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HSTP-IPTV-AISC
Access to Internet-sourced contents

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Summary

This technical paper describes configurations and specifies requirements for the access to Internet-sourced contents from IPTV terminal devices.

Keywords

IPTV, Internet-sourced contents, Internet content provider, IPTV content provider, IPTV service provider

Change Log

This document contains Version 1 of the ITU-T Technical Paper on "*Access to Internet-sourced contents*" approved at the ITU-T Study Group 16 meeting held in Geneva, 14-25 March 2011.

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Access to Internet-sourced contents

1   Scope

This technical paper addresses the issues related to the access to Internet-sourced contents from IPTV terminal devices.

It contains the description of different configurations allowing different levels of integration of the Internet content provider catalogue and contents in the IPTV service provider environment.

The messages which are necessary for the operation of these configurations are identified.

The requirements on the information to be exchanged between Internet content providers and IPTV service providers are also identified in this technical paper.

NOTE 1: Although the term "Internet contents" is used throughout this document, the scope of this technical paper is limited to access to audio and audiovisual Internet contents.

NOTE 2: This technical paper also takes on board the access to contents from IPTV content providers.

2   References

[ATIS IIF-WT-063R36]   IPTV Content on Demand Service (working document)

[ITU-T F.750]   ITU-T Recommendation F.750 (2005), *Metadata Framework*

[ITU-T M.1400]   ITU-T Recommendation M.1400 (2006), *Designations for interconnections among operators' networks*

[ITU-T Y.1901]   ITU-T Recommendation Y.1901 (2008), *Requirements for the support of IPTV services*

[ITU-T Y.1910]   ITU-T Recommendation Y.1910 (2008), *IPTV functional architecture*

3   Definitions

3.1   Terms defined elsewhere

3.1.1 catalogue [ATIS IIF-WT-063R36]: EPG metadata for the Content on Demand assets available for selection by the ITF.

3.1.2 content on demand [b_ATIS-0800020]: A generalized form of Video on Demand that encompasses both video and non-video contents.

3.1.3 content provider [ITU-T Y.1910]: The entity that owns or is licensed to sell contents or content assets.

3.1.4 electronic program guide (EPG) [ITU-T Y.1901]: A structured set of data, intended to provide information on available contents that may be accessed by end-users.

3.1.5 end-user [ITU-T Y.1910]: The actual user of the products or services.

NOTE 1: The end-user consumes the product or service. An end-user can optionally be a subscriber (contractor).

3.1.6 IPTV [ITU-T Y.1901]: Multimedia services such as television/video/audio/text/graphics/data delivered over IP-based networks managed to support the required level of QoS/QoE, security, interactivity and reliability.

3.1.7 metadata [ITU-T Y.1901]: Structured, encoded data that describe characteristics of information-bearing entities to aid in the identification, discovery, assessment, and management of the described entities.

3.1.8 service provider [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 can optionally operate a network. A service provider can optionally be a customer of another service provider.

3.1.9 terminal device (TD) [ITU-T Y.1901]: An end-user device which typically presents and/or processes the contents, such as a personal computer, a computer peripheral, a mobile device, a TV set, a monitor, a VoIP Terminal or an audio-visual media player.

3.2   Terms defined in this document

3.2.1 advertisement insertion point: A precise location in video contents where an advertisement video can be inserted.

4   Abbreviations and acronyms

This Technical Paper uses the following abbreviations and acronyms.

AIP   Advertisement insertion point

CoD   Content-on-demand

IPTV   Internet Protocol TV

TD   Terminal device

5   Conventions

In this Technical Paper:

–   The keyword "is required to" indicates a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

–   The keyword "is recommended" indicates a requirement which is recommended but which is not absolutely required. Thus this requirement need not be present to claim conformance.

–   The keyword "is not recommended" indicates a requirement which is not recommended but which is not specifically prohibited. Thus, conformance with this specification can still be claimed even if this requirement is present.

–   The keyword "can optionally" indicates an optional requirement which is permissible, without implying any sense of being recommended. This term is not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

6   Configurations to access Internet-sourced contents

Several modes of operation (configurations) have been identified for access to Internet-sourced contents:

–   **Full content integration by IPTV service provider:** contents and metadata related to these contents are acquired, stored and aggregated by the IPTV service provider in its catalogue.

–   **Catalogue integration without contents storage:** metadata about Internet contents is acquired and aggregated by the IPTV service provider but the contents itself remains in the Internet contents provider until an end-user request

- **Contents integration without catalogue integration:** limited metadata about Internet contents is made available to the IPTV service provider to allow it to acquire the contents but there is no integration of the Internet contents in the IPTV service provider catalogue.

- **No integration at all:** content catalogue is managed by the Internet content provider and contents remain in the Internet server until end-user request. Catalogue browsing goes through the IPTV service provider

- **No integration at all with external browsing:** content catalogue is managed by the Internet content provider and contents remain in the Internet server until end-user request. Catalogue browsing goes outside the IPTV service provider

- **Browsing and consumption by two different devices:** content catalogue is managed by the Internet content provider. Catalogue browsing goes outside the IPTV service provider and is made with a different device but the content consumption takes place through the IPTV service provider

6.1 Full content integration

An IPTV service provider may want to include Internet-sourced contents among the contents of its catalogue, as illustrated in Figure 6-1.

