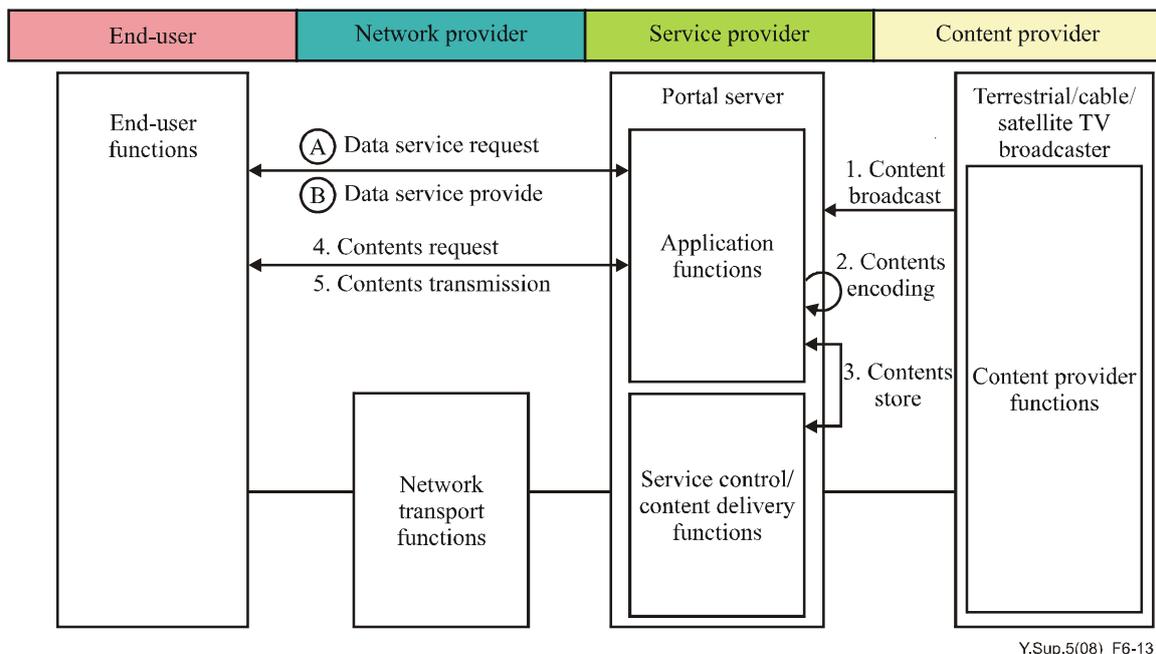
Medical services provide connection between doctors and patients who are in different geographic areas from each other. Doctors can deal with patients by remote diagnosis, remote consultation, remote medical examination, medical education, etc., in real time (i.e., both present at the same time) and/or non-real time (i.e., of their own decision using a messaging capability) through video, audio, pictures and text, etc.

6.2.6 Monitoring services

Monitoring services provide monitoring and surveillance capability. Examples of such services include health monitoring, location surveillance, etc.

6.2.7 Portal services

Portal services are branded aggregation of products and services designed to satisfy a large majority of end-users' needs, such as VoD, shopping, banking, communication, entertainment and other interactive services with a portal menu. Portal services can target end-users by broadcasting commercials, advertisements and interactive response advertising. Portal services may provide walled garden access and/or direct Internet access.



Y.Sup.5(08)_F6-13

Figure 6-13 – Use case of IPTV portal services

- 1) The content provider provides content to the service provider.
- 2) The service provider encodes the received audio/video content.
- 3) The service provider stores the content after additional processes, such as content packaging, encryption, etc.
- 4) The end-user selects the content via an EPG that is provided by the portal server.
- 5) The portal server transmits the requested content.
- (A) The end-user requests data services on the Internet, such as e-mail, FTP, messenger and instant messaging (IM).
- (B) The portal server provides the data services.

6.2.8 Interactive advertising

Interactive advertising is commercial advertising or public promotion of goods, services, companies and ideas that enable end-users to send various types of requests and receive feedback with interactivity.

The end-user clicks on an icon during an advertisement to connect to a website to get additional information on the product.

After pressing a "click-to-call" button (or clicking on an icon), the end-user initiates a free call to purchase the product.

