OIPF

Service and Platform Requirements

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Open IPTV Forum

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Revision History

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V2.0.0	Open IPTV Forum Release 2 Requirements Specification	2008-12-12

Contents

1 SCOPE

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 5.19 and 5.20 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.

1.1 Terminology and Conventions

Throughout this document the requirements are numerically identified and an indication is given as to the release in which the requirement was initiated or substantially updated. The following gives illustrative examples of the requirement numbering convention used.

[1-yyyy] [R1] This is an example of a requirement from R1 (as indicated by [1- it the requirement number).

[1-yyyy] [R2] This is an example of a requirement from R1 (as indicated by [1- in the requirement number) that has been modified during R2 (indicted by [R2]).

[2-yyyy] [R2] This is an example of a requirement from R2 (as indicated by [2- in the requirement number).

Requirements may contain multiple parts which are identified through the use of sub-items numbered [a], [b], [c] etc. Each sub-item is part of the normative requirement.

Requirements and sub-items may contain clarifying notes in order to provide further elaboration. These are identified after the requirement and are preceded with "NOTE:"

2 REFERENCES

2.1 Normative References

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

2.2 Open IPTV Forum References

[SVCS]	Open IPTV Forum, Services and Functions for Release 2

3 DEFINITIONS, ACRONYMS, & ABBREVIATIONS

3.1 Definitions

Term	*Definition*
Access Network	The network infrastructure used to deliver IPTV services to the Consumer. 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.
Access Provider	Entity which operates the Access Network.
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.
Audience Data	Data about consumed contents (e.g. scheduled contents, CoD, PVR contents), access and navigation (e.g. Content Guide, subtitling), interactive applications (e.g. games, rating).
Audience Research System	A system to collect audience data, under the explicit consent of the users. This system can be managed either by the Service Platform Provider or by a Certified Authority, which is collecting audience data across networks, platforms, type of services and IPTV Service Providers.
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)
Bookmark	A means to identify a specific point in time during the play out of a content item from the Scheduled Content service or the Content on Demand service. This combination of the content item and the point in time is called a bookmark.

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	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.
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.
Digital Media	Media that is distributed by electronic means and processed digitally. Examples are digital video and audio clips, e-books, computer games and ring tones.
End User(s)	The individual(s) (e.g. members of the same family) who actually use the IPTV Services.
Fixed Network	Access Network for a fixed location, such as ADSL or FTTH.
Forced Play Out	A mode where some or all user play out control operations such as pause/resume, fast/slow forward, fast/slow backward, skip, and record are not supported for a particular content item.
Forum Specification	Output document of the Open IPTV Forum.

Free-to-View	A content service which may be encrypted but possible to consume with an authorized element (e.g. a viewing card) which is capable of decrypting signals while any form of continual subscription is not required.
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, DVB-T and DVB-H etc.
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).
ITF Remote Control Function (IRCF)	Function that allows the remote control of an ITF from a mobile or portable device.
IPTV Service Provider	Entity that offers IPTV Services and which has a contractual relationship with the Subscriber.
IPTV Solution	The specifications published by the Open IPTV Forum.
IPTV Terminal Function (ITF)	The functionality within the Consumer Network or a Mobile Terminal 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 IPTV Service Provider to pre-load CoD).
Mobile Network	A cellular access network, such as a GSM or a WCDMA network.
Mobile Terminal	A terminal device (ITF), e.g. a cellular phone, connected to IPTV Services via a Mobile Network.
Network Storage	Content storage located in the physical environment or administrative realm of the IPTV Service Provider.

Network Personal Video Recorder	Provision of PVR functionality whereby the content is stored in the IPTV 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 Video Recorder (PVR)	A function that records and plays back Content under the control of the User.
Personalized Channel	A scheduled content service where the program line up is modified on a per user basis according to the user's preferences, viewing habits or service provider recommendations.
Portable Terminal	A handheld terminal device (ITF), such as a notebook computer or a portable game machine, connected to services via a Fixed Network. The device may use wireless technology, e.g. WiFi, WiMax, to access the Fixed Network.
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.
Push CoD	A type of Content on Demand where the content is pre-loaded to the ITF local storage by the IPTV Service Provider. The user has no direct control of what content is downloaded; however the IPTV 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 IPTV Service Providers.
Service Platform Provider	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.