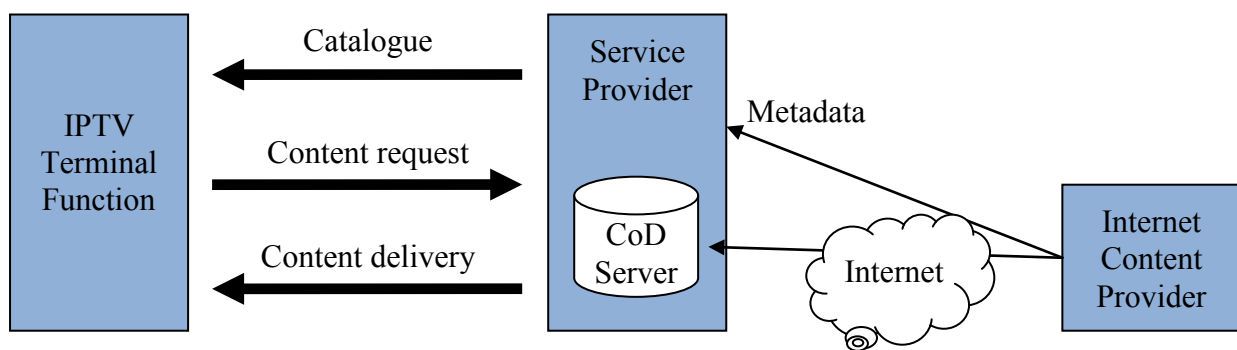NOTE - This configuration applies also to the relation between an IPTV service provider and IPTV content providers.

Figure 6-1: Architecture for full integration by service provider

For this configuration, the IPTV service provider will have to open its platform to Internet content providers over the Internet.

Two modes of operation could be considered in this configuration: a pull mode and a push mode.

These modes apply only to content information exchange and not to the content delivery between providers.

Information about contents (format, description, etc.) may be pushed by the Internet content provider or pulled by the IPTV service provider, this is the meaning of push mode and pull mode.

After the decision to acquire the contents is made by the IPTV service provider who may decide to acquire a contents before any end-user request or only after an end-user request.

For example, in the pull mode, the IPTV service provider browses the Internet to discover contents of interest, requests metadata related to these contents and acquires the contents themselves.

The IPTV service provider fully controls the amount of contents it integrates. The difficulty is to discover the contents of interest for the end users.

Is there anything to be standardized to allow this mode of operation?

The push mode is illustrated in Figure 6-2. In this mode, the Internet-sourced content providers declare their contents for integration in the content catalogue of the IPTV service provider.
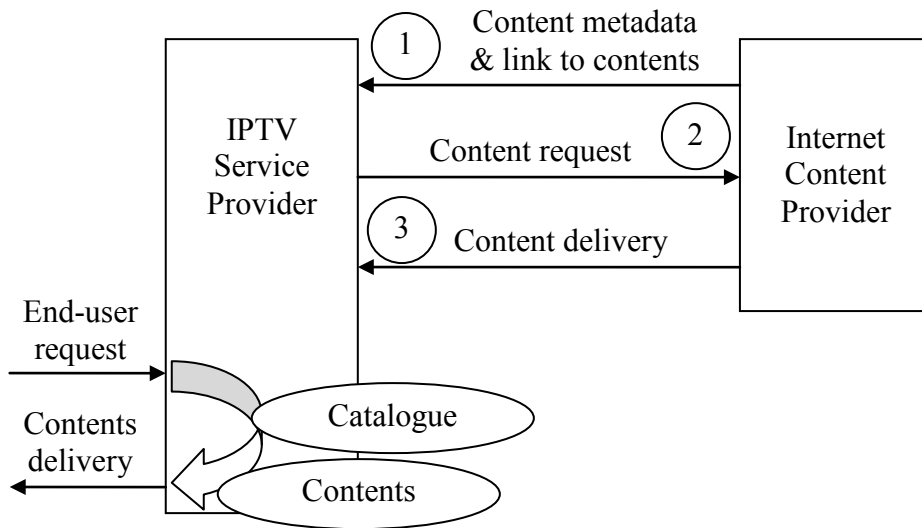

Figure 6-2: Exchanges for full content integration in push mode

In the push mode, the Internet content provider calls the service provider to deliver metadata for contents to be made available to IPTV end users. In a second step, the service provider acquires the contents from the Internet content provider and stores them with its own contents.

This solution allows the Internet content providers to provide their contents to the IPTV end users as soon as they are available.

This solution gives a good control of the content integration to the service provider. The IPTV service provider can select the Internet content providers it wants to integrate in its platform and negotiates with these content providers content filtering and distribution conditions.

