



## **Service and Platform Requirements**

**[V1.0]-[2007-09-14]-[approved]**

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**Open IPTV Forum**

**Open IPTV Forum**

Postal address

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Open IPTV Forum support office address

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650 Route des Lucioles - Sophia Antipolis  
Valbonne - FRANCE  
Tel.: +33 4 92 94 43 92  
Fax: +33 4 92 94 43 42

Internet

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<http://www.openiptvforum.org>

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## **INTELLECTUAL PROPERTY RIGHTS**

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## **FOREWORD**

This document has been produced by the Open IPTV Forum.

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## **INTRODUCTION**

This document describes the service and platform requirements as part of the Open IPTV Forum Release 1 specifications.

# 1 Scope

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This document defines the Service and Platform requirements for the Open IPTV Forum solution. These requirements apply to both the Managed and Open Internet models, with the exception of subsections 5.15 and 5.16 which define specific Managed Network and Open Internet requirements, respectively.

The Open IPTV Forum requirements use the terms "shall", "should" and "may" to represent compliance towards the Open IPTV Forum specification.

Shall - the specification must provide a solution to meet the requirement

Should - it is recommended that the specification provide a solution to the requirement

May - the existence of a solution to the requirement in the specification is optional.

# 2 Normative References

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The following references contain provisions, which, through reference in this text, constitute provisions of this Specification. At the time of publication, the editions indicated were valid. All references are subject to revision; users of this Specification are therefore encouraged to investigate the possibility of applying the most recent edition of the references listed below.

None

## 3 Definitions, Acronyms, & Abbreviations

### 3.1 Definitions

<i>Term</i>	<i>Definition</i>
Access Network	<p>The network infrastructure used by the Access Provider to deliver IPTV services to the Consumer.</p> <p>The access network infrastructure (which may include the Internet) is used for the delivery of the content and may include quality of service management to ensure that appropriate network resources are available for the delivery of the content.</p>
Actors	Any Entity that can provide an interactive application.
Application	Collection of assets and logic that together provide a Service to the User. Assets and logic may reside either in an application Server or in the ITF or both.
Back-in-time	Back-in-time TV: scheduled program events that are already running or finished are made available to the user for viewing and/or recording from the start or a certain time into the past. They are available similar to VoD including optional trick mode support (e.g. pause, fast-forward, rewind). In case the schedule program event is still running the play out cannot go beyond the actual program play out. Selection is possible from the scheduled content program guide. The service might be available for one or more channels (e.g. for the selected channel in case of local storage, a fixed or selected channel list in case of network storage)
Channel	A single instance of Scheduled Content.
Consumer Network	The local area network in which the IPTV Terminal Function is located. Consumer networks include home networks, hot spots, hotel networks etc.
Consumer(s)	See End User(s).
Content	An instance of audio, video, audio-video information, or data.
Content Guide (CG)	An on-screen guide to Scheduled Content and Content on Demand, allowing a User to navigate, select, and discover content by time, title, channel, genre, etc.
Content on Demand (CoD)	A Content on Demand service is a service where a user can select the individual content items they want to watch out of the list of available content. Consumption of the content is started on user request.

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Content Protection	Means to protect content from unauthorized usage, such as re-distribution, recording, playback, duplication etc.
Content Provider	Entity that provides Content and associated usage rights to the IPTV Service Provider.
Deferred Download CoD	A type of Content on Demand where the user first selects the content and then it is downloaded to the ITF some time later (e.g. over night). Consumption is possible after the content is fully downloaded, or after enough content is downloaded to ensure that the remaining content can be downloaded while the user is consuming the content.
End User(s)	The individual(s) (e.g. members of the same family) who actually use the IPTV Services.
Enterprise Network	A local area network provided under some agreement that can be utilized by the User to obtain connectivity, e.g. hotel networks.
Fixed Network	Access Network for a fixed location, such as ADSL or FTTH.
Forum Specification	Output document of the Open IPTV Forum.
Home Network	Residential consumer network.
Hybrid Device	Terminal devices able to connect to IPTV services delivered over the broadband access interface and also receive digital broadcast TV and radio services via other delivery networks. e.g. DVB-S, DVB-C and DVB-T.
Implementation-dependent application	An application specific to a particular device implementing some or all of the IPTV Solution. For example, one compiled to native code for the processor and operating system used by the device.
Internet	The Internet is the worldwide, publicly accessible network of interconnected computer networks that transmit data by packet switching using the standard Internet Protocol (IP).
IPTV Service Platform Provider (SPP)	Entity which, based on a contractual relationship with IPTV Service Providers, provides supporting functions for the delivery of IPTV Services, such as charging, access control and other functions which are not part of the IPTV Service, but required for managing its delivery.
IPTV Service Provider (SP)	Entity that offers IPTV Services and which has a contractual relationship with the Subscriber.
IPTV Solution	Defined by the Forum Specification.
IPTV Terminal Function (ITF)	The functionality within the Consumer Network that is responsible for terminating the media and control for an IPTV Service.

Local Storage	Content storage within the administrative realm of the IPTV Service Provider, but not in their physical environment (for example, local storage could be a partition of storage located in the home network and allocated to the Service Provider to pre-load CoD).
Network storage	Content storage located in the physical environment or administrative realm of the IPTV Service Provider.
nPVR	Provision of PVR functionality whereby the content is stored in the Service Provider domain. The nPVR allows a user to schedule recording of scheduled content programs. The user can later select the content they want to watch from the recorded content.
Pay Per View	The user is charged per selected and/or consumed content item. Can apply to both CoD and Scheduled Content Service.
Personal Content	Content owned by the User. This includes video, music, and photography etc.
Personal Video Recorder (PVR)	A device in the Home Network that records and plays back Content under the control of the User.
Portal	A function of a Service Platform that provides an entry point to individual IPTV Services to Users via a GUI.
Program	A segment of Scheduled Content with a defined beginning and end.
Program Guide	See Content Guide.
Public Access Network	A network that can be used by the Consumer to obtain connectivity. Public access networks include hot spots, etc.
Push CoD	A type of Content on Demand where the content is pre-loaded to the ITF local storage by the Service Provider. The user has no direct control of what content is downloaded; however the Service Provider may make the choice based on user preferences and habits. Content is available for direct consumption after the user selection is confirmed.
Scheduled Content	An IPTV service where the playout schedule is fixed by an entity other than the User. The content is delivered to the user for immediate consumption.
Service	Content and applications provided by Service Platform Providers and Service Providers.
Service Portability	A given service/application being supported on multiple device types for a given IPTV subscriber.

NOTE: this is a non-real time requirement.