The following steps refer to Figure 6-11.

- 1) 2) 3) These steps are identical to those described in clause 6.1.3.1.
- 4c) The end-user receives the stream and can watch the advertisement. The end-user can also click on an icon to connect to a web server.
- 5) The end-user can initiate a free call to purchase a certain product (or get more information on the product and buy it online).

6.3 Communication services

Communication services enable the end-user to exchange information, such as voice, video, and data with other end-users. It is also a key example of converged services of telecommunication and broadcasting that compound phone services (VoIP, videophone, multiple videoconference, etc.) and Internet-based communication services (instant messaging, short messaging service, e-mail, the web, etc.) with television services. It is usually provided by controlling multiple sessions for a phone service, an Internet-based communication service and a television service. IPTV communication services have a few combinations. Thus end-users can access converged services that simultaneously provide "a phone service and a TV service" or "a communication service and a television service" or "a phone service and a communication service and a television service".

Examples of communication services provided through the IPTV service include:

– *Messaging*

Messaging services are one of communication services that offer telecommunication between individual users. Messaging services may be immediate (e.g., instant messaging (IM)) or of a store-and-forward type (e.g., e-mail and voicemail).

- E-mail
- SMS (short messaging service)
- Instant messaging (i.e., messenger)
- Video-based instant messaging (i.e., channel chatting)

It is a kind of instant messaging service with the video stream data.

– *Telephony (i.e., VoIP)*

It is a general telephone call service. One example is VoIP which uses the Internet to transmit the digitized voice data packets.

– *Video telephony*

It is a kind of telephony with the video stream data.

– *Multi-party conference calls*

It is a telephone call in which more than two users take part.

– *Videoconference*

A videoconference service is a service providing bidirectional symmetric real-time transfer of motion video, text and voice between end-users in two or more locations. This real-time text differs from instant messaging systems because it is the bidirectional transmission of one character at a time. This gives the end-user the impression of real-time communications, just like voice or video systems that transport streaming media over IP. The concept is aimed at providing for rich media real-time conversation for all people in various situations. This includes, but is not limited to, people that are disabled in some way, e.g., the deaf or hearing impaired, blind people, etc., but also people who find themselves in a situation where the complementing media video, real-time text and voice together fulfil the conversation needs much better than only voice.

[b-ITU-T F.703] covers videophones with real-time text. Ideally, all videophones should offer this service, but in many cases only video and audio are provided. [b-ITU-T F.703] is useful not only for the disabled but for anyone who can benefit from the textual back-up of, for example, technical data, language translations, and verbal or signed conversations. It can be used for people who are not only deaf or disabled but people who cannot communicate in either of the two mediums, or do not have command of the spoken language used. This service is useful for documenting information within videophone calls (e.g., phone numbers and addresses) without needing a pen and paper. An example would be to get a flight booking reference when making a travel arrangement.

6.4 Others

6.4.1 Public interest services

6.4.1.1 Support for end-users with disabilities

End-users with and without disabilities can benefit from supplementary content alongside and in synchronization with the main content. The most common services are sub-titling, which provides language translation of the dialogue, and captioning, which provides a transcript of sound effects as well as the dialogue to aid people who cannot hear the sound. The sub-titling and captioning services can come in one of two forms: as a text stream that must be rendered in the receiver with a local font or as a series of graphical bitmaps. Each has advantages and disadvantages.

Another form of supplementary content is visual sign language translation for deaf people. A sign language interpreter appears in-vision, using hand gestures and mouth movements to convey the dialogue to viewers. Ideally, the position of the interpreter can be set by the end-user, as well as whether there is a solid or transparent background.

Audio description is commentary explaining the significant visual aspects of the main content, primarily for the benefit of people who cannot see it, though it is also useful for people with learning difficulties. The commentary fits between the dialogue so as not to interfere, but to work in conjunction, with the main content. Ideally, the volume level and positioning of the audio description can be adjusted by the end-user.

Digital television equipment usually provides a user interface comprising a remote control and on-screen display. Some end-users need clearer, larger text or alternative colour combinations to read the display. Others cannot see the screen at all and need alternative forms of information, such as spoken. The remote control also presents a challenge to those who cannot see or who have dexterity limitations. Voice control or a much simpler form of button control can be provided.

