



OIPF

RELEASE 2 SPECIFICATION

VOLUME 1 – OVERVIEW

[V2.0] – [2010-09-07]

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This specification provides multiple options for some features. The Open IPTV Forum Profiles specification complements the Release 2 specifications by defining the Open IPTV Forum implementation and deployment profiles. Any implementation based on Open IPTV Forum specifications that does not follow the Profiles specification cannot claim Open IPTV Forum compliance.

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Foreword

This specification has been produced by the Open IPTV Forum (OIPF).

This specification provides multiple options for some features. The Open IPTV Forum Profiles specification complements the Release 2 specifications by defining the Open IPTV Forum implementation and deployment profiles. Any implementation based on Open IPTV Forum specifications that does not follow the Profiles specification cannot claim Open IPTV Forum compliance.

The Open IPTV Forum Release 2 Solution specification consists of nine Volumes:

- Volume 1 - Overview (the present document)
- Volume 2 - Media Formats
- Volume 2a – HTTP Adaptive Streaming
- Volume 3 - Content Metadata
- Volume 4 – Protocols
- Volume 4a - Examples of IPTV Protocol Sequences
- Volume 5 - Declarative Application Environment
- Volume 6 - Procedural Application Environment
- Volume 7 – Authentication, Content Protection and Service Protection

The Release 1 IPTV Solution specifications were first published in January 2009. They were revised and re-published as V1.1 in October 2009. The Release 2 IPTV Solution specifications are based on the Release 1 V1.1 specifications, including all errata that have been resolved by the time of publication.

Release 2 adds new functionality compared to Release 1. The added services and features are described in the Overview.

The Overview (Volume 1, the present document) is an informative guide to the other Volumes, which deal with the specific aspects of the Release 2 Solution.

1 Scope (Informative)

The Open IPTV Forum (OIPF) IPTV Solution provides the specifications for an end-to-end platform for the deployment of IPTV Services. Figure 1 shows a high-level logical view of the scope of the OIPF IPTV Solution.

The Open IPTV Forum has developed an end-to-end solution to allow any consumer end-device, compliant to the Open IPTV Forum specifications, to access enriched and personalised IPTV services either in a managed or a non-managed network.

To that end, the Open IPTV Forum focuses on standardising the user-to-network interface (UNI) both for a managed and a non-managed network, as depicted in Figure 1.

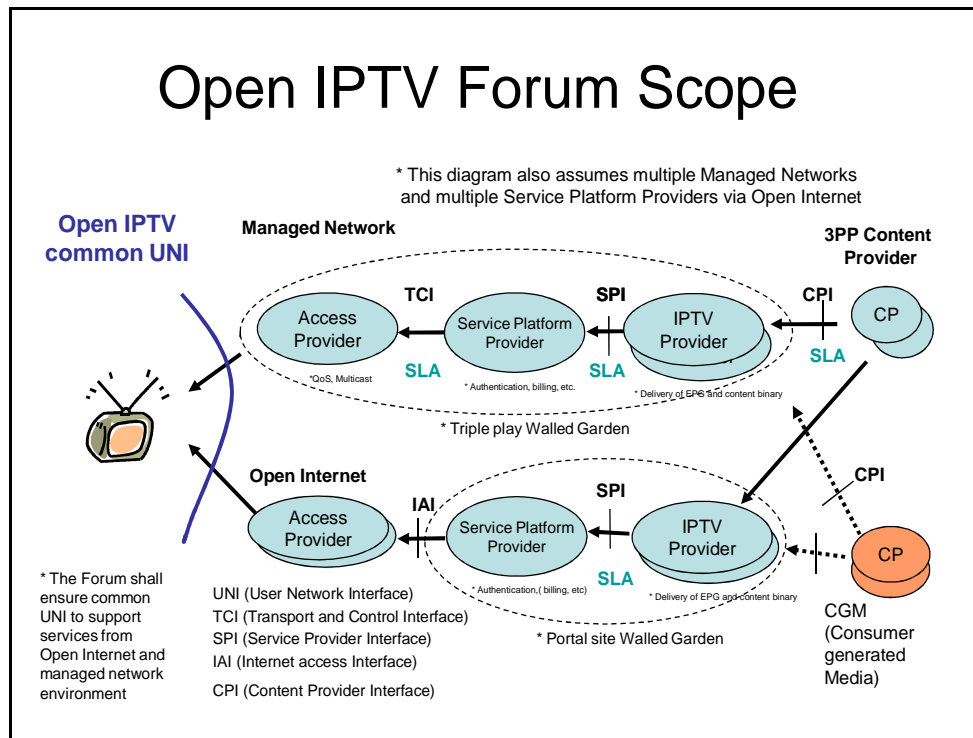


Figure 1 Open IPTV Forum scope

Throughout the specifications, the terms “Open Internet” and “Unmanaged Network” are used interchangeably, to refer to the ability to access any Service Provider using any Access Network Provider without any quality of service guarantees.