Service Protection	Means to protect IPTV Services from unauthorized usage/access, such as <ul style="list-style-type: none"> <li>• Access from unsubscribed consumers</li> <li>• Access that is not covered by the subscription</li> <li>• DOS attack</li> </ul>
Session Portability	Ability of a given service/application to be switched from one device to another for a continuation of a session in real time.
Subscriber	The individual that makes the contract with a Service Provider for the consumption of certain services.
Subscriber Profile	Subscription information associated with an account.
Time Shift	Allows a user to halt a scheduled content service and continue watching this service later supporting pause and rewind.  In time shift mode, trick play functionality (fast-forward, rewind, pause) is limited by the time shift window (i.e. cannot go further than the actual scheduled content play out, cannot go before the start of time shift).
Trick Mode	Facility to allow the User to control the playback of Content, such as pause, fast and slow playback, reverse playback, instant access, replay, forward and reverse skipping.
User Profile	Subscription information associated with a specific User, e.g. viewing preferences.
User Storage	Storage capability which could be inside or outside the ITF and outside the physical and administrative control of the IPTV Service Provider.
User(s)	See End User(s).

## 3.2 Acronyms & Abbreviations

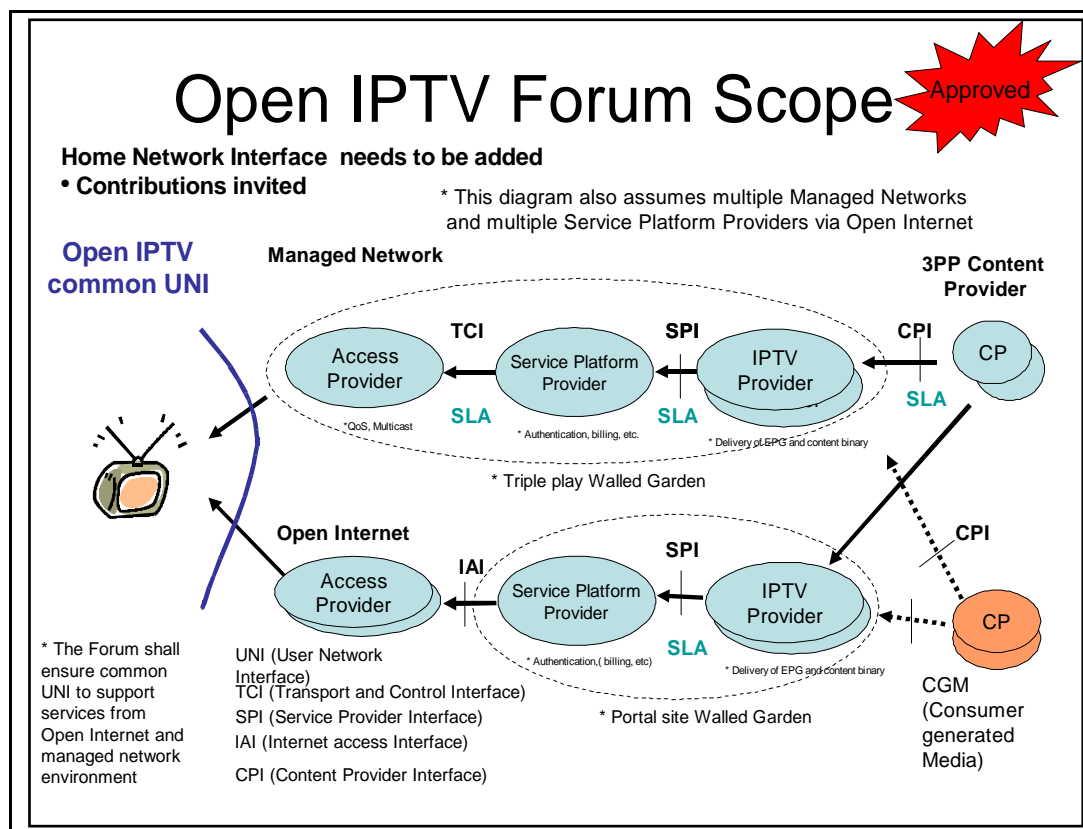
<i>Abbreviation</i>	<i>Definition</i>
ADSL	Asymmetric Digital Subscriber Line
API	Application Programming Interface
CAM	Conditional Access Module
CG	Content Guide
CPI	Content Provider Interface

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DLNA	Digital Living Network Alliance
DLNA DMS	DLNA Digital Media Server
DRM	Digital Rights Management
DVB-C	Digital Video Broadcasting Cable standard
DVB-S	Digital Video Broadcasting Satellite standard
DVB-T	Digital Video Broadcasting Terrestrial standard
EPG	Electronic Program Guide
FTTH	Fiber to the Home
GSM	Global System for Mobiles
GUI	Graphical User Interface
IPTV	Internet Protocol Television
IP	Internet Protocol
ITF	IPTV Terminal Function
NAT	Network Address Translation
NGN	Next Generation Network
nPVR	Network Personal Video Recorder
PVR	Personal Video Recorder
QoS	Quality of Service
RMS	Remote Management System
SIM	Subscriber Identity Module
SMS	Short Message Service
SP	Service Provider
SPI	Service Provider Interface
SPP	Service Platform Provider
UI	User Interface
UICC	Universal Integrated Circuit Card
UNI	User Network Interface
URL	Uniform Resource Locator
VoD	Video on Demand

## 4 Functional Reference Model and Architecture

The following figure illustrates the high level interfaces.



NOTE: In addition to the support of IPTV services delivered via the broadband network the UNI will also support control and information functions for environments where digital broadcast reception (e.g. DVB-S, DVB-C or DVB-T) is integrated in the ITF. This capability is commonly referred to as support of hybrid devices.

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## 5 Service Requirements

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### 5.1 General

- [1-1010] [R1] The IPTV Solution shall be based on open interfaces and standards.
- [1-1020] [R1] The IPTV Solution shall enable a horizontal market based on standardized interoperable interfaces.
- [1-1030] [R1] The specification of the mechanisms and functions for the IPTV Solution, (for example, user/ITF authentication, program guiding, multimedia stream and file delivery, user menu navigation, command and metadata exchanging, security and content protection and transport mechanisms) should be based on minimizing the differences between a deployment of the IPTV Solution using a managed network and a deployment using Open Internet access.

### 5.2 Provider Relationships

- [1-1040] [R1] When there is a suitable relationship between the Service Platform Provider and the user's Access Provider, it shall be possible to set up a connection between the user and the Service Platform Provider for supply of real time content with Quality of Service guarantees.
- [1-1050] [R1] The ITF shall be able to receive content and access services simultaneously from more than one IPTV Service Provider.
- [1-1060] [R1] The IPTV Solution shall support a mechanism to allow a user to select IPTV Service Providers from a list of the available IPTV Service Providers.
- [1-1070] [R1] It shall be possible for the SPP to present to the consumer a list of IPTV Service Providers according to the business agreements between the SPP and IPTV Service Providers.
- [1-1080] [R1] An IPTV Service Provider shall not be able to restrict the ability of a user to consume and purchase content from other IPTV Service Providers within the specification.  