6.4.1.2 Emergency communications

People have different preferences, perhaps based on need, for the delivery of notifications, for example, as audible information, real-time text, or sign language. The rate of delivery to the user of the information may vary also. [b-ITU-T Accessibility Checklist] and [b-ITU-T F.790] should be consulted.

The message content should include all pertinent details and be presented in a way that is easily and quickly understood by the population. This includes multiple languages in some cases, as well as the use of multimedia for illiterate or hearing/visually impaired individuals.

Spoken messages are particularly useful when the natural language text is not well supported by technology, and for reaching anyone who is temporarily unable to read.

The terminal notifies the user of an incoming emergency alert notification (EAN) message both visually and audibly, or according to the user's preferences and capabilities, if specified.

6.4.1.3 Community-related information

These are services providing community-related information, such as announcements, bus routes, weather reports and government services related information.

One example service is the government service that deals with civil appeals, tax payments, public polls, government issue notices, etc. This could enhance government productivity and transparency.

6.4.1.3.1 Emergency communications scenarios and use cases over IPTV systems

6.4.1.3.1.1 Emergency communications generic service components

Under emergency communications circumstances, public authorities and community groups generally act as emergency message providers. The public authority is in charge of generating,

auditing and distributing emergency messages. Figure 6-14 shows how the authority and community interact with each other and the messages exchanged.

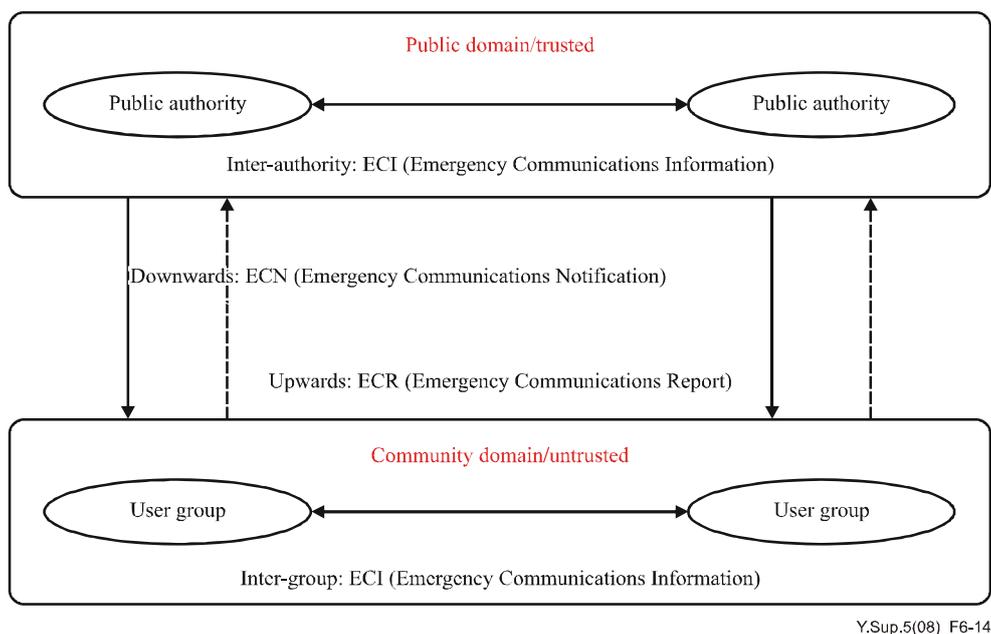


Figure 6-14 – Emergency communications components and message interaction

Present emergency messages and typical use cases across IPTV systems can be divided in to four scenarios:

- 1) Downwards with ECN usage scenario
- 2) Upwards with ECR usage scenario
- 3) Inter-group with ECI usage scenario
- 4) Inter-authority with ECI usage scenario (irrelevant to IPTV systems, hence not described in this supplement)

6.4.1.3.1.2 Downwards with ECN usage scenario

The public authority authenticates the emergency communications notification message. The ECN is then distributed to a specific community group or just broadcast. In that case, emergency communications would be interleaved with other IPTV services, such as VoD streaming. In this scenario, ECN could work in the push or pull mode. In the push mode, the top priority event messages are forced into IPTV broadcast systems, regardless of whether the end-users subscribe to such asynchronous events or not. In the pull mode, end-users can synchronously request the specific ECN of interest, such as traffic events in the specified districts or cities or weather warnings from public departments.