Open Internet IPTV Services are accessed via the Internet, without QoS guarantees. Open Internet IPTV services are accessed via a service platform (e.g., a portal) that provides supporting facilities for multiple Service Providers.

2 References

2.1 Normative References

The present document makes no normative references.

2.2 Open IPTV Forum References

| | |
|-----------------|---|
| [OIPF_SERV2] | Open IPTV Forum, “Services and Functions for Release 2”, V1.0, October 2008. |
| [OIPF_REQS2] | Open IPTV Forum, “Service and Platform Requirements”, V2.0, December 2008. |
| [OIPF_ARCH2] | Open IPTV Forum, “Functional Architecture – V2.0”, September 2009. |
| [OIPF_MEDIA2] | Open IPTV Forum, “Release 2 Specification, Volume 2 - Media Formats”, V2.0, September 2010. |
| [OIPF_HAS2] | Open IPTV Forum, “Release 2 Specification, Volume 2a – HTTP Adaptive Streaming”, V2.0, September 2010. |
| [OIPF_META2] | Open IPTV Forum, “Release 2 Specification, Volume 3 - Content Metadata”, V2.0, September 2010. |
| [OIPF_PROT2] | Open IPTV Forum, “Release 2 Specification, Volume 4 – Protocols”, V2.0, September 2010. |
| [OIPF_PROT2_EX] | Open IPTV Forum, “Release 2 Specification, Volume 4a – ”, V2.0, September 2010. |
| [OIPF_DAE2] | Open IPTV Forum, “Release 2 Specification, Volume 5 - Declarative Application Environment”, V2.0, September 2010. |
| [OIPF_PAE2] | Open IPTV Forum, “Release 2 Specification, Volume 6 - Procedural Application Environment”, V2.0, September 2010. |
| [OIPF_CSP2] | Open IPTV Forum, “Release 2 Specification, Volume 7 - Authentication, Content Protection and Service Protection”, V2.0, September 2010. |

2.3 Informative References

The present document makes no informative references.

3 Terminology and Conventions

3.1 Conventions

All sections in the present document are informative.

3.2 Definitions

| <i>Term</i> | <i>Definition</i> |
|-------------------------------------|---|
| Access Network | The network infrastructure used by the Access Provider to deliver IPTV services to the Consumer. The access network infrastructure 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. |
| 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. |
| Consumer Domain | The domain where the IPTV services are consumed. A consumer domain can consist of a single terminal or a network of terminals and related devices for service consumption. |
| Consumer Network | The local area network in which the IPTV Terminal Function is located. Consumer Networks include Residential 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 from the list of available content. Consumption of the content is started upon 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. |
| End User(s) | The individual(s) (e.g., members of the same family) who actually use the IPTV Services. |
| Internet | The Internet is the worldwide, publicly accessible network of interconnected computer networks that transmit data by packet switching using the standard Internet Protocol (IP). |
| IPTV Service Provider | Entity that offers IPTV Services and which has a contractual relationship with the Subscriber. |
| IPTV Solution | Defined by the Forum's specifications. |
| IPTV Terminal Function (ITF) | The functionality within the Consumer Network that is responsible for terminating the media and control for an IPTV Service. |
| Local Storage | Content storage within the administrative realm of the IPTV Service Provider, but not in their physical environment (for example, local storage could be a partition of storage located in the residential network and allocated to the Service Provider to pre-load CoD). |
| nPVR | Network based 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. |
| 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 Service Provider. The user has no direct control of what content is pre-loaded; however the Service Provider may make the choice based on user preferences and habits. Content is available for direct consumption after the user selection is confirmed. |
| Residential Network | The local network of devices (gateways and terminals) at the End User's premises. |

| <i>Term</i> | <i>Definition</i> |
|----------------------------------|--|
| Scheduled Content | An IPTV Service where the playout schedule is fixed by an entity other than the User. The Content is delivered to the user for immediate consumption. |
| Service | Content and Applications provided by Service Platform Providers and Service Providers. |
| Service Access Protection | Means to protect IPTV Services from unauthorized usage/access, such as - Access from unauthorized users - DOS attack |
| Service Platform Provider | Entity which, based on a contractual relationship with IPTV Service Providers, provides the 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 Protection | Means to protect Contents (files or streams) during their delivery. |
| Session Portability | Ability of a given Service/Application to be switched from one device to another for a continuation of a session in real time. |
| Subscriber | The individual that makes the contract (subscription) with a Service Provider for the consumption of certain Services. |
| Subscriber Profile | Information associated with a subscription. |
| 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 | Information (e.g., viewing preferences) associated with a specific User who is a part of a subscription. |
| User(s) | See End User(s). |