NOTE: where business models are based on some restriction e.g. subsidized ITFs, it is expected that IPTV Service Providers will be able to restrict an ITF with some small modification, in the same way as SIM-locks on GSM phones. However, such a modification is outside the scope of the IPTV Solution.
- [1-1090] [R1] When permitted by the IPTV Service Provider, a user shall be able to browse content available from that IPTV Service Provider, without entering into a contractual relationship with that IPTV Service Provider.
- [1-1100] [R1] When suitable business agreements are in place, the IPTV Solution shall support the ability for a user to be authenticated by the Portal/SPP and not require the user to be re-authenticated when control is passed from the Portal/SPP to IPTV SPs.
- [1-1110] [R1] When appropriate business agreements are in place, an IPTV Service Provider shall be able to provide IPTV services via multiple access networks and service platform providers.

- [1-1120] [R1] A user shall be able to simultaneously use a QoS assured service delivered via managed network and another service delivered via open internet.

## 5.3 Service Categories

### 5.3.1 Scheduled Content Service

- [1-1130] [R1] The IPTV Solution shall support Scheduled Content Services.
- [1-1140] [R1] The IPTV Solution shall support access to free-to-view Scheduled Content Services.
- [1-1150] [R1] The IPTV Solution shall support access to Subscription based Scheduled Content Services.
- [1-1160] [R1] The IPTV Solution shall support access to Pay Per View Scheduled Content Services. It shall be possible to limit consumption to a certain time window or a certain number of consumptions.
- [1-1170] [R1] The IPTV Solution shall make it possible for the user to configure (i.e. manually enter) the location of the IPTV resources providing the Scheduled Content Service. The location may be the service itself or a definition of the service and its offerings.
- [1-1180] [R1] Time delay in switching from one Scheduled Content Service to another should be minimized. The time should be no greater than 2 seconds and the goal should be <500ms.

### 5.3.2 Content on Demand (CoD)

#### 5.3.2.1 Common Requirements

- [1-1190] [R1] The IPTV Solution shall support Content on Demand services.
- [1-1200] [R1] The IPTV Solution shall support access to free-to-view CoD.
- [1-1210] [R1] The IPTV Solution shall support access to Subscription based CoD.
- [1-1220] [R1] The IPTV Solution shall support access to Pay Per View based CoD .
- [1-1230] [R1] The IPTV Solution shall provide a mechanism to present content streams with trick play modes, such as, pause/resume, fast/slow forward and fast/slow backward.
- [1-1240] [R1] The IPTV Solution shall provide a mechanism to resume playback from a specified point.

#### 5.3.2.2 Streamed CoD Requirements

- [1-1250] [R1] The IPTV Solution shall support direct consumption of CoD delivered from content servers.
- [1-1260] [R1] The IPTV Solution shall support the delivery of CoD as live streaming and progressive download.

#### 5.3.2.3 Push CoD

- [1-1270] [R1] The IPTV Solution shall support Push CoD for direct consumption from local storage.

- [1-1280] [R1] The IPTV Service Provider shall be able to initiate a download session on a specific ITF, and on groups of ITF.
- [1-1290] [R1] The IPTV Solution shall support a mechanism for allocating (portions of) user storage to local storage, and vice-versa. Who controls such allocation depends on the contractual terms between the user and the Service Provider.

#### 5.3.2.4 Deferred Download CoD

- [1-1300] [R1] The IPTV Solution shall support Deferred Download CoD.

### 5.3.3 PVR

#### 5.3.3.1 Local PVR

- [1-1310] [R1] The IPTV Solution shall support local PVR functionality. The content is stored locally in the ITF/Home Network.
- [1-1320] [R1] The IPTV Solution should support the following local PVR operations:
- [a] scheduling the recording of a single program event.
  - [b] scheduling the recording of repeating program events (e.g. series, content genres, actors, ...).
  - [c] automatic alignment of the recording with the actual program schedule provided by the program guide.
  - [d] provide the user with the list of scheduled recording sessions.
  - [e] deletion of scheduled recording sessions.

All of the above can be performed manually or via an application.

- [1-1330] [R1] The IPTV Solution shall support the following local PVR play out control: play, stop, pause, fast-forward, rewind.
- [1-1340] [R1] The IPTV Solution shall support the following local PVR content management operations:
- [a] list available content.
  - [b] select content for consumption from the list of recorded content.
  - [c] delete recorded content.
- [1-1350] [R1] Scheduling of PVR recording sessions shall be possible through the ITF.
- [1-1360] [R1] The IPTV Solution shall ensure that recordings which are made at the instigation of a Service Provider are not visible to other Service Providers.

#### 5.3.3.2 nPVR

- [1-1370] [R1] The IPTV Solution shall support a network based PVR service.
- [1-1380] [R1] nPVR service shall allow a user to control the play out of the recorded content (e.g. play, stop, pause, fast-forward, rewind).
- [1-1390] [R1] The IPTV Solution shall support the following nPVR operations:

- [a] scheduling the recording of a single program event.
- [b] scheduling of the recording of a repeating program events (e.g. series, content genres, actors, ...).
- [c] automatic alignment of the recording with the actual program schedule provided by the program guide.
- [d] provide the user with the list of scheduled sessions.
- [e] deletion of scheduled recording sessions.

All of the above can be performed manually or via an application.

- [1-1400] [R1] Scheduling of nPVR recording sessions shall be possible through the ITF.
- [1-1410] [R1] The IPTV nPVR solution shall support the following nPVR content management operations:
- [a] list of available content.
  - [b] select content for consumption from the list of recorded content.
  - [c] delete recorded content.

### 5.3.4 Time Shift

- [1-1420] [R1] The IPTV Solution shall support time shift functionality.
- [1-1430] [R1] The time shift function shall support the use of local storage and functions.
- [1-1440] [R1] The time shift functionality shall support back-in-time capability.

### 5.3.5 Service and Content Navigation

- [1-1450] [R1] A user shall be able to browse content available from an IPTV Service Provider after entering into a contractual relationship with that IPTV Service Provider.

#### 5.3.5.1 Service Navigation

- [1-1460] [R1] The IPTV Solution shall provide a mechanism to identify a portal and provide the user with the necessary information to access that portal with a URL.
- [1-1470] [R1] The IPTV Solution shall enable Portals to be accessed both via the Internet, (without any relationship between the Portal and the Access Network Provider), and via managed networks.
- [1-1480] [R1] The IPTV Solution shall provide mechanisms for a Portal to hand over control of the ITF User Interface to an IPTV Service Provider (e.g. via a hyperlink), or directly reference content available from an IPTV Service Provider (depending on the relationship of the Portal and the Service Provider).

#### 5.3.5.2 Content Guide (CG)

- [1-1490] [R1] The IPTV Solution shall support CGs that provide information to users about the content accessible through CoD system(s). The information shall include; title, actors, description, genre, playing time, parental information, ratings, costs.