The key points of the downwards usage scenario are:

- 1) ECN broadcasting;
- 2) ECN distribution toward specific communities according to the service they have subscribed to;
- 3) ECN distributed in push or pull mode;
- 4) ECN media streaming has the priority over other content delivery (text, audio and video);
- 5) ECN distribution community groups correlate with IPTV end-users and multicast groups.

6.4.1.3.1.3 Upwards with ECR usage scenario

The emergency communications report (ECR) is passed through IPTV systems to a public authority (such as a fire station or a medical centre). This is in addition to legacy emergency communications. Fire warning and illegal house intrusion event reports could be passed to the public authority. Personalized notices or warnings are delivered to the corresponding authority. Different types of personalized and customized emergency services can be implemented, such as personal medical services, home visual surveillance services, or global remote medical systems. In this scenario, IPTV systems would be flexibly integrated with other service systems, such as medical centres or fire stations.

In ECR mode, IPTV systems work as emergency communication message sources with their interactive channels. These multimedia ECRs are forwarded to a specific public authority, where they are authenticated and audited.

The key points of the upwards usage scenario are:

- 1) Multimedia ECR;
- 2) IPTV systems forward the ECR to a specific public authority; and
- 3) IPTV end-user location and identification information that can also be delivered to a public authority.

6.4.1.3.1.4 Inter-group with ECI usage scenario

ECI is part of user created content (UCC) in IPTV systems. Aside from ECRs going to the public authority, ECI from one user group could be delivered to another group for inter-group warning or notifications.

6.4.1.3.2 Emergency communications scenarios in IPTV systems

6.4.1.3.2.1 Downwards with ECN usage scenario

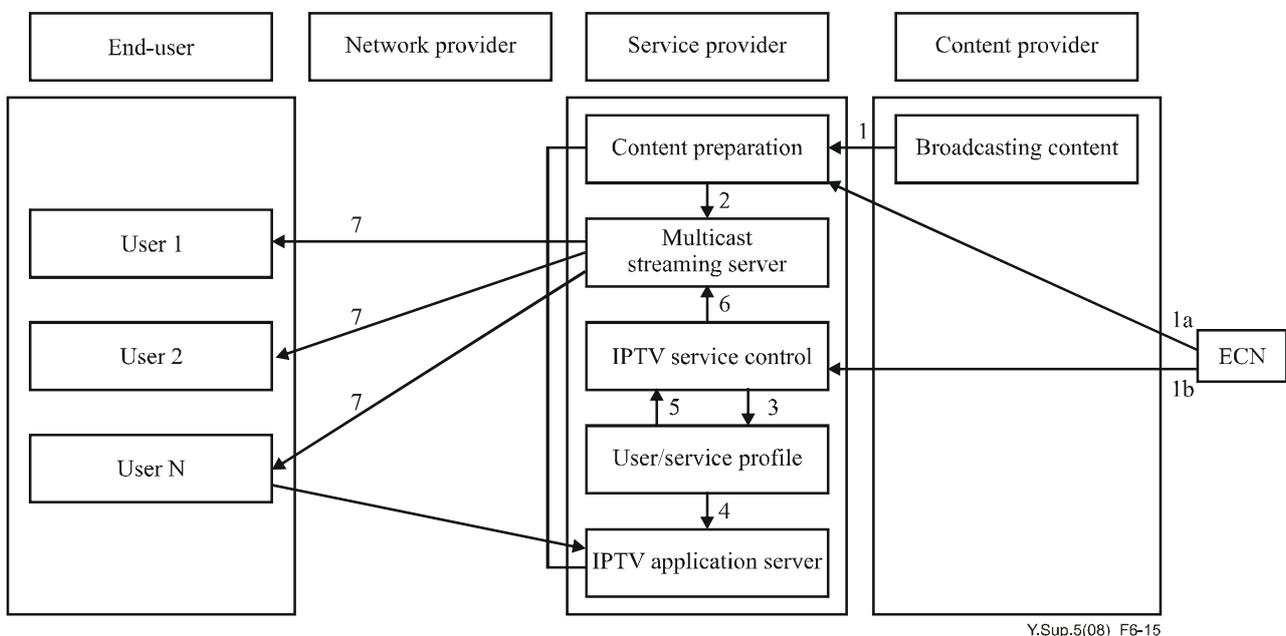


Figure 6-15 – Downwards with ECN usage scenario

- 1) The content enters the service provider domain from the content provider.
 - 1a) ECN messages are forwarded to the service provider, and the content is processed by the content preparation function.