3.3 Abbreviations

| <i>Abbreviation</i> | <i>Definition</i> |
|---------------------|--|
| ADSL | Asymmetric Digital Subscriber Line |
| AG | Application Gateway |
| AKA | Authentication and Key Agreement |
| AP | Access Point and Authentication Proxy |
| API | Application Programming Interface |
| A-RACF | Access Resource Admission Control Function |
| AS | Application Server |
| ASM | Authentication and Session Management |
| AV | Authentication Vector |
| A/V | Audio and Video |
| BCG | Broadband Content Guide (specified by the DVB Project) |
| BTF | Basic Transport Function |
| CAC | Connectivity Admission Control |
| CAS | Conditional Access System |
| CC | Cluster Controller |
| CD | Content Delivery |
| CDC | Connected Device Configuration |
| CDF | Content Delivery Function |
| CDN | Content Delivery Network |
| CDNC | CDN Controller |
| CDS | Content Directory Service |

| <i>Abbreviation</i> | <i>Definition</i> |
|---------------------|--|
| CE | Consumer Equipment |
| CG | Content Guide |
| CK | Ciphering Key |
| CoD | Content on Demand |
| CPE | Customer Premise Equipment |
| CPI | Content Provider Interface |
| CSP | Content and Service Protection |
| CSPG | CSP Gateway |
| DAE | Declarative Application Environment |
| DHCP | Dynamic Host Configuration Protocol |
| DLNA | Digital Living Network Alliance |
| DLNA DMC | DLNA Digital Media Controller |
| DLNA DMP | DLNA Digital Media Player |
| DLNA DMR | DLNA Digital Media Renderer |
| DLNA DMS | DLNA Digital Media Server |
| DOS | Denial of Service |
| DRM | Digital Rights Management |
| DSCP | DIFFServ Code Point |
| DSL | Digital Subscriber Line |
| DTCP-IP | Digital Transmission Content Protection over Internet Protocol |
| DTT | Digital Terrestrial Television |
| DVB-IP | Digital Video Broadcasting (over) Internet Protocol |
| ECMA | European Computer Manufacturers Association, ECMA International - European association for standardizing information and communication systems |
| EPG | Electronic Program Guide |
| FE | Functional Entity |
| GBA | Generic Bootstrapping Architecture |
| GENA | General Event Notification Architecture |
| GPON | Gigabit Ethernet Passive Optical Network |
| GUI | Graphical User Interface |
| HAS | HTTP Adaptive Streaming |
| HD | High Definition |
| HDMI | High Definition Multimedia Interface |
| HLA | High Level Architecture |
| HN | Home Network |
| HSS | Home Subscriber Server |
| HTTP | Hypertext Transfer Protocol |
| IAI | Internet Access Interface |
| IG | IMS Gateway |
| IGMP | Internet Group Management Protocol |

| <i>Abbreviation</i> | <i>Definition</i> |
|---------------------|---|
| IMPI | IMS Private User Identity |
| IMPU | IMS Public User identity |
| IMS | IP Multimedia Subsystem |
| IP | Internet Protocol |
| IPTV | Internet Protocol Television |
| ISIM | IMS Subscriber Identity Module |
| ISP | Internet Service Provider |
| ITF | IPTV Terminal Function |
| M/C-U/C | Multicast to Unicast |
| LAN | Local Area Network |
| MAC | Message Authentication Code |
| MDTF | Multicast Data Terminating Function |
| MSRP | Message Session Relay Protocol |
| NAT | Network Address Translation |
| nPVR | Network Personal Video Recorder |
| OIPF | Open IPTV Forum |
| OITF | Open IPTV Terminal Function |
| OMA | Open Mobile Alliance |
| PAE | Procedural Application Environment |
| P2P | Peer-to-Peer |
| PC | Personal Computer |
| PIM | Protocol Independent Multicast |
| PiP | Picture-in-picture |
| PLMN | Public Land Mobile Network |
| POTS | Plain Old Telephony Service |
| PSS | (3GPP) Packet-switched Streaming Service |
| PVR | Personal Video Recorder |
| QoS | Quality of Service |
| RAC | Resource and Admission Control |
| RAND | Random Challenge |
| RCEF | Resource Control Enforcement Function |
| RTP | Real Time Protocol |
| RTCP | Real Time Control Protocol |
| RTSP | Real Time Streaming Protocol |
| RMS | Remote Management System |
| RUI | Remote User Interface |
| SAA | Service Access Authentication |
| SCART | Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs |
| S-CSCF | Serving Call Session Control Function |
| SD | Standard Definition |

| <i>Abbreviation</i> | <i>Definition</i> |
|---------------------|--|
| SD&S | Service Discovery and Selection (specified by the DVB Project) |
| SDP | Session Description Protocol |
| SLA | Service Level Agreement |
| SIM | Subscriber Identity Module |
| SIP | Session Initiation Protocol |
| SMS | Short Message Service |
| SP | Service Provider |
| SPI | Service Provider Interface |
| SPDF | Service-based Policy Decision Function |
| SPP | Service Platform Provider |
| SSO | Single Sign-On |
| STB | Set Top Box |
| TBD | To Be Determined |
| TCI | Transport and Control Interface |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| UE | User Entity |
| UI | User Interface |
| UICC | Universal Integrated Circuit Card |
| UNI | User Network Interface |
| URI | Uniform Resource Identifier |
| URL | Uniform Resource Locator |
| USIM | Universal Subscriber Identity Module |
| VoD | Video on Demand |
| xDSL | Any DSL |
| WLAN | Wireless LAN |
| WG | WAN Gateway |
| WAN | Wide Area Network |
| XML | eXtensible Markup Language |
| XHTML | eXtensible Hypertext Markup Language |

4 Release 2 Specifications Overview (Informative)

The Release 2 IPTV Solution specifications build upon the Release 1 specifications published in January 2009 and revised in October 2009.