6.2 Catalogue integration without content storage

In this operation mode, the IPTV service provider integrates content metadata in its own catalogue as in the previous scenario but the contents remain in the Internet content provider until end-user request.

Figure 6-3: Architecture for metadata integration without content storage by service provider

In this configuration, illustrated in Figure 6-3, the contents remain on the Internet servers and are acquired only after content request from a consumer. However, the content metadata has to be acquired for content metadata integration in the catalogue of the service provider.

Two modes of operation are also possible: a pull mode and a push mode.

The description of the pull mode and the push mode is similar to the description made in the previous configuration.

In the pull mode described in clause 6.1, the IPTV service provider browses the Internet to discover and acquire metadata for contents it wants to offer to its IPTV end users.

In the push mode, authorized Internet content providers declare their contents to the IPTV service providers and deliver the metadata related to these contents.

For the push mode, here are the exchanges between the IPTV service provider and the Internet content provider. See Figure 6-4.
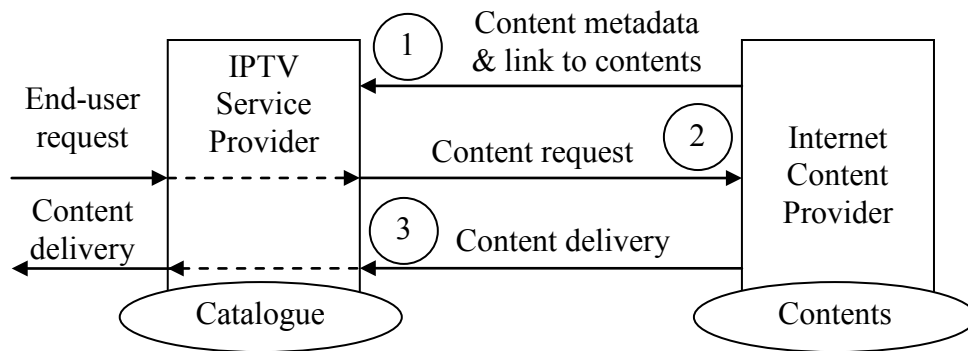

Figure 6-4: Exchanges for metadata integration without content storage in push mode

These exchanges are not really different from the exchanges for full integration in push mode, except that the content request to the Internet content provider is delayed until the arrival of an end-user request for these contents.

However, it is likely that the quality of service of the content delivery will be impacted due to the late content acquisition by the IPTV service provider.

6.3   Content integration without catalogue integration

In this configuration, the IPTV service platform integrates the internet-sourced contents in its storage but the catalogue is operated by the Internet content provider. This is illustrated in Figure 6-5.
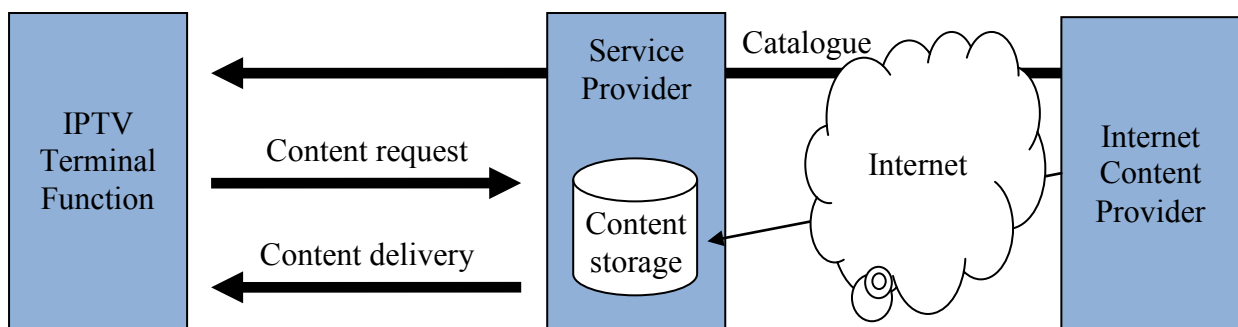

Figure 6-5: Architecture for content integration without catalogue integration

In this configuration, the service provider platform is used for content delivery with QoS over the managed network.