- 1b) The public authority informs the IPTV service control function of the ECN entering the IPTV system.
- 2) Upon ECN receipt, the content preparation function interleaves the ECN with the other content or interrupts the forwarding of the other content. The aggregated content is ready for delivery by a (multicast) streaming server. Alternately, the aggregated content is delivered to the IPTV application server instead of the (multicast) streaming servers.
- 3) The IPTV service control checks the available ECNs then checks end-user or group profile and service information to be able to inform the aggregated content of a destination.
- 4) The end-user and service profile instructs the IPTV application server to deliver the media (ECN receipt user group mapping to IPTV application user group).
- 5) The end-user and service profile informs the IPTV service control of the (multicast) streaming delivery (ECN receipt user group mapping to an IPTV multicast group).
- 6) The aggregated content and destination group and service information is ready for delivery by the (multicast) streaming server.
- 7) The media is forwarded to the end-users and user groups. It could be multicast streaming or any other application format, such as VoD, presence, VoIP or web servers.

6.4.2 Hosting services

Hosting services consist of IPTV platforms with hosting capabilities that provide organizations and end-users with an online/offline system and network for storing information, images, video, or any content accessible via the IPTV hosting services.

6.4.2.1 Business-to-business

The business-to-business hosting service is an IPTV hosting service for special group or business unit subscribers. It connects the channel, VoD, and portal services made by the end-user business unit to the IPTV platform to supply particular groups with real-time broadcasting channels and value-added interactive services.

6.4.2.2 User created content (UCC) hosting

User created content (UCC) hosting service is an IPTV hosting service for the individual end-user. This service allows the end-user to operate his or her own channel, like a personal web TV, by uploading A/V, applications and other content that he or she generates through the IPTV hosting platform, e.g., a user-generated video or interactive content data.

6.4.3 Presence services

Presence services manage presence information between end-users (watchers, [b-IETF RFC 2778]) and presentities for enabling applications and services to make use of presence information.

Those services provide information about the end-user's location. They also provide access to presence information to be made available to other users or services, including IPTV service.

Presence information is a set of attributes characterizing current properties, such as status (online, offline, in a meeting, on the phone, etc.), place (home, office, library, etc.), communication means (audio, video, text, etc.), etc. [b-3GPP TS 22.141].

A presentity is an entity that provides presence information.

A watcher is an entity that requests presence information about a presentity [b-IETF RFC 2778].

Example services might include:

- Electronic program guide (EPG) personalization based on presence on top of locally stored data,
- Targeted advertising based especially on presence at specific times of the day, and

- Ability to chat with friends watching the same channel.