The Release 2 specifications provide an end-to-end solution for the deployment of the set of IPTV services described in [OIPF_SERV2], and enable any consumer end-device, compliant to the OIPF specifications, to access enriched and personalised IPTV services either in a managed or a non-managed network. The solution adheres to the Open IPTV Platform and Service Requirements for Release 2 [OIPF_REQS2] and is based on the Release 2 Architecture [OIPF_ARCH2].

Figure 2 shows a high-level logical view of the scope of the Release 2 Solution in terms of networks and functional entities in the residential network. Note that there is no prescription about how these functional entities are mapped to physical device implementations. For example, it is conceivable that a single residential device could host a terminal (OITF) function and any of the gateway functions (IMS-, Application-, and/or Content & Service Protection Gateways) in one “box”. Section 5.3.4 of the Release 2 Architecture specification [OIPF_ARCH2] describes many plausible deployment scenarios involving allocation of these functional entities to physical entities such as a TV or a STB.

Managed Network IPTV Services are provided from within an operator’s core network, enabling the Service Provider to make use of service enhancement facilities like multicast delivery and QoS provision.

Open Internet IPTV Services are accessed via an independently operated access network, with or without QoS guarantees. Open Internet IPTV services may be accessed via a service platform (e.g., a portal) that provides supporting facilities for multiple Service Providers.

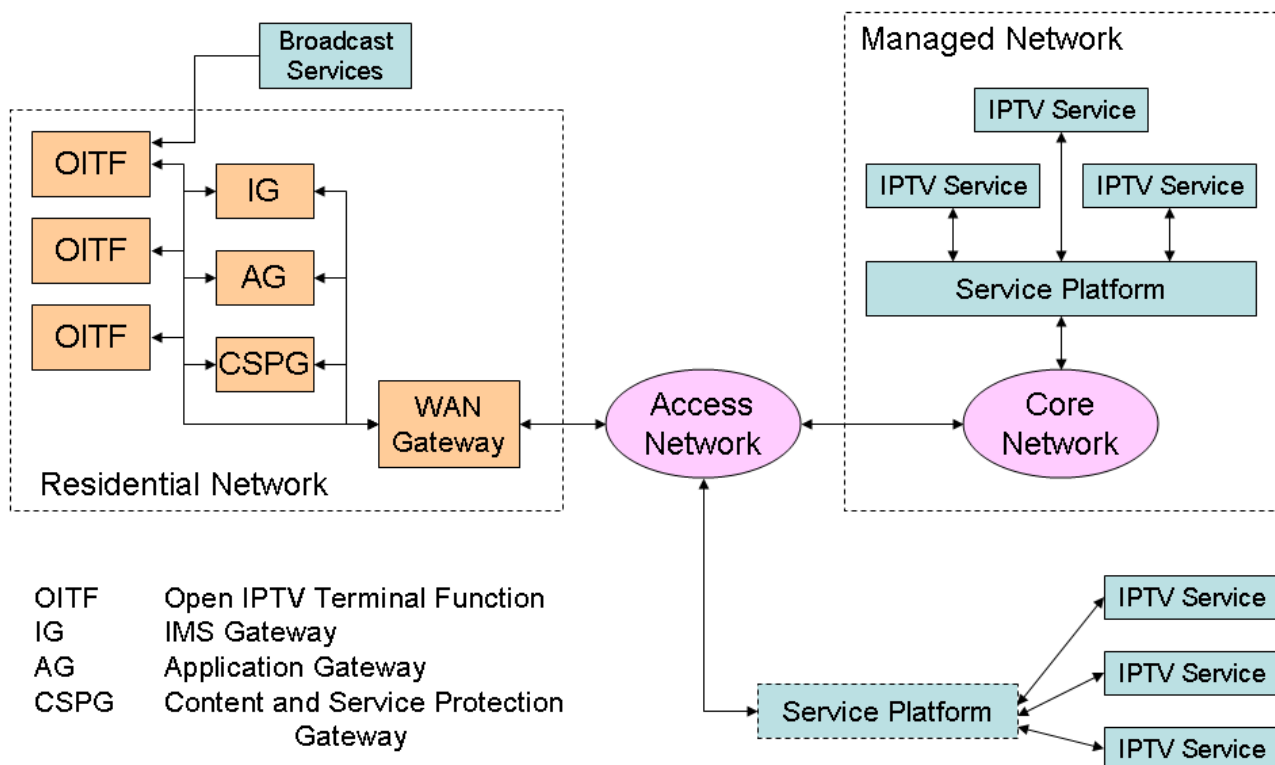


Figure 2 IPTV Solution scope

The Release 2 specifications provide an end-to-end solution that can provide any of the following IPTV Services:

- Scheduled content services (linear TV), including their recording (PVR), Electronic Programme Guide (EPG) and hybrid services (combining the usage of the IPTV and broadcast channels);
- Content on demand (both streaming and download) services;
- Information services, both with and without any relation to the content delivery services; and

- Communication services, including notifications, and their blending with the content delivery services.