- [1-1500] [R1] The IPTV Solution shall support CGs that provide information to users about scheduled content programs. The information shall include; channel name, program title, program description, actors, scheduled start and end times, genre, parental information.
- [1-1510] [R1] The IPTV solution shall support the ability for content guides to show the schedule for the current day and a number of days into the future. For example, a service provider could choose to make available the content guide for the current day and the following 2 weeks.
- [1-1520] [R1] The IPTV user shall be able to select items of content to view or download from the CG supported by the IPTV Solution.
- [1-1530] [R1] Depending on the IPTV business model, IPTV Service Providers shall be able to offer CGs over the Internet or over the managed network.
- [1-1540] [R1] The IPTV Solution shall support filtering of Content Guide information to show different amounts of detail according to whether the content item is part of the subscription or not.
- [1-1550] [R1] The IPTV Solution shall support filtering of Content Guide information according to the rating of the item and the personal profile (including parental controls placed if any) of the user.
- [1-1560] [R1] The IPTV Solution shall support customization of the Content Guide information in a way that presents the information in a format selected by the user.
- [1-1570] [R1] The IPTV Solution shall support a CG that provides information about content from a single IPTV SP or from several IPTV SPs selected by the user.
- [1-1580] [R1] The CG information supported by the IPTV Solution shall include a linkage mechanism to allow the unique correlation of Scheduled Content Services and content across all Service Providers (e.g. unique content identifier, etc.).
- [1-1590] [R1] It shall be possible for the SPP to present a consolidated CG from multiple IPTV Service Providers aggregated in different ways depending on business agreements between the SPP and IPTV Providers.

### 5.3.6 User Notification Service

- [1-1600] [R1] The IPTV Solution user notification service shall support the following functions that can be requested directly by the user or via an application:
- [a] Notification of the start of a selected single scheduled content program.
  - [b] Notification of each instance of a selected scheduled content program group (e.g. series, content genres, actors ...).
  - [c] Request notification via selection from the CG.
  - [d] Automatic alignment of notifications with the program schedule times provided by the CG. Including updates to the schedule
  - [e] List of requested notifications.
  - [f] Delete notification requests.
- [1-1610] [R1] The IPTV Solution shall be able to notify the user through the display of an ITF.



### 5.3.7 Advertising

- [1-1620] [R1] The IPTV Solution shall support mechanisms for the insertion of advertising graphics and video content in non-video (information) services.
- [1-1630] [R1] The IPTV Solution shall allow for the selection and presentation of advertising material on a regionalized basis.
- [1-1640] [R1] The IPTV Solution shall allow for the insertion of advertising material utilizing network located equipment.
- [1-1650] [R1] The IPTV Solution shall allow for the insertion of advertising material utilizing home network based equipment.
- [1-1660] [R1] The IPTV Solution shall allow advertising material containing textual and graphic items to be overlaid with transparency into video streams.
- [1-1670] [R1] The IPTV Solution shall allow advertising material containing textual and graphic items to be presented in a horizontal “ticker style” format with the video stream.
- NOTE: This format should consume less than 10% of the available vertical resolution.
- [1-1680] [R1] The IPTV Solution shall support mechanisms for the user to log (e.g. bookmark) individual advertisement information.
- [1-1690] [R1] The IPTV Solution shall support various advertising media such as video, audio, graphics, text.

### 5.3.8 Communication Services

#### 5.3.8.1 Caller ID

- [1-1700] [R1] The IPTV Solution shall provide interception of incoming voice calls.
- [1-1710] [R1] The IPTV Solution shall enable the presentation of information relating to intercepted voice calls.

#### 5.3.8.2 Presence

- [1-1720] [R1] The IPTV Solution shall allow multiple users of an ITF to communicate their presence.
- [1-1730] [R1] The IPTV Solution shall permit information on the content item currently being rendered to be included as part of a user's Presence status.
- [1-1740] [R1] When the content item currently being rendered is part of the user's Presence status, external applications shall be able to use this information together with other presence information (e.g. NGN Communication Presence). This requirement is dependent on compliance to the requirements in the data confidentiality section.

#### 5.3.8.3 Messaging

- [1-1750] [R1] The IPTV Solution shall provide a mechanism allowing an IPTV user to send textual messages to another user or to a list of users using the ITF display and a suitable text entry device e.g. remote control or remote keyboard.

[1-1760] [R1] The IPTV Solution shall provide a mechanism for the IPTV user to receive textual messages from other users and display the content of the message on the ITF display.

#### 5.3.8.4 Chatting

[1-1770] [R1] The IPTV Solution shall provide a mechanism for an IPTV user to establish a chat session with another IPTV user using the ITF display and a suitable text entry device e.g. remote control.

[1-1780] [R1] The IPTV Solution shall provide a mechanism for an IPTV user to establish a chat session with a group of IPTV users.

[1-1790] [R1] The IPTV Solution shall allow an IPTV user to send textual messages within a chat session and have all other users in that session receive the message on the ITF display.

## 5.4 Application Deployment and Execution

### 5.4.1 General Requirements

[1-1800] [R1] The IPTV Solution shall include 3 different types of interactive applications;

- Implementation-dependent applications (e.g. written in native code for a particular operating system).

NOTE: Consideration of the execution environment and operating system for implementation-dependant applications is outside the scope of these requirements.

- Browser applications which are expressed in the combination of a declarative format and a scripting language.
- Executable applications which are compiled from a general purpose programming language.

[1-1810] [R1] The IPTV Solution shall include a presentation component that shall be able to present browser applications.

[1-1820] [R1] The IPTV Solution shall include an execution environment and hence be able to execute executable applications.

[1-1830] [R1] The IPTV Solution shall support deployments where the application execution environment is not implemented on a TV and/or TV Set Top Box.

[1-1840] [R1] When an ITF is deployed without an application execution environment, it shall be able to access as many as possible of the services to be addressed by the IPTV Solution.

NOTE: As a consequence, services to be deployed over un-managed networks cannot assume the presence of an application execution environment.

### 5.4.2 Common Requirements

[1-1850] [R1] IPTV Service Platform Providers and IPTV Service Providers shall be able to create new Applications that involve information, multimedia and communication features.

- [1-1860] [R1] The IPTV Solution shall support mechanisms to deliver Interactive Applications via both unicast and multicast.
- [1-1870] [R1] An application shall be able to:
- [a] Scale and position video content on the display.
  - [b] Specify portions of the display with alpha-blending to the video plane.
  - [c] Select alternative video and audio streams to render, both within a content item or between content items.
  - [d] Perform trick mode control of content item playback.
  - [e] Request the initiation or termination of a content on demand session.
  - [f] Request the download of content items to local storage, when available.
  - [g] Request the necessary rights to view content.
  - [h] Store, retrieve and manage persistent information.
  - [i] List, present and remove content items which have been downloaded.
 