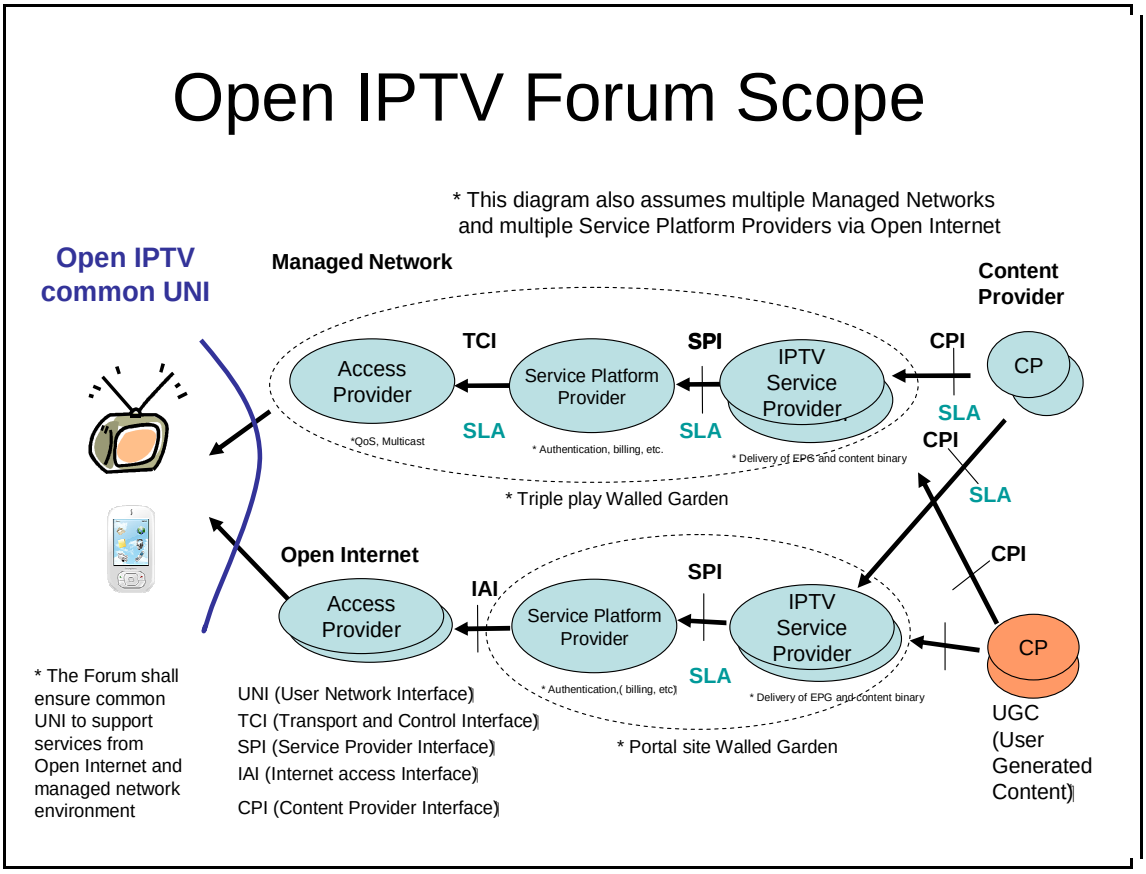
Service Portability	The ability that a given service or application can be utilised on various types of ITF.
Service Protection	Means to protect IPTV Services from unauthorized usage/access, such as • Access from unsubscribed consumers • Access that is not covered by the subscription • DOS attack
Session Continuity	The ability to move, in real time, a given service or application from one ITF to another resulting in the continuation of an existing session.
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.
Simplified Residential Network	A deployment where most of the functions are located outside of the Consumer Network.
Subscriber	The individual that makes the contract with an IPTV 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 mode 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

Abbreviation	*Definition*
ADSL	Asymmetric Digital Subscriber Line
API	Application Programming Interface
CAM	Conditional Access Module
CPE	Customer Premise Equipment
CPI	Content Provider Interface
DLNA	Digital Living Network Alliance
DRM	Digital Rights Management
DVB-C	Digital Video Broadcasting Cable standard
DVB-H	Digital Video Broadcast Handheld standard
DVB-S	Digital Video Broadcasting Satellite standard
DVB-T	Digital Video Broadcasting Terrestrial standard
EPG	Electronic Program Guide
FTTH	Fibre to the Home
GSM	Global System for Mobiles
GUI	Graphical User Interface
IPTV	Internet Protocol Television
IP	Internet Protocol
IRCF	ITF Remote Control Function
ITF	IPTV Terminal Function
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
SPI	Service Provider Interface
UI	User Interface
UICC	Universal Integrated Circuit Card
UNI	User Network Interface
URL	Uniform Resource Locator
VoD	Video on Demand
WCDMA	Wideband Code Division Multiple Access

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.

5 SERVICE REQUIREMENTS

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.

[2-1031] [R2] Services defined by the Open IPTV Forum shall be available on various end devices that are suitable for the service consumption. The list of devices shall include:

- TV
- PC
- Portable Terminal such as a PDA
- Mobile Phone

NOTE: The user experience and available services may vary due to different device capabilities.

[2-1032] [R2] Services defined by the Open IPTV Forum shall be accessible over fixed and mobile access networks that are suitable for service delivery.

NOTE: The user experience and available services may vary due to different access network capabilities.

[2-1033] [R2] The IPTV Solution shall allow bundling of IPTV services, available over certain access networks to certain end devices for flexible service offerings.

NOTE: This bundling can include different kinds of access networks and different kinds of devices.

[2-1034] [R2] The IPTV Solution shall allow an IPTV Service Provider to offer regionalization of service and content offerings.

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 streaming delivery of content with QoS guarantees.

[2-1041] [R2] When there is a suitable relationship between the IPTV Service Provider and the user's Access Provider, it shall be possible to set up a connection between the user and the IPTV Service Provider for streaming delivery of content with QoS 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 Service Platform Provider to present to the consumer a list of IPTV Service Providers according to the business agreements between the Service Platform Provider and IPTV Service Providers.

[1-1080] [R2] An IPTV Service Provider or Service Platform Provider shall be able to restrict the ability of a user to consume and purchase content from other IPTV Service Providers or Service Platform Providers if the business models are based on some restrictions.