These IPTV services can be provided generally in both the managed network and open internet modes of operation, but there may be differences in how each service is provided between these two modes of operation.

Functions are specified which enable attractive and innovative ways to provide the services listed above. They can be summarised as:

- Service provisioning, including network attachment, User management, including the management of multiple users within a household, where applicable, Quality-of-Service (QoS) provisioning, Remote management of the devices in the home network, including configuration, fault diagnosis and software upgrade;
- Service access and control;
- Service and content navigation;
- Interactive application platforms;
- Content and service protection, where applicable;
- Interworking with DLNA-compliant home network devices.

As is the stated goal of OIPF, wherever possible, relevant existing standards and specifications from industry initiatives are reused. The specifications refer to published specifications from various branches of the industry in order to build the Release 2 IPTV Solution, including most notably: 3GPP, Broadband Forum, CEA, CI Plus LLP, DLNA, DVB, ETSI TISPAN, IETF, JCP, Marlin Developer Community (MDC), MPEG, Open Mobile Alliance (OMA) and W3C. The specifications essentially provide the “glue” between these to build the IPTV Solution. The OIPF also engages with these fora to address gaps or necessary refinements, as appropriate.

Release 1 Version 1.1 of the IPTV Solution specification contained some minor new features, errata, and editorial improvements compared to V1.0.

The Release 2 Solution specifications add the following major features compared to Release 1:

- Services and applications:
 - Sub-picture video formats (reduced picture resolution compared to SD);
 - Voice and A/V communication services (only codecs so far, to be completed in maintenance release);
 - Content services via mobile networks to mobile terminals;
 - Added network PVR and managed local PVR;
 - Timeshift for network PVR and personalised channel services;
 - Purchase of digital media service;
 - Bookmarking of content;
 - Session continuity and portability between devices;
 - Notification services (network-generated notifications, user reminders, emergency announcement);
 - Hybrid (broadcast-broadband) application support
 - Packaged applications
- Features:
 - Adaptive streaming of content over HTTP. This feature is contained in the new Volume 2a;
 - Fast-channel change (FCC) and Retransmission (RET), based on DVB-IPTV V1.4;
 - HNI-IGI instantiation using SIP;

- Content navigation controls (also known as “forced play-out”);
- HTML5 <video> tag
- DLNA Remote UI - control of OITF

The Release 2 Solution specifications are organised as nine Volumes, whereby Volumes 2-7, also 2a and 4a, specify particular aspects of the IPTV Solution, as summarised in the following sub-sections.

Annex A of the present document provides an informative summary of all XML schema usage in the Release 2 Solution specifications.

4.1 Media formats

Volume 2 specifies the complete set of media formats adopted in Release 2, including audio, video and systems layers, also ancillary content like subtitles and resources used by other parts of the Solution, namely graphics and audio clip formats for the interactive application environments.

Support for H.264/AVC video and HE-AAC audio for content delivery services is mandatory, but further optional codecs are included in order to cater for specific regional requirements and migration from legacy deployments.

Video formats for A/V content services are specified for HD and SD formats. Release 2 adds sub-picture video profiles for PiP and other services.

Systems layers are specified based on MPEG-2 Systems (Transport Stream) and MP4 File Format, both of which are mandatory to be supported for unprotected content in the OITF. For protected files, three variants are specified – OMA DCF, OMA PDCF and Marlin IPMP.

Release 2 adds the following features related to media formats:

- Extended set of optional audio codecs for A/V content services;
- Clean Audio function, referring to the solution specified by DVB;
- Media formats for voice and A/V communication services;
- Media formats for A/V content services via mobile networks to mobile terminals.
- Signalling for the delivery of DAE applications in-band within MPEG-2 TS.

Release 2 also adds Volume 2a, a specification for HTTP Adaptive Streaming (HAS). This is based on 3GPP Release 9 PSS, but an extension is specified in order to accommodate the MPEG-2 TS systems layer as well as MP4 File Format. HAS also provides efficient management and delivery of component media streams (e.g. alternative audio languages) with adaptively streamed content.

4.2 Content Metadata

Volume 3 specifies all aspects of content metadata, including service provider information and metadata delivery.

Two levels of service and content discovery and selection are defined, mirroring the DVB specifications, standardised by ETSI, for Service Discovery and Selection (SD&S), and Broadband Content Guide (BCG).