NOTE: A mechanism to manage visibility of downloaded content items between different Service Providers should be considered.
  - [j] React to asynchronous events from the network.
- [1-1880] [R1] An application shall be able to obtain status information (e.g. watched channel) and events (e.g. remote control key-presses) from the ITF. For hybrid devices, this shall be applicable also to non-IP services. The user shall consent to the use of and/or sharing of identity, status, or event information.
- [1-1890] [R1] The IPTV Solution shall support a mechanism to signal the availability of an Interactive Application as part of a service, along with a locator for that service.
- [1-1900] [R1] The IPTV Solution shall support a mechanism to deliver applications some time in advance of their execution.
- [1-1910] [R1] The requirements in the “Application Security” section shall apply to both browser applications and executable applications.
- [1-1920] [R1] The requirements in the “Communication Security” section shall apply to both browser applications and executable applications.

### 5.4.3 Requirements Specific to Browser Applications

- [1-1930] [R1] The IPTV Solution shall include support for browser applications with access to similar functionality to that available in a web browser (ignoring plugins), including:
- The rendering of text and graphics.
  - The entry of text and numbers, including menus, lists, “radio buttons”, buttons, etc.
- [1-1940] [R1] Browser applications that make use of the browser shall be implemented such that they economize as much as possible on the usage of resources (e.g. processing power, run-time memory, data storage capacity).

- [1-1950] [R1] The logic of browser applications shall be primarily implemented on the server side.
- [1-1960] [R1] It shall be possible for a browser application user interface to transfer control to application user interfaces provided by other actors via e.g. a hyperlink mechanism.
- [1-1970] [R1] It is recommended that the same user interface technologies are used, as far as possible, by the various components of the IPTV Solution.
- [1-1980] [R1] The IPTV Solution shall allow pull downloading of browser applications to the browser.
- [1-1990] [R1] The browser shall be able to obtain browser applications from all of the following;
- [a] Service Providers
  - [b] implementation-specific applications in the home
  - [c] executable applications (see requirement [1-2130])

## 5.4.4 Requirements Specific to Executable Applications

### 5.4.4.1 General Requirements

- [1-2000] [R1] Executable applications shall be distributed in a form which is independent of any particular processor and operating system.
- [1-2010] [R1] The execution environment shall support multiple applications running at the same time.
- [1-2020] [R1] The IPTV Solution shall permit multiple actors to deploy executable applications to the same application execution environment.
- [1-2030] [R1] The execution environment shall permit a range of solutions for separation between executable applications from simple implementations where all applications have to be coordinated / co-operating (and one badly behaved application can disrupt others) to more robust implementations where no co-ordination is required with sufficient separation that one badly behaved application cannot disrupt others.
- [1-2040] [R1] Executable applications shall be able to include functional enablers including implementations of operator specific access network protocols and implementations of home network protocols not included in the IPTV Solution.
- NOTE: How the protocols implemented in functional enablers interwork with the IPTV Solution is outside the scope of these requirements.
- [1-2050] [R1] The IPTV Solution shall allow downloading of functional enablers to the application execution environment.
- [1-2060] [R1] The IPTV Solution shall allow pull and push downloading of executable applications to the Application Execution Environment. Applications are then executed by the environment and are able to use the execution environment API.

### 5.4.4.2 Functional Requirements

- [1-2070] [R1] The execution environment shall support multi-threading applications including the use of synchronization primitives.
- [1-2080] [R1] The execution environment shall support applications making and receiving connections to and from other devices.

- [1-2090] [R1] The execution environment shall support applications accessing DLNA devices.
- [1-2100] [R1] The execution environment shall support applications making and receiving connections to and from network servers.
- [1-2110] [R1] The execution environment shall support applications which provide secure services as required by the “Communication Security” section.

#### 5.4.4.3 User Interface Requirements

- [1-2120] [R1] The normal graphics and UI APIs for the execution environment shall be supported. Their output shall be possible to display via the following;
- [a] On devices with a locally connected display, by the implementation of the execution environment's UI API directly calling the graphics system for that locally connected display.
  - [b] The possibility of Service Provider specific solutions in the device containing the application execution environment shall not be excluded, e.g. ones relying on [1-3160]
- [1-2130] [R1] Executable applications shall be able to generate and serve browser applications to browsers in the same way as an application server in the network would be able to do.

NOTE: In [1-2120], the executable application would use the normal graphics/UI API for the technology. In [1-2130], the executable application would not use a graphics/UI API. It would instead generate the markup and scripting language of a browser application in text form and then make these available to devices including the IPTV Solution's browser technology as defined by requirement [1-1990].

#### 5.4.5 Other Requirements

- [1-2140] [R1] Subject to an appropriate commercial agreement, a non-IPTV broadcast application in a hybrid device should be able to interwork with an IPTV Service.

## 5.5 Security

### 5.5.1 Access control

#### 5.5.1.1 Application Security

- [1-2150] [R1] The IPTV Solution shall support the ability constrain, through an access policy, an application's access to sensitive facilities and features in the ITF on a per-application basis.
- [1-2160] [R1] Constraints on sensitive facilities and features in the ITF shall be expressed in a way which can be easily audited by the IPTV Service Provider.
- [1-2170] [R1] The default access policy shall be to deny access to sensitive facilities and features on an ITF where access has not been explicitly requested.
- [1-2180] [R1] These constraints shall be secure and authenticated.

- [1-2190] [R1] The IPTV Service Provider shall be able to configure a policy or policies for running interactive applications on an ITF and granting access to sensitive facilities depending on the creator or distributor of the application.
- [1-2200] [R1] When multiple interactive applications are able to run simultaneously on the ITF, applications not permitted access to one or more sensitive facilities shall not be able to obtain access by subverting other applications which are permitted that access.

## 5.5.2 Authentication

### 5.5.2.1 User Authentication

- [1-2210] [R1] When a 3rd party IPTV Service Provider does not belong to the same business entity as the Service Platform Provider but has a service level agreement with the Service Platform Provider, the IPTV Service Providers shall be able to authenticate the User for the purpose of IPTV service access.
- [1-2220] [R1] When an IPTV Service Provider belongs to the same business entity as the Service Platform Provider, the IPTV Solution shall support the ability to re-use the Service Platform-level authentication for granting IPTV service access.
- [1-2230] [R1] When the appropriate relationship is in place between the Service Platform Provider and the IPTV Service Provider, the IPTV Solution shall support a mechanism for the Service Platform Provider to be able to identify the user to the IPTV Service Provider in a secure manner.
- [1-2240] [R1] The IPTV Solution shall support the ability, through appropriate authentication mechanisms, e.g. username/password, etc. to distinguish and authenticate individual users that share a subscription for access to services and content.
- [1-2250] [R1] The IPTV Solution shall support the ability to authenticate the subscriber when placing controls on individual users.
- [1-2260] [R1] The IPTV Solution shall support the ability to authenticate the user not just the device.
- [1-2270] [R1] The IPTV Solution shall support communication between the ITF and IPTV Service Provider (e.g. for CG download, content download, remote management) without, or independently from, individual user authentication.
- [1-2280] [R1] The IPTV Solution shall support access to content that is part of the general subscription and is not restricted (e.g. by parental control settings) without individual user authentication.
- [1-2290] [R1] The IPTV Solution shall support independent login and selection of the service consumption point for each of the different services that a user has subscribed to (e.g. IPTV, presence, phone, messaging, chatting, email).
- [1-2300] [R1] When common login is configured as part of the user profile, the IPTV Solution shall support common login to multiple services.
- [1-2310] [R1] The IPTV Solution shall support the ability for several individual users to be concurrently logged in for different services on the ITF.
- [1-2320] [R1] The IPTV Solution shall support a mechanism to relate IPTV family user accounts with other services (e.g. phone, email) the user has subscribed to.