NOTE: This type of restriction of the user's ability to consume and purchase content from other IPTV Service Providers or Service Platform Providers is only valid when there is a business model that makes this necessary. An example of such a business model would be one that is based on subsidization of the ITF.

[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 Service Platform Provider and not require the user to be re-authenticated when control is passed from the Service Platform Provider to IPTV Service Providers.

[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 a Managed Network and another service delivered via the 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.

[2-1171] [R2] Time delay in switching from one scheduled content channel to another should be no greater than 2 sec.

[2-1172] [R2] The IPTV Solution shall provide a fast channel changing mechanism to switch from one scheduled content channel to another in less than 500 msec.

5.3.2 Content on Demand (CoD)

5.3.2.1 Common Requirements

[1-1190] [R1] The IPTV Solution shall support CoD 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] [R2] The IPTV Solution shall support the following CoD play out controls:

[a] play,

[b] stop,

[c] pause,

[d] resume,

[e] normal backward,

[f] fast-forward,

[g] slow-forward,

[h] fast-backward,

[i] slow-backward,

[j] jump to time,

[k] jump to bookmark,

[l] jump to chapter,

[m] skip forward time interval,

[n] skip backward time interval.

[1-1240] [R1] The IPTV Solution shall provide a mechanism to resume playback from a specified point.

NOTE: The bookmarking functions described in section 5.3.9 may be used to realize this mechanism.

[2-1241] [R2] The IPTV Solution shall provide a mechanism to resume playback on the same or any other ITF where the user has registered.

[2-1242] [R2] For download CoD services (e.g. Push CoD, Deferred Download CoD) the IPTV solution shall provide a mechanism for synchronization of content and associated rights information between a CoD service and local ITF storage.

NOTE: The synchronization is used to recover content after failure or replacement of an ITF storage device.

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 IPTV 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 or in the Home Network.

[1-1320] [R2] The IPTV Solution should support the following local PVR scheduling 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] scheduling the recording by channel, date and time.

[e] providing the user with the list of scheduled recording sessions.

[f] deletion of scheduled recording sessions.

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

[1-1330] [R2] The IPTV Solution shall support the following play out controls:

[a] play,

[b] stop,

[c] pause,

[d] resume,

[e] normal backward,

[f] fast-forward,

[g] slow-forward,

[h] fast-backward,

[i] slow-backward,

[j] jump to time,

[k] jump to bookmark,

[l] jump to chapter,

[m] skip forward time interval,

[n] skip backward time interval.

[1-1340] [R1] The IPTV Solution shall support the following local PVR content management operations:

[a] providing the user with the list of recorded content,

[b] deleting recorded content.

[2-1341] [R2] The IPTV Solution shall support the selection and play out of recorded content by an authorized user using any ITF in the home network.

[1-1350] [R2] It shall be possible for an authorized user to perform the local PVR scheduling and content management operations from an ITF.

[1-1360] [R1] The IPTV Solution shall ensure that recordings which are made at the instigation of an IPTV Service Provider are not visible to other IPTV Service Providers.

[2-1361] [R2] It shall be possible for an authorized user to perform the local PVR scheduling and content management operations using devices without ITF capabilities (e.g. mobile phones, PDAs, PC etc) that are associated with the IPTV subscription.

[2-1362] [R2] It shall be possible for the IPTV Service Provider to perform the local PVR scheduling and content management operations at the request of an authorized user (e.g. request via web portal, mobile phone).

[2-1363] [R2] The IPTV Solution shall provide a means for the local PVR to notify the operation results to the user.

5.3.3.2 nPVR

[1-1370] [R1] The IPTV Solution shall support a network based PVR (nPVR) service.

[1-1380] [R2] The IPTV Solution shall support the following play out controls:

[a] play,

[b] stop,

[c] pause,

[d] resume,

[e] normal backward,

[f] fast-forward,

[g] slow-forward,

[h] fast-backward,

[i] slow-backward,

[j] jump to time,

[k] jump to bookmark,

[l] jump to chapter,

[m] skip forward time interval,

[n] skip backward time interval.

[1-1390] [R2] The IPTV Solution shall support the following nPVR scheduling 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] scheduling the recording by channel, date and time.

[e] providing the user with the list of scheduled sessions.

[f] deletion of scheduled recording sessions.

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

[2-1391] [R2] The IPTV Solution shall support the selection and play out of recorded content by an authorized user using any ITF.

[1-1400] [R2] It shall be possible for an authorized user to perform the nPVR scheduling and content management operations using an ITF.

[2-1401] [R2] It shall be possible for an authorized user to perform the nPVR scheduling and content management operations using devices without ITF capabilities (e.g. mobile phones, PDAs, PC etc) that are associated with the IPTV subscription.

[2-1402] [R2] The IPTV Solution shall provide means for nPVR to notify the operation results to the user.

[1-1410] [R2] The IPTV nPVR service shall support the following nPVR content management operations:

[a] providing the user with the list of recorded content.

[b] deleting recorded content.

5.3.4 Time Shift

[1-1420] [R1] The IPTV Solution shall support time shift functionality.

[2-1421] [R2] The time shift function shall support the use of Network Storage and functions.

[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.

[2-1441] [R2] The scheduled content service shall provide the ITF with a mechanism to identify those items of scheduled content that can be time shifted.