Two operation modes (pull and push) are also possible for the IPTV service provider to acquire information about contents.
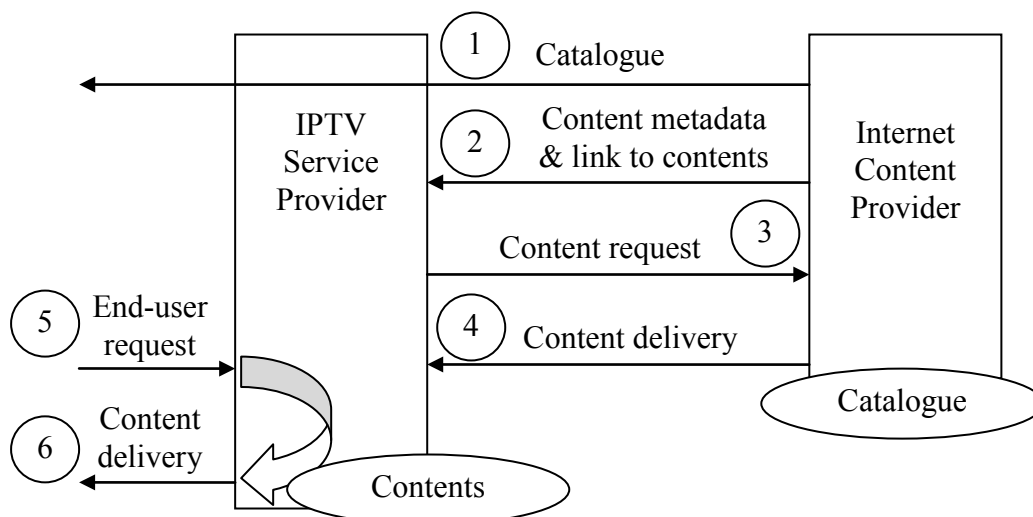
Figure 6-6: Exchanges for content integration without catalogue integration in push mode

In the push mode illustrated in Figure 6-6, the Internet content provider provides to the end user terminal device, through the IPTV service provider, information about contents and links to acquire them. At the same time, the Internet content provider when authorized declares these contents to the IPTV service provider with content location to allow it to acquire these contents before end-user requests to deliver them with the required QoS over the managed network.

Figure 6-7: Exchanges for content integration without catalogue integration in pull mode

In the pull mode illustrated in Figure 6-7, the IPTV service provider analyzes the exchanges between the Internet content provider and the IPTV terminal device, extracts the URLs for contents which are made available to the end-user, requests information about these contents from the Internet content providers for delivery with QoS. After this, the IPTV service provider will acquire the contents from the Internet content provider. The IPTV service provider will prepare these contents (e.g. transcoding) for future delivery on end-user request.

6.4   No Internet content integration at all

In the configuration illustrated in Figure 6-8, the IPTV service platform does not integrate the Internet-sourced contents in its catalogue, therefore no exchange of content description metadata is needed.

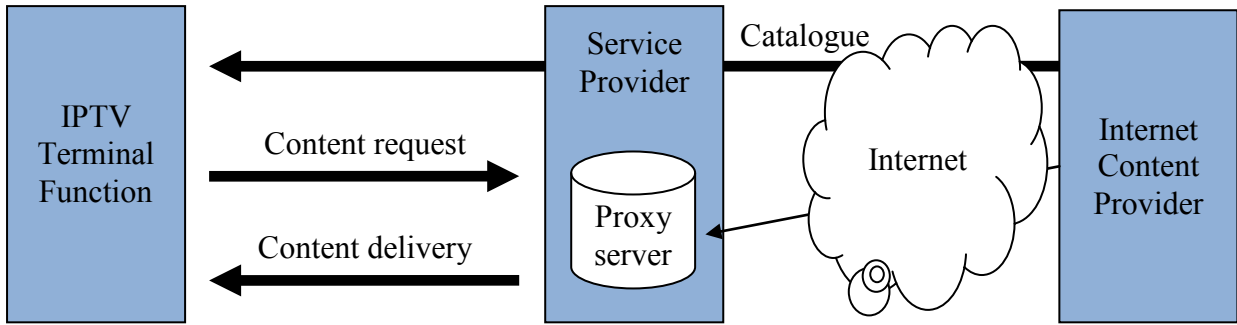**Figure 6-8: Architecture for no Internet content integration by service provider**

In this operation mode, the service provider platform is used for content delivery over the managed network. See Figure 6-9.

Figure 6-9: Exchanges for no Internet content integration at all by the IPTV service provider

In this operation mode, the IPTV service provider intercepts the request for Internet-sourced contents, requests the contents from the Internet content provider and delivers it through the managed network.

6.5 No integration at all with external browsing

In the configuration illustrated in Figure 6-10, the IPTV service platform does not integrate the internet-sourced contents in its catalogue so no exchange of content description metadata is needed.

Figure 6-10: Architecture for no Internet content integration with external browsing

In this operation mode, the service provider platform is used for content delivery over the managed network. See Figure 6-11.