- [1-2330] [R1] The IPTV Solution shall support a range of possibilities for identifying individual end-users for access to personalized services including;
- [a] the end-user directly identifying themselves to the device with which they are interacting.
  - [b] the end-user identifying themselves via a remote UI to either another device in the home or to a server running in the network.
- [1-2340] [R1] The IPTV Solution shall only require identification of individual end-users within a subscription for access to personalized services.
- [1-2350] [R1] The IPTV Solution shall support a mechanism to derive the IPTV Service Provider(s) from the user profile information stored by the service platform provider.
- [1-2360] [R1] The IPTV Solution shall support a mechanism for a user to change their IPTV subscription (e.g. add/remove Service Providers).
- [1-2370] [R1] Users shall be able to purchase, access and consume content without the involvement of additional 3rd party or external hardware (such as CAM or UICC).
- [1-2380] [R1] Users shall be able to purchase, access and consume content over the Open Internet without the involvement of a Service Platform Provider.

### 5.5.2.2 Application Authentication

- [1-2390] [R1] The IPTV Solution shall support the ability to securely identify the creator or distributor of a browser application or executable application to the end-user.
- [1-2400] [R1] The IPTV Solution shall support the ability to securely identify the origin or source of an application which ITFs may present to end-users.
- [1-2410] [R1] The IPTV Solution shall support the ability to securely identify individual interactive applications as having been provided by the same creator or distributor.
- [1-2420] [R1] The IPTV Solution shall support a range of options to authenticate a browser application or executable application. These options shall include; no authentication, authentication only of the creator or distributor of the interactive application and authentication of the contents of the individual files of the application.
- [1-2430] [R1] The IPTV Solution shall support the ability for application servers to be able to securely identify ITFs, (both before running an application and while running an application) within limits imposed by privacy requirements.

NOTE: Application distributors may want to control which ITFs run their applications and doing this via a content security mechanism would be limiting since it would force connections between application servers and content security servers which would not otherwise exist. It would force organizations providing interactive applications but not A/V content to have content security servers.

### 5.5.3 Data Confidentiality

- [1-2440] [R1] The operation of the IPTV Solution shall not require disclosure of information on each item of content being consumed by a user to any party other than the provider of each specific item of content.

NOTE: Wider disclosure of information may be allowed either following consent by users or as a consequence of regulatory or legal requirements.

## 5.5.4 Service and Content Protection / DRM

- [1-2450] [R1] The IPTV Solution shall support a mechanism to equip scheduled content services with rules governing content usage and distribution within the home network.
- [1-2460] [R1] ITFs shall be able to reliably enforce adherence to the rules governing scheduled content service usage and distribution within the home network.
- NOTE: How this is achieved shall not be described by the IPTV Solution.
- [1-2470] [R1] ITFs shall be able to process messages containing cryptographic keys.
- [1-2480] [R1] ITFs shall take protective measures to prevent the user from obtaining direct access to sensitive keying material.
- NOTE: How this is achieved shall not be described by the IPTV Solution.
- [1-2490] [R1] At the option of the IPTV Service Provider, content shall, be either encrypted or not encrypted during transmission across the network.
- [1-2500] [R1] The IPTV Solution shall support content consumption controlled by a DRM system.
- [1-2510] [R1] The IPTV Solution shall support the ability for an IPTV Service Provider to make items of content freely available without the need for registration with that Service Provider.
- [1-2520] [R1] The IPTV Solution shall provide a mechanism for service protection for limiting the access to services only to authorized users.
- [1-2530] [R1] The IPTV Solution service protection mechanism shall, as far as possible, be built on existing openly available standards.
- [1-2540] [R1] All parts of the IPTV Solution service protection mechanism, including key management, the delivery and scrambling and descrambling of keys and content and interfaces shall be openly standardized so that no proprietary extensions to any part of the system is required.
- [1-2550] [R1] The IPTV Solution shall include the tools to realize at least the following content protection profiles for the delivery of content:
- [a] "in the clear", that is, without the application of any technical protection measures;
  - [b] "protected stream", that is, where the content is protected with the same keys for many recipients. These keys shall change frequently over time, at the discretion of the Service Provider;
  - [c] "protected package", that is, where the content item instance delivered to the user is protected with individually applied protection keys.
- NOTE: Additional content protection profiles may be added.
- [1-2560] [R1] The IPTV Solution service protection mechanism shall support the ability to protect scheduled content in such a way that it is not feasible for Users who have not registered or subscribed to the service to render the service content in clear.
- [1-2570] [R1] In the IPTV Solution service protection mechanism, the content keys shall be generated and distributed to the ITFs of authorized users in a way that prevents eavesdropping of these keys.



- [1-2580] [R1] The IPTV Solution service protection mechanism should not require the usage of additional 3rd party or external hardware (such as Smart-Card, UICC or CAM) in the ITF.
- [1-2590] [R1] IPTV terminals shall be able to reliably enforce adherence with rules governing service content usage and distribution in the home network.

NOTE: How this is achieved shall not be described by the Open IPTV Solution.

### 5.5.5 Communication Security

- [1-2600] [R1] The IPTV Solution shall support a mechanism for applications to be able to open and use secure (encrypted) connections with application servers.
- [1-2610] [R1] The IPTV Solution support a mechanism for interactive applications to be able to authenticate the identity of a server with which they have a secure connection.
- [1-2620] [R1] The IPTV Solution shall support the ability to include root certificates to be used in authenticating servers with which an application has secure connection(s), as part of an application.
- [1-2630] [R1] When root certificates are required to be built in to the terminal, the IPTV Solution shall support mechanisms to distribute and update the certificates.
- [1-2640] [R1] At least one of the supported mechanisms for certificate distribution shall not require any involvement of the ITF manufacturer / integrator.

### 5.6 Remote Management

- [1-2650] [R1] The IPTV Solution shall support ITF upgrade by the appropriate parties (e.g. device manufacturer, IPTV Service Provider).
- [1-2660] [R1] The ITF upgrade mechanism shall support upgrade of implementation-dependent applications as well as the basic implementation of the ITF.
- [1-2670] [R1] The IPTV Solution shall provide a mechanism for the ITF to connect to the RMS provided by the SPP.
- [1-2680] [R1] The IPTV Solution shall provide a mechanism for the SPP to carry out provisioning of the ITF via RMS.
- [1-2690] [R1] The IPTV Solution shall provide a mechanism for the SPP to either create a new Subscriber Profile, or recognize the Subscriber and modify the existing Subscriber Profile for the Services offered, automatically upon first connection of the Subscriber to the SPP.
- [1-2700] [R1] Upon activation of a new ITF in the Home Network, it shall be possible for the SPP to support the discovery, boot-strapping, registration and configuration for that ITF.
- [1-2710] [R1] It shall be possible for the IPTV Service Provider to deploy new browser applications on the ITF when it is first connected.