[2-1442] [R2] The network based time shift function shall support to resuming watching the time shifted program on the same or any other ITF that the user has registered.

[2-1443] [R2] The IPTV Solution shall support the following play out controls:

[a] play,

[b] stop,

[c] pause,

[d] resume,

[e] normal backward,

[f] fast-forward,

[g] slow-forward,

[h] fast-backward,

[i] slow-backward,

[j] jump to time,

[k] jump to bookmark,

[l] jump to chapter,

[m]skip forward time interval,

[n] skip backward time interval.

NOTE: Any forward movement cannot go beyond the actual scheduled content play out.

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.

[2-1451] [R2] The IPTV Solution shall support a mechanism to receive information from a mobile or a portable device describing an item of IPTV content and enable the user to then access this IPTV content item on an ITF.

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 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 IPTV Service Provider).

[2-1481] [R2] The IPTV Solution shall provide a mechanism to alert the user of the availability of new Services.

5.3.5.2 Content Guide

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

[1-1500] [R2] The IPTV Solution shall support Content Guides that provide information to users about scheduled content programs. The information shall include at least; channel name, program title, program description, actors, scheduled start and end times, genre, parental information and information advising the user on recording the content (e.g. do not record locally as the content owner does not sell licenses for later playback, the content will be made available by the nPVR service).

NOTE: The information about recording the content could include recording locations and time of content availability.

[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, an IPTV Service Provider could choose to make available the content guide for the current day and the following 2 weeks.

[2-1511] [R2] The IPTV Solution shall enable a user to access information about recorded content through a Content Guide. The information shall include; channel name, program title, program description, actors, scheduled start and end times, genre, parental information and information advising the user on the recorded content (e.g. local PVR vs. nPVR, how long it will be available, etc.)

[1-1520] [R1] The Content Guide shall contain information to allow the IPTV user to select content items to view or download.

[1-1530] [R1] Depending on the IPTV business model, IPTV Service Providers shall be able to offer Content Guides 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 Content Guide that provides information about content from a single IPTV Service Provider or from several IPTV Service Providers selected by the user.

[1-1580] [R1] The Content Guide information supported by the IPTV Solution shall include a linkage mechanism to allow the unique correlation of Scheduled Content Services and content across all IPTV Service Providers (e.g. unique content identifier, etc.).

[1-1590] [R1] It shall be possible for the Service Platform Provider to present a consolidated Content Guide from multiple IPTV Service Providers aggregated in different ways depending on business agreements between the Service Platform Provider and the IPTV Service Providers.

[2-1591] [R2] The IPTV Solution shall support a Content Guide that provides a visual indication of the availability of new Service offerings, where selecting the new Service offering (e.g., invoking the icon) should allow the user to order the new offering.

[2-1592] [R2] The IPTV Solution shall allow user to search for content items that fulfil certain criteria (e.g. title, actor, director, genre).

5.3.6 User Notifications

[1-1600] [R1] The IPTV Solution 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 Content Guide.

[d] Automatic alignment of notifications with the program schedule times provided by the Content Guide, 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.

[2-1611] [R2] The IPTV Solution shall be able to notify the user on devices outside the home network.

[2-1612] [R2] The IPTV Solution shall support mechanisms to deliver notifications via both unicast and multicast.

[2-1613] [R2] The IPTV Solution shall provide a mechanism by which the user shall be able to discover and access sources of notifications.

[2-1614] [R2] The IPTV Solution shall provide a mechanism by which the ITF shall be able to discover and obtain Emergency notification messages without user intervention.

[2-16!5] [R2] The IPTV Solution shall provide a mechanism by which the notification can either carry the message information or provide a reference to the message information.

[2-1616] [R2] The IPTV Solution shall provide a mechanism to assign a priority to a notification.

[2-1617] [R2] The IPTV Solution shall provide a mechanism to guarantee the delivery of critical notification messages with minimal delay.

[2-1618] [R2] The IPTV Solution shall provide a mechanism to synchronize the notification message with the related content.

[2-1619] [R2] The IPTV Solution shall provide a mechanism to enable the ITF or the IPTV Service Provider to filter notification messages based on user preference, location, priority etc.

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.

[2-1621] [R2] The IPTV Solution shall allow for the selection and presentation of advertising material according to a personalization profile (or personal preferences identified via a profile).

[1-1630] [R1] The IPTV Solution shall allow for the selection and presentation of advertising material on a regionalized basis.

[2-1631] [R2] The IPTV Solution shall allow for the selection and presentation of advertising material on a demographic 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.

[2-1671] [R2] The IPTV Solution shall provide mechanisms for delivering personalized interactive advertisements to the ITF.

[1-1680] [R1] The IPTV Solution shall support mechanisms for the user to log (e.g. bookmark) individual advertisement information.

[2-1681] [R2] The IPTV Solution shall support feedback mechanisms to the advertiser based on user interaction with the advertisement.

NOTE: To avoid traffic overhead in the core network and server congestion, the IPTV Solution shall provide a scalable mechanism to enable large scale usage with acceptable infrastructure costs.

[1-1690] [R1] The IPTV Solution shall support various advertising media such as video, audio, graphics, text.

[2-1691] [R2] The IPTV Solution shall provide a mechanism for delivering an advertisement relating to the scene or the object in which the user has expressed an interest.