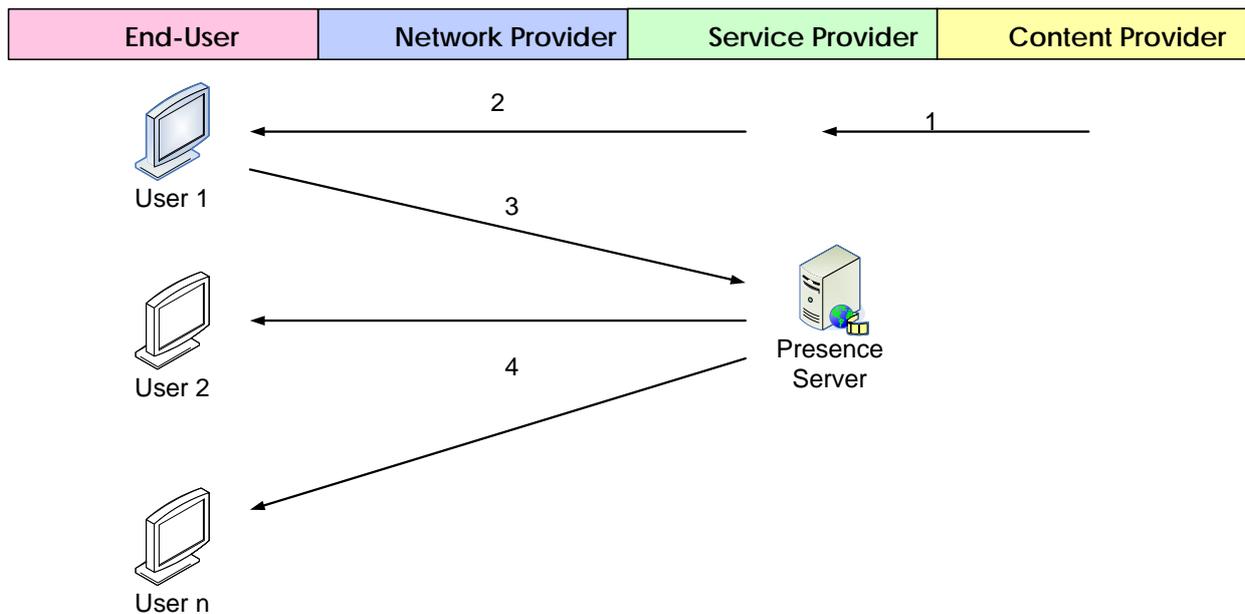


Figure 6-16 – Use case of presence services

- 1) Content is acquired by the service provider from sources, such as a satellite downlink or a content library.
- 2) The content is delivered to the end-users.
- 3) The presence information of users and information on users' devices, services and service components is provided to the presence server. The information might be content information (broadcast TV channel, VoD content, commercial advertising, etc.) currently accessed.
- 4) The presence information can be distributed to other end-users.

6.4.3.1 Basic presence service

End-user A is watching TV.

End-user B logs in on the TV at home.

Now, user A knows that user B is at home and calls him or her.

6.4.3.2 Channel-based presence service

End-user A is watching a football game on the IPTV terminal device.

He or she would like to chat with friends who are watching the same channel.

He or she opens the presence service client and pushes the button marked "Search for friends".

In a pop-up window on the screen, he or she specifies the search criteria, which are "buddies watching the same channel now" and "available for chatting".

He or she gets a list and invites them all to a multipoint messaging session.

6.4.3.3 Targeted advertising based on presence service

The presence server gathers the presence information of end-users and logs it into a database with their approval. The presence information could be what content they watch, shopping habits, etc.

An advertiser requests the end-user log of end-users from the presence server and can then make targeted advertisements.

6.4.4 Session mobility service

This is an IPTV service in which an ongoing multimedia session can be transferred seamlessly between different devices based on user preferences. That is, with the service, a subscriber can see his or her subscribed real-time IPTV content seamlessly. It is different from the place-shifting service in that it is more suited for transferring ongoing or real time-sessions.

Figure 6-17 illustrates the details of session and media transfers for session mobility. In this scenario, we assume that the correspondent device is in a real-time session with the originating terminal device on a mobile host. We want to move the session to a target device on a fixed host. The originating terminal device and target device share the same content relay A that is controlled by the content transfer controller A. Similarly, content relay B provides content relay service to the correspondent device. Session mobility can be used to achieve session and content transfer.

Session mobility basically is to support the capture of session control context information from the originating terminal device and subsequent transfer to the target terminal device by a media transfer controller, if a session transfer request is received. The exchange between the media transfer controller and media relay can also be used to negotiate capabilities and transfer the session. It also supports the suspending and resuming of the session based on the subscriber's requirements. This service allows for an end-user's terminal to be a mobile device.