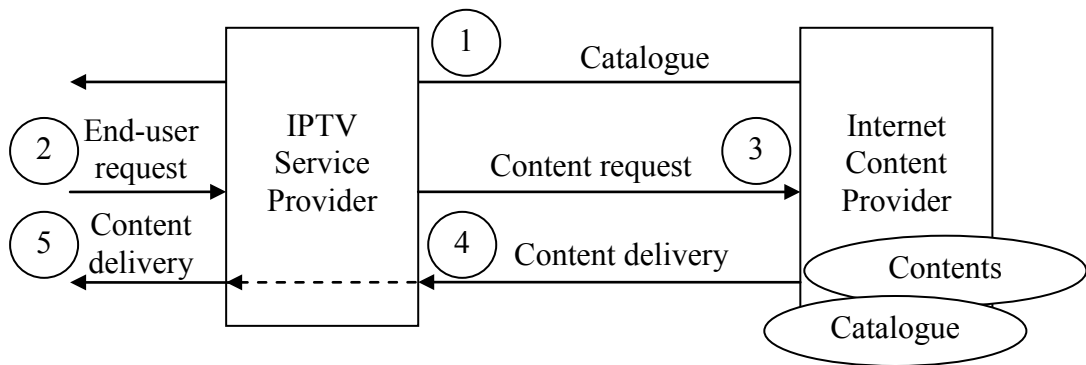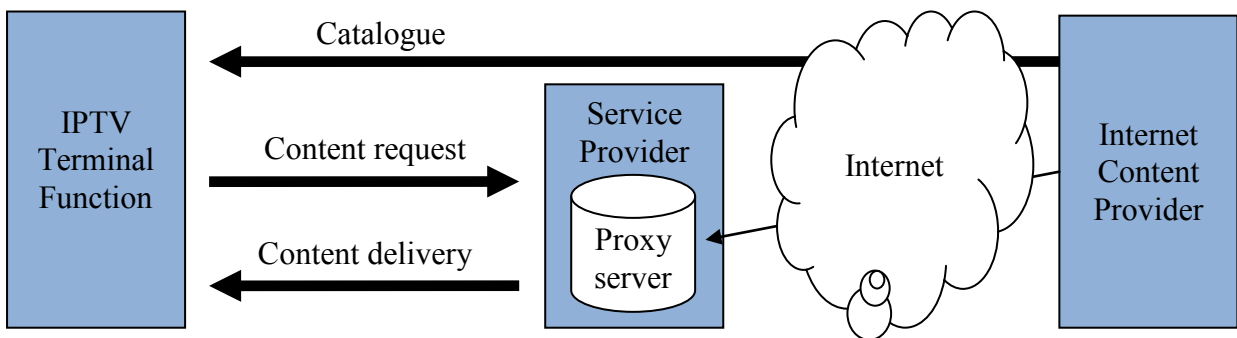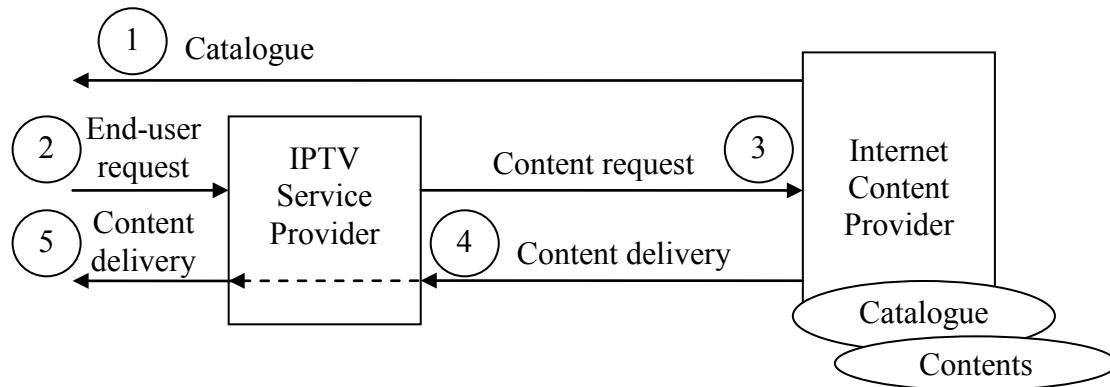**Figure 6-11: Exchanges for no Internet content integration at all with external browsing**

In this operation mode, the IPTV service provider gets the request for Internet-sourced contents, requests the contents for the Internet Server and delivers it through the managed network.

6.6 Browsing and consumption by two different devices

In this configuration, illustrated in Figure 6-12, a different device is used to browse the Internet and select Internet contents, which will be required later by an IPTV terminal device without having to browse again the Internet. The basic and extended scenarios are discussed below.
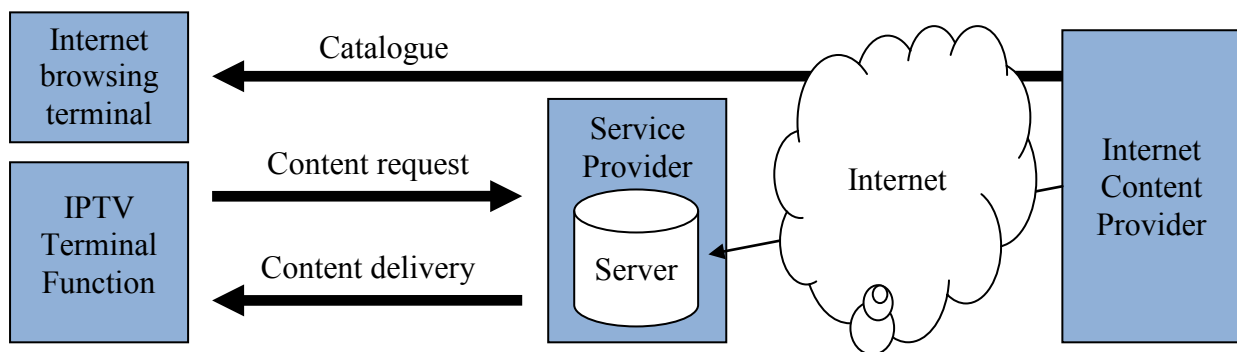

Figure 6-12: Architecture for browsing and consumption by two different devices

6.6.1 Basic scenario

In the basic scenario of configuration, an Internet browsing terminal (e.g. a PC or a mobile phone) is used to browse the Internet.