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.

[2-1721] [R2] The IPTV Solution shall allow the IPTV User to obtain the presence status of other IPTV Users with that user's consent.

[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).

[2-1741] [R2] When the content item currently being rendered is a part of a user's presence status, the IPTV Solution shall permit other users to select this content item and switch immediately to view the same content item on their ITF, provided they have the right to access this content item.

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.

[2-1791] [R2] The IPTV Solution shall allow an IPTV user to send a private message to another user within a group chat session.

5.3.8.5 Voice and Video Telephony

[2-1792] [R2] The IPTV Solution shall support the ability for a user to interact with applications that provide establishment and management of voice calls.

[2-1793] [R2] The IPTV Solution shall support the ability for a user to interact with applications that provide establishment and management of video telephony calls.

[2-1794] [R2] The IPTV Solution shall provide a mechanism for a user to switch from an ITF based voice call to an ITF based video call and vice-versa.

[2-1795] [R2] The IPTV Solution shall provide mechanisms to manage video and audio capture devices.

NOTE: Manage implies control of local characteristics of the capture devices.

[2-1796] [R2] The IPTV Solution shall support the local camera video being shown in a preview window.

[2-1797] [R2] The IPTV Solution shall provide a mechanism to support multiple devices of the user to participate in a video call in order to support different media types.

5.3.8.6 Content Sharing

[2-1798] [R2] When allowed by the relevant DRM policies, users shall be able to select items of content available at their ITFs and send them directly to another user's ITF.

[2-1799] [R2] The IPTV Solution shall support that the receiving user can select the appropriate ITF for consumption of the content.

5.3.9 Bookmarks

[2-1811] [R2] The IPTV Solution shall support Bookmarks.

[2-1812] [R2] The use of a bookmark shall only be in accordance with the rights associated with the program.

[2-1813] [R2] The IPTV Solution shall associate a unique identifier with a bookmark.

[2-1814] [R2] It shall be possible for the IPTV User to create a bookmark with minimal user interaction with the content item being played out.

[2-1815] [R2] It shall be possible to associate a human friendly identifier (e.g. title@time-offset) with a bookmark.

[2-1816] [R2] It shall be possible to associate a bookmark with the IPTV User who has initiated the active Scheduled Content or Content on Demand session.

[2-1817] [R2] It shall be possible for the IPTV User to view all his bookmarks, sort them by any user-defined category, and delete them from any device (assuming the necessary capabilities for manipulation exist).

[2-1818] [R2] It shall be possible for an IPTV User to start playout of a content item at a bookmark not created by him (e.g., having received it in a chat message) so long as he has the proper access rights to that content item in his subscription.

[2-1819] [R2] It shall be possible for bookmarks to "expire" based on IPTV Service Provider settings. When expired, it is no longer possible to resume a content item at the bookmark. The expiration may be linked to the playout rights associated with the content item.

[2-1821] [R2] It may be possible for an IPTV Service Provider to offer pre-configured bookmarks.

[2-1822] [R2] The format of the bookmark should allow the content item to be started on any supported ITF when an appropriate media format is available.

[2-1823] [R2] The IPTV Solution shall ensure that bookmarks are updated to reflect any changes in the storage of the content item.

5.3.10 Personalized Services

5.3.10.1 Personalized Channel

[2-1831] [R2] The IPTV Solution shall support Personalized Channel Service.

[2-1832] [R2] The IPTV Solution shall enable inclusion of the user's Personalized Channel in the Content Guide.

[2-1833] [R2] The IPTV Solution shall use either local or network storage to provide the Personalized Channel.

5.3.11 Purchase of Digital Media

[2-1841] [R2] The IPTV Solution shall provide mechanisms to advertise digital media related to a content item.

[2-1842] [R2] The IPTV Solution shall allow a user to purchase digital media related to a content item or advertisement.

[2-1843] [R2] The IPTV Solution shall allow a user to send the purchased digital media to suitable end devices of the user.

[2-1844] [R2] The IPTV Solution shall support different methods for the delivery of purchased digital media to the end device including direct delivery (e.g. email with attached media, MMS) and indirect delivery by providing a link to the media (e.g. SMS with link).

5.3.12 User Reviews

[2-1851] [R2] The IPTV Solution shall provide a mechanism for presenting messages or comments expressed by other users during a previous instance, synchronized in line with the content.

5.4 Remote Control Function

[2-1861] [R2] The IPTV Solution shall support the control of an ITF by an ITF Remote Control Function (IRCF) provided by a mobile or portable device.

[2-1862] [R2] The IPTV Solution shall support the ability to enable and disable a user's IRCF remote control access per ITF.

[2-1863] [R2] The IPTV Solution shall offer a mechanism through which an IRCF associated with an IPTV User can be correlated to a specific ITF.

[2-1864] [R2] The IPTV Solution shall support a presentation capability on the IRCF for control of the ITF.

[2-1865] [R2] The IPTV Solution shall support control of IPTV services (e.g. Scheduled Content selection, CoD selection and trick mode, PVR) and ITF functions (e.g. volume control) via the IRCF.

[2-1866] [R2] The IPTV Solution shall support the use of communication services that are combined with the IPTV service (e.g. chatting, messaging) via the IRCF.