## 5.7 Registration

NOTE: Registration with a Service Provider is the initial act of establishing a contract or relationship with a Service Provider performed at the end of the Service Provider discovery process. Registration is normally performed once only. Subscribing to IPTV services can include the initial act of registration and contract for a service and any subsequent extensions or changes to the contracted services.

- [1-2720] [R1] Users shall be able to register with and/or subscribe to IPTV services offered by Service Providers. Registration and subscription shall be possible electronically over the Internet or over a “traditional” channel such as telephone call, mail, email, SMS.
- [1-2730] [R1] When IPTV Solution is deployed without a portal, the IPTV Solution shall support the ability for a user to be able to register directly with an IPTV Service Provider either via a browser based-UI or via a dedicated registration application using a standardized protocol.

## 5.8 Charging

- [1-2740] [R1] The IPTV Solution shall support a Pay Per View charging mechanism where the user pays per content item they consume.
- [1-2750] [R1] The Pay Per View charging mechanism shall support limiting consumption to a certain time window or a certain number of consumptions
- [1-2760] [R1] The IPTV Solution shall support a content subscription charging mechanism where the user subscribes to a package of content items or a certain number of content items.
- [1-2770] [R1] When the appropriate relationships and agreements are in place between the access network provider, IPTV Service Provider and SPP, the IPTV Solution shall support a mechanism for the SPP can to aggregate charging data with respect to usage of the access network and/or IP connectivity services with charging data generated with respect to usage of Platform Provider services and the IPTV services of IPTV Service Providers.
- [1-2780] [R1] Where appropriate agreements are in place, IPTV Service Providers shall be able to generate charging data for the use of their services and to transfer this charging data to the SPP that they are associated with.
- [1-2790] [R1] The IPTV Solution shall support a mechanism for IPTV Service Providers to be able to supply and charge for items of content over the Internet, without any relationship with the user’s Access Provider.
- [1-2800] [R1] The IPTV Scheduled Content Service provider shall be able to provide the User with charging information regarding the IPTV scheduled content service that the User has selected.
- [1-2810] [R1] Charging information shall be provided to the User prior to actual service consumption.
- [1-2820] [R1] The IPTV Solution shall support independence between the time when a content item is requested, the time when consumption of that content item starts, and the time when the corresponding optional charging transactions take place; this applies both to scheduled content services and to on-demand content services.

## 5.9 Accessibility

- [1-2830] [R1] The IPTV Solution shall include facilities to deliver services and content with accessibility enhancements to aid users with impaired vision or hearing.
- [1-2840] [R1] It shall be possible for the Service Provider to include additional service or content components that provide, for example a subtitle (closed caption) stream, or an additional descriptive audio stream.
- [1-2850] [R1] It shall be possible for the user to conveniently select the rendering of such auxiliary streams at the ITF.
- [1-2860] [R1] The IPTV Solution shall enable accessible user interfaces for IPTV services, e.g. for the handicapped or elderly.

## 5.10 Profiles

### 5.10.1 User Profiles

- [1-2870] [R1] The IPTV service subscription shall identify a default user with a user profile that has limited rights.
- [1-2880] [R1] The IPTV Solution shall support mechanisms for IPTV Service Providers to be able to add/delete/modify user profiles.
- [1-2890] [R1] The IPTV Solution shall provide a mechanism for the user to be able to add, remove and modify their user profile (e.g. edit the preference data used for content recommendation).
- [1-2900] [R1] The IPTV Solution shall support a mechanism for the subscriber to modify user profiles of users who are part of the subscription in order to place controls on access to services and content e.g. to not allow purchasing, or setting purchase limits etc.
- [1-2910] [R1] The IPTV Solution shall support a mechanism that utilizes user profiles to target and/or restrict content items as part of the content selection mechanism.
- [1-2920] [R1] The IPTV Solution shall support a mechanism to manage a group of registered Users within a single Subscription.
- [1-2930] [R1] The IPTV Solution shall offer a mechanism whereby the Subscriber is able to express preferences for the usage of their Services.

### 5.10.2 Network Resources

NOTE: One of the key differences between a managed network and Open Internet deployment of an Open IPTV Solution is that in the managed network case the system has detailed knowledge and control of the network resources available and used for delivering the IPTV service to its subscribers.

This section covers network resource profile requirements that are common to all IPTV Solutions. Specific network resource profile requirements for the managed network deployment can be found in section 'Managed Network Specific Service Requirements'.

- [1-2940] [R1] The IPTV Solution shall support a mechanism to have knowledge of the types of network resource available to carry its services. The profile of the types of network resources available to the implementation of a solution shall include the supported protocols and whether multicast transport and multicast group management protocol are supported.
- [1-2950] [R1] The IPTV Solution shall support a mechanism as part of service provisioning or as part of initiating a service delivery for the IPTV SP or SPP to be able to use stream set up mechanisms to determine the current profile of a users network access resources.
- [1-2960] [R1] When mechanisms are not available to automatically detect the access network resource profile of a user, the IPTV Solution shall support a mechanism for the profile to be input manually or be set by default as part of the users profile.
- [1-2970] [R1] The IPTV Solution shall support a mechanism for the Service Provider to have knowledge of, and not exceed the capabilities of, the resources (physical interfaces, bandwidths and guaranteed throughput) available between the IPTV Service Provider and the access network.

### **5.10.3 Content “Parental” Control**

- [1-2980] [R1] The IPTV Solution shall provide an authorization framework to support the enforcement of parental controls based on a number of criteria including age of user
- [a] content cost,
  - [b] time of day of consumption request,
  - [c] duration consumption of item,
  - [d] scheduled content service channel number,
  - [e] scheduled content service channel rating defined in a manner consistent with ratings defined by recognized content advisory boards.
- [1-2990] [R1] The IPTV Solution shall provide a mechanism to allow users of remote equipment to be involved in the authorization aspects of content acquisition.
- [1-3000] [R1] The IPTV Solution shall allow users of remote equipment to approve the use of content for other users.
- NOTE: Only as part of a network function for request of authentication. Home network based requests for remote lifting of a parental control restriction on scheduled content is not scoped for R1

### **5.11 Service Portability**

- [1-3010] [R1] The IPTV Solution shall support service portability that allows access to IPTV and communication services from any ITF.

### **5.12 Home Network**

- [1-3020] [R1] The IPTV Solution shall support the ability for the ITF to read/understand the IPTV CG information in order to publish the information within the home network.