Whereas DVB SD&S foresees the delivery of metadata within XML documents, the IPTV Solution also enables service discovery via CE-HTML content as part of an interactive application hosted by the Declarative Application Environment (DAE), described below.

Provision is also made for metadata to be delivered within the content i.e. the MPEG-2 Transport Stream, namely as DVB Service Information, EIT present/following, without accompanying SDT information. This method ensures that at least a minimum of metadata is available to the OITF in every circumstance, e.g. when unicast retrieval of the metadata might be overloaded at the server. It is also very convenient for quick retrieval e.g. when the OITF is zapping through linear TV services.

Volume 3 specifies some extensions to DVB SD&S. Extensions are defined for the following purposes: DAE application signalling, bandwidth renegotiation, content and service protection control information, and file format indication.

Several extensions are also specified for BCG, namely: transport protocol indication, content protection information, and content format information, comprising audio, video, file format, transport protocol, and parental guidance information.

Metadata delivery is performed as specified in DVB SD&S and BCG, i.e. using DVBSTP for multicast delivery, and HTTP for unicast delivery.

As specified by DVB, BCG data can be delivered in containers via unicast or multicast, including updates via TVA fragments. The OITF may also implement the SOAP Query mechanism to selectively retrieve BCG data.

Release 1 V1.1 of Volume 3 contained the following major changes compared to V1.0:

- The Service Provider discovery extensions for DVB SD&S (section 3.2.1) are deprecated.
- Application signalling - The method for signalling interactive applications via Service Provider Discovery extensions, specified in section 3.2.1 of Vol. 3, is deprecated. It is replaced by Application Announcement and Signalling based on ETSI TS 102 809 V1.1.1 (originally DVB blue book A137r1), specified in the new section 3.2.3.
- Service Provider related application signalling and the application usage schema have been extended to include applications providing non-native HNI-IGI functionality.

Release 2 of Volume 3 contains all amendments of metadata resources for the inclusion of the Release 2 services and functions.

4.3 Protocols

Volume 4 brings together the specification of the complete set of protocols for the IPTV Solution, covering the reference point interfaces defined in the Release 2 Architecture [OIPF_ARCH2]. These reference points are classified as:

- The UNI interfaces, between the network or service provider domains and the consumer domain;
- The HNI interfaces, between the functional entities in the consumer network domain;
- The NPI interfaces, between the functional entities in the network and service provider domains; and
- Interfaces to external systems, e.g. the DLNA home network.

Figure 3 shows the functions inside each of the residential network functional entities and the set of UNI and HNI reference points that interface to them.

Note that the Application Gateway (AG) functional entity is optional, so that in its absence, OITFs communicate with services via the HNI-UNI set of interfaces directly. This mode is also still possible when an AG is deployed.

Note also that Release 2 does not define the HNI-AGG and HNI-AGI interfaces.

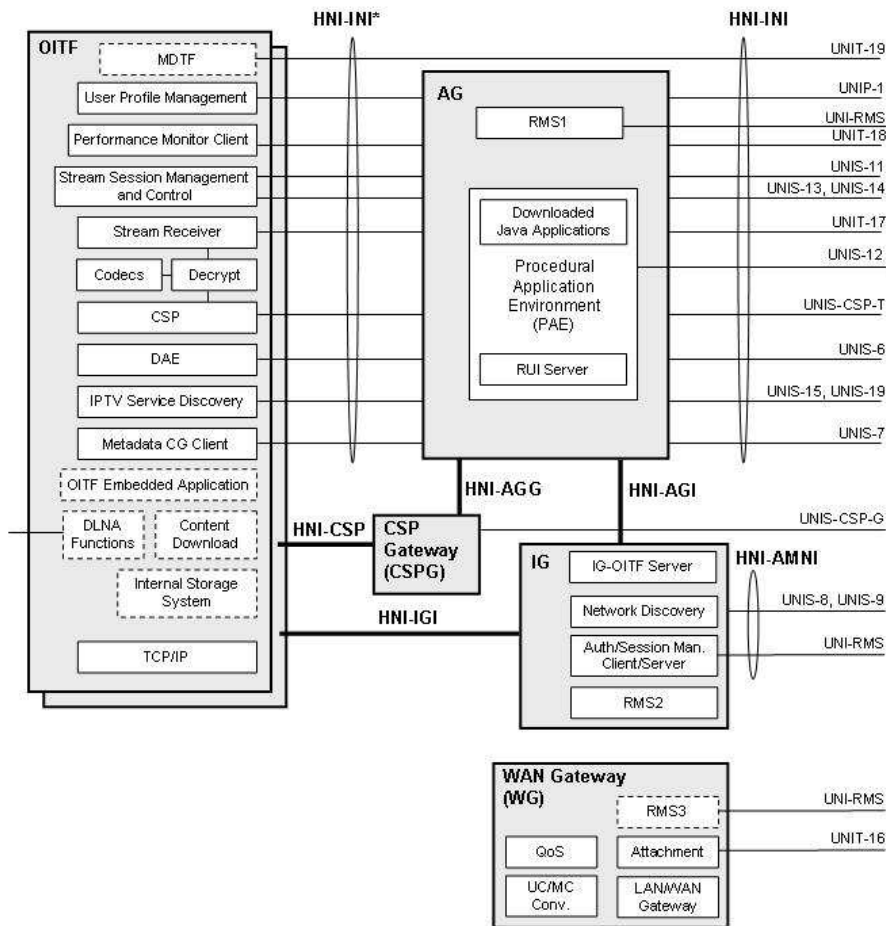


Figure 3 Residential Network; Functional Entities, UNI and HNI Reference Points

Table 1 gives a description of each of the UNI reference points and indicates which protocols have been specified for their realisation.