[2-1867] [R2] The IPTV Solution shall support the use of interactive services that are related to the IPTV service (e.g. voting, betting, advertisement) via the IRCF.

[2-1868] [R2] The IPTV Solution shall support the ability to provide additional information related to the IPTV service via the IRCF.

[2-1869] [R2] The IPTV user authentication requirements (see section 5.6.2.1) shall also apply for authentication of the user of the IRCF.

5.5 Application Deployment and Execution

5.5.1 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.

5.5.2 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] [R2] The IPTV Solution shall support mechanisms to deliver Interactive Applications via both unicast and multicast. For Hybrid Devices, the delivery of Interactive Applications via the digital broadcast TV channel shall be possible.

[1-1870] [R2] 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 IPTV Service Providers should be considered.

[j] React to asynchronous events from the network.

[k] React to events synchronized with or embedded within a content item being consumed. For Hybrid Devices the IPTV Solution shall also react to events originating from digital broadcast TV services.

NOTE: The event payload may include timing information pertaining to the validity of an action associated with the event.

[l] Present a textual or graphic notification of an event received according to [j] or [k].

[m] Mix, mute and manage the volume of selected audio streams.

[n] Request the initiation or termination of ITF-based audio and video calls.

[o] Select and present multiple content (e.g. video/audio/data) flows simultaneously.

[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.

[2-1881] [R2] An application shall be able to obtain the occurrence time of user interaction according to time base of the content item.

[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.

[2-1921] [R2] The IPTV Solution shall support mechanisms for rich media interactive applications which allow the user the possibility to personalize the scene composition of multiple content items (e.g. audio/video/data).

5.5.3 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])

5.5.3.1 Plug-ins

[2-1991] [R2] The IPTV Solution shall allow the use of browser plug-ins.

[2-1992] [R2] The IPTV Solution shall permit implementation-dependent plug-ins (e.g. native code) to be deployed either as part of the initial OITF software image or through the software update process for that image.

NOTE: There is no requirement for a more dynamic process for deploying implementation-dependent plug-ins.

[2-1993] [R2] The IPTV Solution shall define the interface between the browser and implementation-dependent plug-ins sufficiently to permit portability of plug-ins between browsers at the source code level. This interface shall be based on widely deployed industry standards.

[2-1994] [R2] The IPTV Solution may permit implementation-independent plug-ins to be deployed dynamically.

NOTE: This shall re-use elements of the executable application environment.

5.5.3.2 Multiple Windows

[2-1995] [R2] The IPTV Solution shall include an execution environment able to manage multiple browser windows/instances simultaneously taking care of resource (processor, memory, etc) management needs at each moment.

[2-1996] [R2] The IPTV Solution shall provide an API to manage and support a multi-window environment where accessing the API can be restricted.

5.5.4 Requirements Specific to Executable Applications

5.5.4.1 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.

5.5.4.2 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.

5.5.4.3 User Interface Requirements

[1-2120] [R2] 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 IPTV Service Provider specific solutions in the device containing the application execution environment shall not be excluded, e.g. ones relying on [1-3160].

[c] via a protocol between the execution environment and other devices in the home.

[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 mark-up 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].

5.5.5 Other Requirements

[1-2140] [R1] Subject to an appropriate commercial agreement, a digital broadcast TV application in a Hybrid Device should be able to interwork with an IPTV service.

[2-2141] [R2] The IPTV Solution shall provide mechanisms to use a mobile terminal or a portable terminal for interactive actions towards an application connected to an IPTV service (e.g. SMS-based voting on a program shown on TV).

5.6 Security

5.6.1 Access control

5.6.1.1 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.

5.6.2 Authentication

5.6.2.1 User Authentication

[1-2210] [R2] When an 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 Solution shall support the ability to be able to reuse the Service Platform-level authentication for granting 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.

[2-2231] [R2] The IPTV Solution shall support a single sign-on mechanism that protects the privacy of the user across different IPTV services.

[2-2232] [R2] The IPTV Solution shall support a single sign-on mechanism that allow an IPTV service to request particular sets of information about the user.

[2-2233] [R2] The IPTV Solution shall support a single sign-on mechanism that allows one authentication session to enable access to multiple IPTV services at the same time.

[1-2240] [R1] The IPTV Solution shall support the ability, through appropriate authentication mechanisms, e.g. username/password, 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 Content Guide 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 IPTV 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.

5.6.2.2 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.

5.6.3 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.

5.6.4 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 IPTV Service Provider.

[2-2511] [R2] The IPTV Solution shall allow the content and service protection function to be provided by the Service Platform Provider while the user specific entitlement information can be provided by the IPTV 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 IPTV 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 IPTV Solution.

5.6.5 Forced Play Out

[2-2591] [R2] The IPTV Solution shall provide a method to enforce the Content Provider's or Service Provider's Forced Play Out control options during user consumption of the content.

[2-2592] [R2] The IPTV Solution shall provide a mechanism by which a Content Provider can indicate to the IPTV Service Provider that Forced Play Out should be in effect for a particular content item.

[2-2593] [R2] The IPTV Solution shall provide a mechanism to deliver the Content Provider's or Service Provider's Forced Play Out control options. The provider's Forced Play Out control option shall be delivered when the user receives the content description information from the Content Provider or Service Provider.

[2-2594] [R2] The ITF shall be able to limit play out operations during the consumption of the content according to the Forced Play Out control options of the Content Provider or Service Provider.