- [1-3030] [R1] The IPTV ITF shall support functionality to make IPTV content and related content information available to DLNA devices in the home network in a DLNA compliant manner.
- [1-3040] [R1] The ITF shall be able to present the IPTV user with a list of content items and pictures that are available and stored in the Home Network on DLNA compliant devices (DMS).
- [1-3050] [R1] The ITF shall support the consumption of content items and pictures stored in the Home Network on DLNA compliant devices (DMS).
- [1-3060] [R1] Access network protocols in the IPTV Solution shall either;
- [a] be usable on the Home Network without disturbing other Home Network traffic, or
  - [b] be terminated and translated according to the following principles;
    - [b.1] Termination and translation must occur before content / information in the Access Network protocol enters the Home Network.
    - [b.2] The translation should only add relatively small cost to the translating device(s).
    - [b.3] Translation may apply only to a subset of the protocols that are involved in delivering IPTV service to a managed ITF on the Home Network, e.g. translation may only apply to the protocols for discovering IPTV services on the Access Network and for delivering the metadata
    - [b.4] Translation of Access Network protocols that deliver the actual IPTV content should be avoided or require minimal processing in the translating device.
- [1-3070] [R1] For implementations where the ITF functions are distributed across multiple physical devices in the home, the protocols for communicating between these functions over the home network shall, as far as possible, be ones used in other parts of the IPTV Solution.

## 5.13 Protocols and Data Formats

### 5.13.1 Content Formats

- [1-3080] [R1] The IPTV Solution shall support the following content types:
- [a] Combined audio and video content, including subtitles and closed captions,
  - [b] audio content

NOTE: Refer to “Accessibility” section for requirements on accessibility.

### 5.13.2 Transmission Protocols

NOTE: The choice of transmission protocols for the different categories of Open IPTV content are defined in the solution architecture. The requirements in this section are guidance to making the design decisions on transmission protocols and their profiles.

- [1-3090] [R1] The design aim shall be to define a minimum set of allowed transmission protocol profiles. Priority should be given to specifying protocols and their profiles that can be common for use in the managed network and open internet deployments of IPTV Solution.
- [1-3100] [R1] Transmission protocols shall also be chosen to provide a user experience in terms of presentation and response time that is appropriate to the IPTV Solution business model.
- [1-3110] [R1] The transmission protocols defined by DVB Project for DVB Service transmission over IP networks should be taken as the guideline for the choice of transmission protocols.
- [1-3120] [R1] The IPTV Solution shall support the use of multicast transmission for the scheduled content service and mass deployment of content and data download.
- [1-3130] [R1] Where multicast transmission cannot be utilized, an alternative mechanism shall be defined for delivery of the scheduled content service and mass deployment of content and data download.
- [1-3140] [R1] The choice of transmission protocols should be optimized for use over the various physical connections deployed in the solution, e.g. GPON, xDSL etc.
- [1-3150] [R1] Transmission protocols that support revisions and backward compatibility shall be chosen in order to minimize the impact on the whole solution of a protocol update.
- [1-3160] [R1] The IPTV Solution shall not exclude the possibility of devices which decode (and decrypt) transmitted content, manipulate it in some way (e.g. composite it with device-generated graphics), recode (and reencrypt it) and pass it on.

### **5.13.3 Control Protocols**

NOTE: The choice of control protocols for the selection and control of the delivery of the different categories of Open IPTV content are defined in the architecture. The requirements in this section are for guidance to making the design decisions on control protocols and their profiles.

- [1-3170] [R1] The design aim should be to define a minimum set of allowed control protocol profiles. Priority should be given to specifying protocols and their profiles that can be common for use in the managed network and open internet deployments of the IPTV Solution.

### **5.13.4 Content Download Protocols**

- [1-3180] [R1] The IPTV Solution shall utilize both multicast and unicast transmission protocols for the transfer of stored content items.
- [1-3190] [R1] The IPTV Solution shall support temporarily stopping an ongoing download, to continue an interrupted download, and to recover a downloading session after an unwanted/unforeseen interruption (e.g. power loss).
- [1-3200] [R1] The IPTV Solution shall provide a method to check the integrity of downloaded content items, and to recover errors and missing parts.
- [1-3210] [R1] The IPTV Service Provider shall be able to remotely check the integrity of downloaded content items delivered to a given ITF, and to assess failed and successful downloads.

### **5.13.5 Metadata**

- [1-3220] [R1] When allowed by the Service Provider, the IPTV Solution shall support a mechanism to supply content metadata from sources other than from the IPTV Service Provider supplying the content.
- [1-3230] [R1] The IPTV Solution shall include a mechanism to supply content metadata to aid retail ITF devices to perform navigation, selection, association (linking) and recommendation.
- [1-3240] [R1] The IPTV Solution shall define, as a minimum, the following content metadata
- category of content (e.g. movies, news, sports...),
  - description,
  - title,
  - scheduled time, for scheduled content services.
- [1-3250] [R1] The IPTV Solution shall provide a syntax, semantics and protocol for querying for content based on metadata properties (e.g. query for movies with a particular actor; query for a list of actors etc.).
- [1-3260] [R1] The IPTV Solution shall support a scalable mechanism to deliver/update metadata associated with scheduled content.

## **5.14 Data Export**

- [1-3270] [R1] The IPTV Service Provider shall be able to export filtered content metadata to a 3rd party Content Guide provider.
- [1-3280] [R1] The IPTV Solution shall support standard mechanisms to export filtered subscription data excluding any explicit reference to the actual user identity.

## **5.15 Managed Network Specific Service Requirements**

### **5.15.1 Network Resources**

- [1-3290] [R1] The IPTV Solution shall support managing the available bandwidths through the access network from the IPTV Service Provider stored content servers and live IP streaming headends to individual Consumer Networks.
- [1-3300] [R1] As part of the content selection and control process the IPTV Solution shall perform a check on the availability of the network resources that would be required to deliver the selected content with the required quality.
- [1-3310] [R1] When there are insufficient resources of the correct quality, the end user shall be informed and the content and control process terminated without starting the distribution of the content to the user.
- [1-3320] [R1] When the resource availability check is successful, the resources required to deliver the service must be removed from the set of resources available to other users.
- [1-3330] [R1] As part of the termination of the content selection and control process (i.e. after stopping the playout at the end of movie) the IPTV Solution shall restore the availability of the resources that had been used for the delivery of the content.

## **5.16 Open Internet Specific Service Requirements**

[1-3340] [R1] The IPTV solution shall permit deployments where business models do not support the creation of software upgrades for consumer owned equipment including all or part of the ITF. (e.g. a "sell and forget" retail model).

NOTE: Technology choices relating to consumer owned equipment in such deployments need to be more conservative than technology choices for deployments where software upgrades are routinely available as part of a maintenance contract.

## **5.17 Hybrid Device Requirements**

[1-3350] [R1] The IPTV Solution shall support hybrid devices.

[1-3360] [R1] The hybrid device shall support navigating an integrated channel list including IPTV services and non-IPTV services.

[1-3370] [R1] The content guide provided by the IPTV Solution shall be able to provide information on the content accessible via non-IPTV services.

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