| Reference Point | Description | Protocols |
|------------------------|---|------------------|
| UNIP-1 | Reference point for user initiated IPTV service profile management. | HTTP, XCAP |
| UNIS-6 | Reference point for user interaction with application logic for transfer of user requests and interactive feedback of user responses (provider specific GUI). HTTP and FLUTE is used to interface between the DAE and the IPTV Application Function in both the managed and unmanaged models. | HTTP, FLUTE |
| UNIS-7 | Requests for transport and encoding of content guide metadata. The reference point includes the metadata and the protocols used to deliver the metadata, and SHALL be based on DVB-IP BCG. | HTTP, DVBSTP |
| UNIS-8 | Authentication and session management for managed network model. | IMS SIP |
| UNIS-9 | Authentication for GBA Single-Sign on. | HTTP |
| UNIS-11 | Reference point for control of real time streaming (e.g. control for pause, rewind, skip forward). The reference point includes content delivery session setup in case of unmanaged. | RTSP |
| UNIS-12 | Reference point between the AG and the provider specific application functional entity. | HTTP, FLUTE |
| UNIS-13 | User Stream control for multicast of real time content and data for the managed network model. | IGMP |
| UNIS-14 | Reference point used for authorization of service access for the unmanaged network model. | HTTP |
| UNIS-15 | Reference point to the IPTV Service Discovery FE to obtain information about IPTV services offered by an IPTV Service Provider. | HTTP, DVBSTP |

| | | |
|------------|--|----------------|
| UNIT-16 | Reference point used for Network Attachment. | DHCP |
| UNIT-17 | Content stream including content; content encryption (for protected services) and content encoding. This reference point MAY be used for both multicast and unicast (UNIT-17M and UNIT-17U, respectively). | RTP, HTTP, UDP |
| UNIT-18 | Performance monitoring interface for reporting the performance monitoring results. | RTCP, RTSP |
| UNIS-19 | Reference point to the IPTV Service Provider Discovery functional entity to obtain the list of Service Providers, and related information. | HTTP |
| UNI-RMS | Remote Management using the Broadband Forum TR-069 framework. | HTTP/TR-069 |
| UNIS-CSP-T | Rights management for protected content – including key management and rights expression. | HTTP/MARLIN |

Table 1 UNI Reference Point Descriptions and Protocols

The NPI interfaces largely replicate reference point implementations specified by TISPAN.

The Volume 4 specification is organised in terms of each of the major protocols used, whereby the specific usage of each protocol for a particular IPTV Service or function is then stated.

For Release 2 the major additions are:

- Protocols for the new Release 2 Services - network PVR and managed local PVR; timeshift for network PVR and personalised channel services; purchase of digital media service; bookmarking of content; session continuity and portability between devices; notification services (network-generated notifications, user reminders, emergency announcement);
- Fast-channel change (FCC) and Retransmission (RET), based on DVB-IPTV V1.4;
- HNI-IGI instantiation using SIP, in addition to the existing instantiation using HTTP;
- Remote control/access from a mobile terminal.

4.4 Declarative Application Environment

Volume 5 specifies the browser-based Declarative Application Environment (DAE) that runs in the OITF functional entity. The DAE enables web technologies to be used to provide access to IPTV (and other) services deployed via both managed networks and the open internet.

The starting point for the DAE specification is CEA-2014, also known as CE-HTML. The CEA-2014 specification makes a selection from among the various available web technologies, namely XHTML 1.0 transitional or strict; DOM level 2 core, style, events and a subset of the HTML DOM; CSS TV 1.0; ECMA-262 Java-script and W3C (working draft) XMLHttpRequest. Both CEA-2014 and the DAE specification define more detail on these including exactly which parts are required and which are optional.

In addition the DAE specification also defines several extensions – the adoption of some properties of CSS-3 that avoid the use of Java-script for simple user interface navigation; tagged opcode replacement, for more streamlined user event generation; and most importantly, the capability exchange mechanism. This allows the IPTV server to customise offerings based on the signalled capabilities of the OITF. Examples of OITF capabilities that can be provided are media format and DRM-specific capabilities, local broadcast tuner control, PVR and content recording or download control.