[2-2595] [R2] The IPTV Solution shall ensure that Forced Play Out control is in effect during media consumption.

[2-2596] [R2] The Forced Play Out of a content item should not prohibit the IPTV User from terminating the content play out or changing to another content source.

5.6.6 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.

5.7 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.

[1-2664] [R1] The IPTV Solution shall define a mechanism to obtain the IPTV User's consent for remote management operations.

[1-2665] [R1] The IPTV Solution shall support the triggering of a upgrade of the browser and firmware components as parts of 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 Service Platform Provider.

[1-2671] [R1] The RMS shall be scalable in order to provide monitoring and simultaneous provisioning of a large population of ITFs.

[1-2672] [R1] The IPTV Solution shall provide a mechanism to prevent unauthorized access to the remote management function of the ITF.

[1-2673] [R1] The IPTV Solution shall support feedback mechanism to the Service Platform Provider of monitored performance measures such as packet loss and decoder errors in the ITF.

[1-2676] [R1] The monitored performance measures of the IPTV Solution shall be reported on a provisioned regular period or on demand from the Service Platform Provider.

[1-2677] [R1] The ITF may defer or skip the reporting of the monitored performance measures if sufficient resources are not available at the required time.

NOTE: Deferring the reporting is preferable to skipping for the on demand request from the Service Platform Provider.

[1-2680] [R1] The IPTV Solution shall provide a mechanism for the Service Platform Provider to carry out provisioning of the ITF via RMS.

[1-2683] [R1] The IPTV Solution shall support a mechanism for the Service Platform Provider to obtain basic information about the ITF including at a minimum vendor name, model name and version, upgradeable software versions.

[1-2686] [R1] The IPTV Solution shall provide a mechanism for the Access Network provider to reset the IP addresses under its control.

[1-2688] [R1] The IPTV Solution shall provide a mechanism for the IPTV Service Provider to clear their service specific parameters in the ITF. The mechanism shall prevent a IPTV Service Provider from disrupting access to or influencing the presentation of services from other IPTV Service Providers.

[1-2690] [R1] The IPTV Solution shall provide a mechanism for the Service Platform Provider 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 Service Platform Provider.

[1-2700] [R1] Upon activation of a new ITF in the Home Network, it shall be possible for the Service Platform Provider 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.

5.8 Registration

NOTE: Registration with an IPTV Service Provider is the initial act of establishing a contract or relationship with an IPTV Service Provider performed at the end of the IPTV 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 IPTV 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.

5.9 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 Service Platform Provider, the IPTV Solution shall support a mechanism for the Service Platform Provider 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 Service Platform Provider 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.

[2-2821] [R2] The IPTV Solution shall allow for purchased Digital Media to be charged alongside the regular billing activities for IPTV services.

[2-2822] [R2] The IPTV Solution shall support aggregation of charging information of all services of a user independently of the end device and the access network over which the service is used.

5.10 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 IPTV 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.

5.11 Audience Measurement

[2-2865] [R2] The IPTV solution shall provide a mechanism to send audience data to an audience research system. These data can be sent both from a suitable entity in the ITF (e.g. DAE) and from a suitable entity in the network with access to the information

[2-2866] [R2] IPTV Solution should provide a mechanism to deliver a subset of audience gathered data to applications, e.g. to allow the users to know which are the most watched channels in almost real time

5.12 Profiles

5.12.1 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.

[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.

[2-2931] [R2] The IPTV Solution shall provide an element in the user profile to indicate the ability of a device associated with the IPTV User to receive purchased Digital Media. The element may be manipulated by the IPTV Solution in situations where the device abilities can be directly interrogated. The element should include information relating to the format and quality of media that the device can accept, such that most appropriate media can be provided.

[2-2932] [R2] The user-specific preferences/configuration of an ITF recorded in the user profile shall be made in a way such that these can be applied to any ITF available to the user (provided the device offers functionality to support the capability)

5.12.2 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 Service Provider or Service Platform Provider 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 User Profile.

[1-2970] [R1] The IPTV Solution shall support a mechanism for the IPTV 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.

5.13 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

[a] content cost,

NOTE: Cost can be expressed as a range of values, maximum spending limits, spending limits per time period, etc.

[b] time of day of consumption request,

[c] duration consumption of item,

[d] scheduled content service channel number,

[e] content service rating defined in a manner consistent with ratings defined by recognized content advisory boards.

[f] age of user.

[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 belonging to the same subscription.

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.

[2-3001] [R2] The IPTV Solution shall provide a mechanism to identify all active users within an IPTV subscription.

[2-3002] [R2] The IPTV Solution shall provide a mechanism to identify the current status of the users within an IPTV subscription. Such status information includes logged-in users, the content being watched, etc.

[2-3003] [R2] The IPTV Solution shall allow a user, with the appropriate authorization, the ability to access the active user status information.

NOTE: The authorized user can make use of mobile terminals, browsers or other bi-directional communications mechanisms, e.g. SMS, to access this information.

[2-3004] [R2] The IPTV Solution shall provide a mechanism by which a user, with appropriate authorization, can temporarily block access to certain IPTV services and content for other users within the same IPTV subscription.

[2-3005] [R2] The IPTV Solution shall enable a user to set web filtering criteria for the other users in the same subscription.