Example

An end user discovers contents he would like to see on his big home screen using his IPTV terminal device or to send a recommendation to watch to a friend who is also an IPTV customer.

The contents, which are watched on the Internet browsing terminal, may be a "preview", "trailer" or "teaser" to the main contents, which will be watched on the IPTV terminal. The selector of the main contents and the viewer of the main contents may be different: e.g., where the end user selects a "gift" contents for a friend.

The end user presses a button on the web page from the Internet web site, and the web site requests the identification of the IPTV service provider to be used later for contents consumption and some additional data (to be defined). This is done to allow simple identification at consuming time.

Later, the targeted end user connects its IPTV terminal device and he is immediately informed of an Internet contents to watch. Some information is available about the contents. If he decides to watch or record it, he requests these contents.

Operation

As illustrated in Figure 6-13, the contents is declared by the Internet content provider to the IPTV service provider and the IPTV service provider may decide to get immediately the contents (this would allow a better delivery QoS) or to wait for the consumer request for the contents.
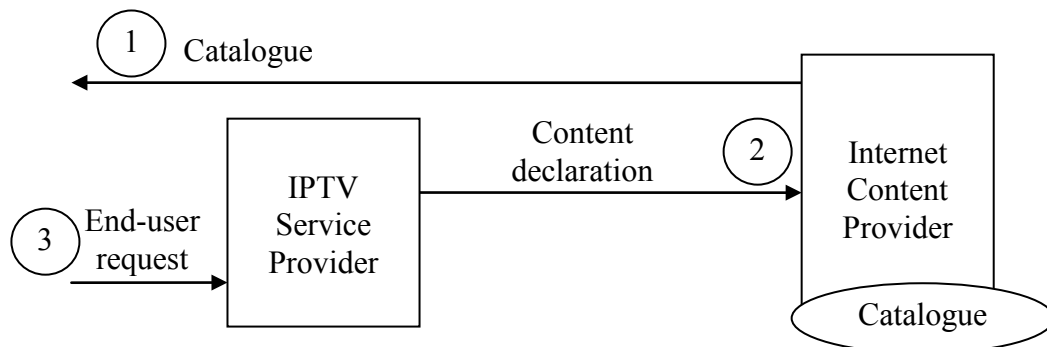

Figure 6-13: Exchanges for browsing and consumption by two different devices

6.6.2 Extended scenario

As in the basic scenario, an Internet browsing terminal (e.g. a PC, a mobile phone, etc.) is also used to browse the Internet for the extended scenario.

Example

An end user discovers a contents and begins to watch it with the Internet browsing terminal (for instance, in the office). After a while, the end user needs to go back home and hopes to continue watching the contents (for instance, at home) through IPTV from where he/she stops. The end user pauses the player and presses a button on the web page from the Internet website. The website requests the identification of the IPTV service provider to be later used for content consumption. At this time, the website will generate a record of pause status for the play, which includes at least the Content Identifier, the playing time progress. The website will then send the record of pause status to the IPTV service provider.

Later, the targeted end user connects its IPTV terminal device and he/she is immediately informed that an Internet contents is available for continued watching. The IPTV terminal can renew the play from the time point where the contents was paused according to the Content Identifier, the playing time progress, etc., in the record of pause status.

Operation

The operation is the same as the basic scenario, except that the content declaration contains more information, such as the playing time progress.

7 Communication modes between Internet content providers and IPTV service providers

Two operation modes have been identified in the description of the different configurations, summarized in Table 7-1 and described in this clause.

Table 7-1: Communication modes

Configurations	Content declaration mode (also called "push mode")	Content information request mode (also called "pull mode")
Full content integration	A	A
Catalogue integration without content storage	A	A
Content integration without catalogue integration	A	A
No Internet content integration at all	NA	A
No integration at all with external browsing	NA	A
Browsing and consumption by two different devices	A	NA

NOTE: "A" means applicable, "NA" means "Not Applicable".