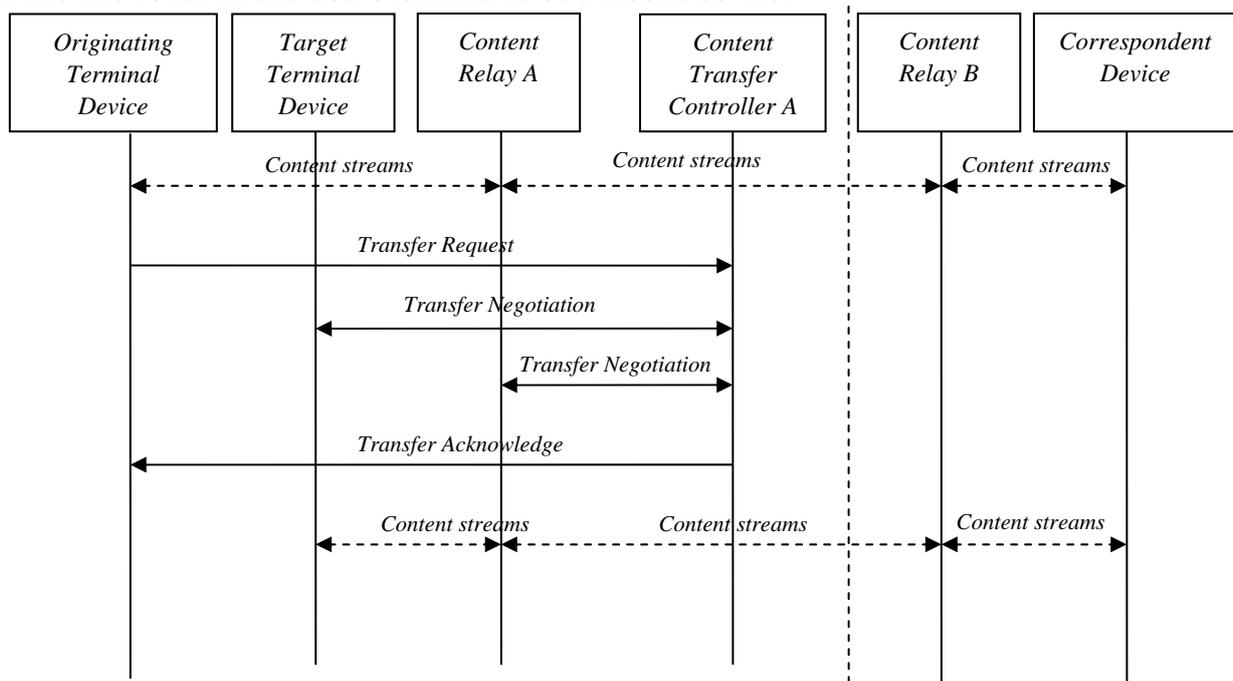


Figure 6-17 – Session and content transfer for session mobility

Content transfer controller: A gateway or router that receives content transfer requests from terminal devices and exchanges session context information and device capabilities with a content relay. One media transfer controller may control one or several content relays.

Content relay: A gateway or router that negotiates session context information and device capabilities with the content transfer controller and relays content to a corresponding device. One content relay may provide content relay functionality to one or several terminal devices.

7 Payment methods for accessing IPTV services

Payment methods are essential components for accessing IPTV services. Such methods affect the way IPTV services are delivered and accessed by end-users.

There are a number of well-known payment methods that can also be applied to IPTV services as shown below. The following list of payment methods is not exhaustive. Such payment methods can vary or can be applied concurrently, depending on the IPTV service characteristics, the IPTV service environment and the service provider's policy.

- **Free**
The end-user can access the IPTV content without paying. In this case, no change for the service scenario related to charging is required.
- **Subscription**
The end-user pays the predefined amount of money to access IPTV services. In this case, additional procedures for appropriate subscription and for checking whether the end-user is properly subscribed are required.
- **Pay per view (PPV) or pay per use (PPU)**
The end-user pays for accessing each individual content of the IPTV service. In this case, additional procedures for proper payment and authorization and/or accounting are required.
- **A la carte**
The end-user can purchase simply the channel(s) he or she wants to receive, instead of the entire list of programs proposed by the service provider. In this case, the end-user makes his or her own program selection. Additional procedures for proper payment and authorization and/or accounting are required.
- **Cash-back point**
A cash-back point is a kind of credit which can be used as real money to pay for IPTV services. The end-user can acquire the cash-back point(s) by using or purchasing IPTV services with real money and use it for payment instead of real money. In this case, additional procedures for managing the cash-back point(s) with proper authentication, authorization, and/or accounting are required.
- **Package**
The end-user can select and/or purchase a set of channels, content, applications, or a combination thereof that is already organized by the service provider. In this case, additional procedures for proper payment and authorization and/or accounting are required.

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