[2-3006] [R2] The IPTV Solution shall provide a mechanism to filter web content out based on the filtering criteria of the authenticated user.

5.14 Service Portability

[1-3010] [R1] The IPTV Solution shall allow access to IPTV services from any ITF.

5.15 Session Continuity

[2-3015] [R2] The IPTV Solution shall support Session Continuity under the control of the user.

[2-3016] [R2] When there is a request to move a session to another ITF, the IPTV Solution should support continuous service experience to the user.

[2-3017] [R2] The IPTV Solution shall support a mechanism for an IPTV Service Provider to duplicate an existing service session on another ITF.

5.16 Home Network

[1-3020] [R1] The IPTV Solution shall support the ability for the ITF to read/understand the IPTV Content Guide 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] [R2] The ITF shall be able to present the IPTV user with a list of content items and their related information that are available and stored in the Home Network on DLNA compliant devices.

[1-3050] [R2] The ITF shall support the consumption of content items and their related information stored in the Home Network on DLNA compliant devices.

[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.

[2-3071] [R2] The ITF shall prevent that any information about devices, services, users or content available in the home network is provided to outside parties including IPTV Service Providers or trusted 3rd Party Internet Service Providers.

[2-3072] [R2] The IPTV Solution shall enable a User to define a set of content, devices, and services in the home network that are accessible by browser applications.

5.16.1 Remote Access

[2-3075] [R2] The IPTV Solution shall provide a protected mechanism to access the ITF in the Home Network by devices (e.g. mobile or portable terminal) outside of the Home Network.

5.17 Protocols and Data Formats

5.17.1 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.

[2-3081] [R2] The IPTV Solution shall provide mechanisms for adaptation of content format (e.g. video in TV format or in a suitable format for mobile devices) to accommodate different ITFs.

[2-3082] [R2] The IPTV Solution shall support different picture aspect ratios and resolutions for display according to the capabilities of devices in [2-1031].

5.17.2 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 the 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 recrypt it) and pass it on.

5.17.3 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.

[2-3171] [R2] The IPTV Solution shall provide a standardized mechanism to recover content streams from transmission errors by providing error recovery data in addition to the content stream, both for Scheduled Content Services as well as CoD services.

[2-3172] [R2] The IPTV Solution shall provide a standardized mechanism to recover content streams from transmission errors by retransmission of the missing data, both for Scheduled Content Services as well as CoD services.

[2-3173] [R2] The mechanism for recovery from transmission errors shall not affect rendering of the content stream by ITFs that do not support such mechanisms.

5.17.4 Content Download Protocols

[1-3180] [R1] The IPTV Solution shall utilize both multicast and unicast transmission protocols for the transfer of 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.

[2-3211] [R2] The IPTV Solution shall be able to inform the IPTV Service Provider about the successful download of a content item.

5.17.5 Metadata

[1-3220] [R1] When allowed by the IPTV 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).

[1-3260] [R1] The IPTV Solution shall support a scalable mechanism to deliver/update metadata associated with scheduled content.

5.17.6 Digital Media Transfer

[2-3263] [R2] The IPTV Solution shall support reporting of successful transfer of the Digital Media or the notification which provides a link to the Digital Media.

5.17.7 Quality of Service

[2-3266] [R2] The IPTV Solution should be able to take advantage of different QoS types and levels.

5.18 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.

5.19 Managed Network Specific Service Requirements

5.19.1 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.

5.20 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.

5.21 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 digital broadcast TV.

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

[2-3371] [R2] An application shall be able to obtain status information and events relating to content provided in broadcast digital TV services.

[2-3372] [R2] The IPTV Solution shall support a mechanism to signal the availability of an Interactive Application as part of a digital broadcast TV service, along with a locator for that service.

6 PLATFORM REQUIREMENTS

6.1 Content Delivery Network

NOTE: These apply to a managed network. The use of these requirements for unmanaged networks is optional.

[2-3401] [R2] The content delivery network control entities shall have a view of the maximum/actual capacity of the delivery servers (e.g., number of users served, bandwidth, etc.) within the content delivery network. This information shall be organized and distributed to the control entities depending on the content delivery network topological organization.

[2-3402] [R2] The content delivery network control entities shall be able to detect a change in the capacity of the content delivery servers within an organized group of server (e.g. a cluster or a set of clusters). The content delivery network control entities shall be able to notify these changes to other control entities in the Content Delivery Network.

[2-3403] [R2] The content delivery network control entities shall be able to detect a change in the availability of the content within a group of content delivery servers (e.g. a cluster or a set of clusters). Content delivery network control entities shall be able to notify changes in the content availability (and/or distribution) to other control entities in the Content Delivery Network as well as other entities in the Service Platform Provider.

NOTE: The Content Delivery Network control entities shall make use of the information provided by other Content Delivery network entities in their server or cluster assignment policy. The Service Platform Provider will process the request for a content item based on the updated content availability information in one or more Content Delivery Networks.

[2-3404] [R2] The Content Delivery Network Entities shall be able to detect an irregular signalling from the ITF (e.g., irregular frequency of requests for content, unexpected messages etc). The documentation of such irregular signalling is service provider dependent. The Content Delivery Network control entities shall able to notify irregular signalling events to other entities in the content delivery network as well as other entities in the Service Platform Provider.

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