7.1 Content declaration mode (or push mode)

This mode is used by the Internet content provider to declare contents to the IPTV service provider as follows (see Figure 7-1).
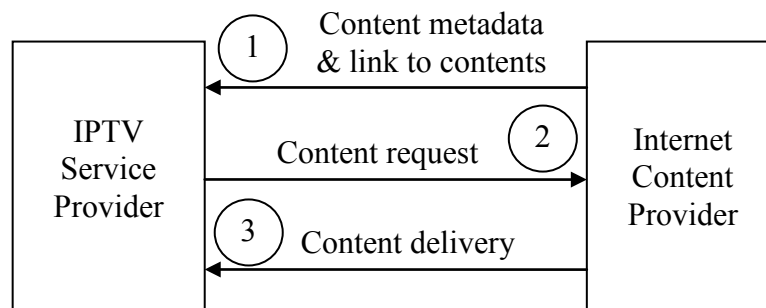

Figure 7-1: Exchanges between Internet content provider and IPTV service provider in content declaration mode with integration in the IPTV service provider catalogue

Content metadata may be exhaustive when it is to be used for integration in the content catalogue of the IPTV service provider. It should include content description, content format, etc.

Content metadata may be very limited when Internet content providers just want to inform the IPTV service provider about contents which have been selected by end users using another terminal device for consumption by an IPTV terminal device. In this case, specific metadata is needed to associate the end user identifier and the selected contents and to identify the purpose of the selection (to be viewed, present, recommendation, for information, etc.)

Content metadata may be also very limited when Internet contents are not to be integrated in the content catalogue of the IPTV service provider. In this configuration, an additional exchange is necessary to provide a content reference or location to the Internet content provider as illustrated in Figure 7-2.
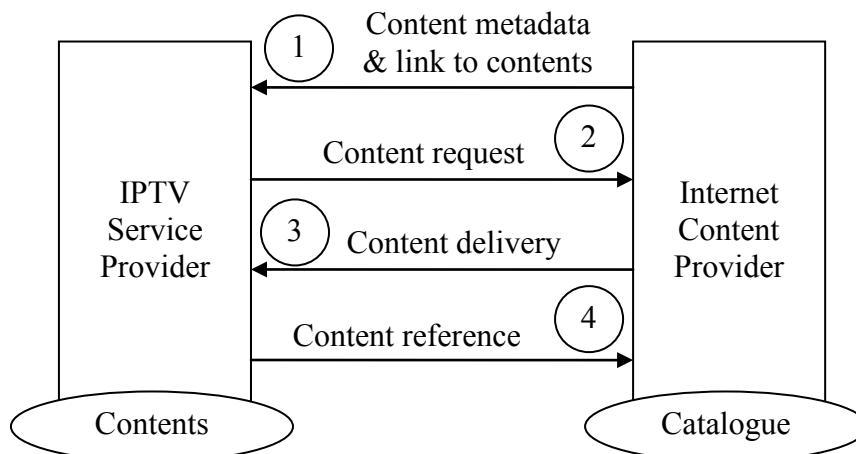
Figure 7-2: Exchanges between Internet content provider and IPTV service provider in content declaration mode without integration in the IPTV service provider catalogue

The content request may follow immediately the content declaration from the Internet content provider or be issued later. It may be linked or not to consumer request.

The following items are to be specified:

– Mechanism for the Internet content provider to send content metadata to the IPTV service provider

– Content metadata for Internet content declaration

– Mechanism for the IPTV service provider to acquire the contents from the Internet content provider

– Mechanism to provide content reference back to the Internet content provider

– Content reference metadata for Internet contents acquired by the IPTV service platform

The following sub-clauses contain the requirements for these elements.

7.1.1 Requirements for the mechanism to be used by the Internet content provider to send content metadata to the IPTV service provider

– A mechanism is required to be specified to allow Internet content provider to discover the IPTV service provider access point for content declaration

– A reliable protocol is required to be specified for the delivery of content metadata to the IPTV service provider

7.1.2 Requirements for the content metadata for Internet content declaration

Elements to be included in the content metadata which could be used for content search:

– content provider Id (1)

– content Id (1)

– content title (1-*) if different languages

– content synopsis (0-*), several possible if different languages

– content keyword (0-*)

– content genre (0-1)

– content parental guidance (0-*), if several rating schemes

- content language (0-*)

- content caption language (0-*)

- credits list (actors, director) (0-*)

- awards list (0-*)

- related material (0-*)

- production information (location and date) (0-*)

- duration (0-1)

- release information (country and date) (0-1)

- other identifier (0-*)

- member of a group of contents (0-*)

- derived from another content (0-1)

- episode of a series (0-1)

- part of an aggregated content (0-1)

- aggregation of other contents (0-1)

Elements related to content acquisition:

- Internet provider content URL which could be used to check content availability

- Content URL for content acquisition (if different from internet provider content URL)

- AV Attributes

- Internet content provider point to feedback IPTV service provider content reference (if necessary)

Elements related to content distribution:

- Distribution start date

- Distribution end date

- Distribution area

- Targeted user (for example in the scenario: select with a non-IPTV device and view with an IPTV device)

- Pricing policy

- Advertisement insertion configuration consisting of a list of advertisement insertion point (AIP) and associated rules for advertisement insertion

There are two cases concerning handling of advertisements:

Case 1: Advertisements are provided by the IPTV service provider

The advertisement insertion rules can be recommendation rules that can be used to select advertisements that can be inserted (e.g. advertisement for kids under 12), and/or restriction rules (e.g. no cigarette advertisement) that can be used to exclude advertisements that cannot be inserted.

The Internet content providers may have their own preferences for the advertisements that can be inserted into their contents. The rules can be sent to IPTV service providers as part of content metadata, and are used to select the advertisements that will be inserted into the corresponding contents.

IPTV service provider probably has its own advertisement insertion rules. For instance, IPTV service provider may first filter all the advertisements that can be inserted by the rules from the Internet content providers, and if there are more advertisements than that can be inserted, then further decide the most appropriate advertisements by its own rules (e.g. advertisement for girls because the end user is a girl).

Case 2: Advertisements are provided by the Internet content provider

In this case, for each advertisement insertion point there is a content provider URL with parameters to be filled in to request the video contents to be inserted.

Examples of parameters to be filled in by the IPTV service provider are:

–   userId, sex, age, user location, temperature, and mood.

–   Some parameters could already be in the content provider URL, e.g. InternetContentId, AIPId, and service provider Id.

–   Audience measurement configuration, which is defined by the Internet content provider to specify its requirements for audience measurement collection and reporting.

–   Elements related to content viewing, e.g. pause point (for example in the extended scenario in clause 6.6, when contents was selected with a non-IPTV device and viewed with an IPTV device)

7.1.3   Requirements for the mechanism for the IPTV service provider to acquire contents from the Internet content provider

A reliable protocol is required to be specified for the content acquisition from the Internet content provider. For example, HTTP and FTP.

7.1.4   Requirements for the mechanism to provide content reference back to the Internet content provider

A reliable protocol is required to be specified to provide IPTV service provider content reference to the Internet content provider.

7.1.5   Requirements for the content reference metadata for Internet contents acquired by the IPTV service platform

List of elements to be included in content reference metadata:

–   IPTV service provider Id (1)

–   Content Id from Internet content provider (1)

–   IPTV service provider content reference to be used by the Internet content provider to request these contents from the IPTV service provider (1).

7.2   Content information request mode (or pull mode)

This mode is used by IPTV service providers wishing to get information from Internet content providers to deliver Internet contents with an improved QoS allowed by the IPTV service operation.

In this mode, the IPTV service providers discover Internet contents without previous content declaration from the Internet content providers. This is illustrated in Figure 7-3.

Following or anticipating consumer request, the IPTV service provider relates to the Internet content provider to get information about contents for further delivery of these contents to the consumers as appropriate.
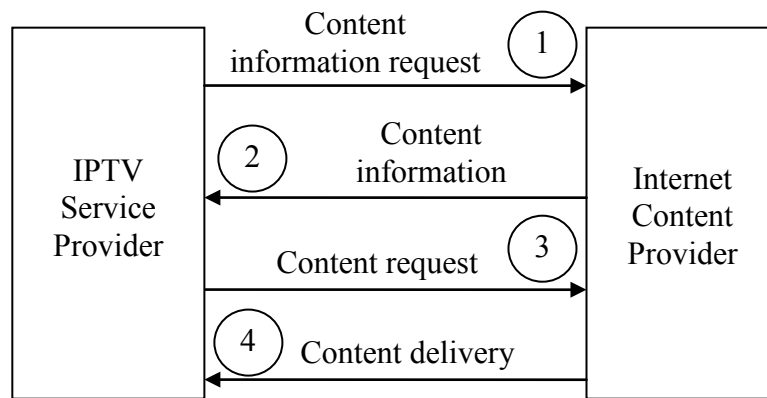
**Figure 7-3: Exchanges between Internet content provider and IPTV
service provider in content information request mode**

To get information about an Internet contents, the IPTV service provider has to use elements of the URL of the contents to generate its request to the relevant Internet content provider.

The following items are to be specified:

– Mechanism to generate a content information request from the URL of the Internet contents

– Content information semantics and syntax (should be already specified in the content declaration mode)

– Mechanism for the IPTV service provider to acquire the contents from the Internet content provider (should be the same as for content declaration mode)

The following sub-clauses contain the requirements for these elements.

7.2.1 Requirements for the mechanism to generate a content information request from the URL of the Internet contents

A URL should be created using the Internet content URL of the contents (provided by Internet content provider) for which metadata is requested (by IPTV service provider). Examples are:

– Internet Content URL in content catalogue from the Internet content provider (ICP) captured by IPTV service provider: http://www.content_provider.com/dir/sample.h264

– Content information request URL to ICP created by IPTV SP: http://www.content_provider.com/metadata.php?contentUrl=dir/sample.h264

7.2.2 Requirements for the content information semantics and syntax

These requirements should be the same as the requirements in clause 7.1.2, with the difference that there are no "Elements related to content viewing".

7.2.3 Requirements for the mechanism for the IPTV service provider to acquire the contents from the Internet content provider

These requirements should be the same as the ones in clause 7.1.3.

Bibliography

[b_ATIS-0800020]   ATIS-0800020 *IPTV Electronic Program Guide Metadata Specification* (2008)

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