The DAE specification also defines how SVG (Scalable Vector Graphics) can be included, either within an HTML document (the same way as Flash is typically used) or as a stand-alone document. The version of SVG used is SVG Tiny 1.2, recently finalised by the W3C.

The specification provides several methods for service lifecycle management for use depending on the kind of application at hand. A security model is defined to control access from services to device capabilities, based on fine-grained permissions for each capability. Examples of such permissions are access to OITF configuration and settings, diagnostics and remote management functions, and interaction with the content and service protection agent. Note that a mechanism for services to request particular permissions and a mechanism to configure terminals to grant or refuse permissions have been deferred for later consideration and are not included in the Release 1 or Release 2 specification.

The specification contains the complete set of Java-script API definitions for the DAE.

For Release 2, as well as the inclusion of many amendments to accommodate the Release 2 services and functions, the major DAE-specific addition is media control via subset of the HTML5 <video> tag.

4.5 Procedural Application Environment

Volume 6 specifies the Java-based Procedural Application Environment (PAE) that runs in the Application Gateway (AG) functional entity.

The PAE is based on DVB's IPTV profile of GEM – Globally Executable Multimedia Home Platform. This is a powerful open Java execution environment that can allow multiple applications to run in parallel on the host device. Applications can be user-centric, such as EPG, PVR control or VoD client, or interactive applications associated with particular content, or system services like remote management, audience metering, data access tools and protocol handlers. The GEM platform provides a set of Java APIs that define a common core of TV-specific functionality for various markets. This includes user interface, access to content metadata, media (also TV-specific) decoding and rendering control.

Various deployment options exist for the AG. When deployed in a gateway device with no direct user interaction this is referred to as “headless” operation. PAE applications are also able to serve remote user interface elements for the DAE of connected OITFs. When combined with an OITF in a terminal device the PAE can provide direct interaction via the local user interface.

4.6 Authentication, Content Protection and Service Protection

Volume 7 specifies the set of tools and methods to protect IPTV services and content, and for User authentication.

Two approaches are specified for content and service protection (CSP) - the terminal-centric approach (CSP-T), and the gateway-centric approach (CSP-G).

The terminal-centric approach provides the common protected content delivery solution deployed in compliant terminals, thereby offering a huge population of secure sinks for IPTV Services delivering protected content. CSP-T is an end-to-end protection system based on Marlin Broadband, defined by the Marlin Developer Community (MDC). With CSP-T the CSP-T client in the OITF interacts directly with the CSP-T server function in the network to acquire protected content.

The gateway-centric approach provides a content protection solution whereby the service provider is able to deploy any preferred protection system, or continue to use their current solution, to deliver protected content to the user, but the delivery protection is terminated in the CSP Gateway (CSPG) function and a common local protection solution is used to maintain protection on the content on the final link between the CSPG and the OITF.

Two methods are defined to realise the gateway-centric approach, one based on DTCP-IP – home network link encryption, and one based on CI+, the recently published enhancement of the DVB Common Interface, providing a secure channel for the content sourced by the module and for communications between module and host.

The DTCP-IP based option relies on a common CSPG function in the residential network that terminates the Service Provider protection solution and sources content streams protected with DTCP-IP link protection to one or more terminals in the home.

The CI+ based option relies on the provision of a separate CSPG device in the form of a CI+ CAM module which is hosted by each OITF device that is to have access to content and services provided by this means. Although originally targeted towards protected broadcast stream reception, the IPTV Solution foresees that the CI+ host can route protected content received via the IP interface to the CI+ interface and hence the CI+ host acting as CSPG.

As for user authentication, several methods are specified for use by IPTV Services, if required. User authentication can be performed by HTTP basic and digest authentication, network-side authentication, web-based authentication with user-entered credentials within a DAE application, GBA authentication using the ISIM in the IMS Gateway, or SAML web-based single sign-on authentication.

Release 1 V1.1 of Volume 7 added the following major changes compared to V1.0:

- Support of HDCP and DTCP System Renewability Message delivery independently from Marlin;
- Mandating of IMS Registration;

- Addition of Marlin Action Token in the MarlinPrivateData schema, to enable delivery of the Marlin Token in the Content Access Descriptor, triggering license acquisition; and
- Addition of IMS AKA Registration for consistency with Volume 4 [OIPF_PROT2].

For Release 2 the major new features added to Volume 7 are:

- Content navigation controls (also known as “forced play-out”), based on Marlin DMZ;
- A generalized HTTP digest authentication procedure using credentials from the IMS Gateway.

Release 2 also adds an informative appendix on how the Gateway-Centric Approach (CSPG) can be applied to an embedded CSPG that terminates any chosen CA/DRM solution in a device that hosts both that CSPG and the OITF.

Annex A XML Schemas (Informative)

A.1 Imports

Table 2 lists the schema files that are imported into other schemas, but that are not defined by the Open IPTV Forum.

| Schema Namespace | Schema Filename |
|---|-----------------------------------|
| urn:ietf:params:xml:ns:enum-token-1.0 | enum-token-1.0.xsd |
| urn:ietf:params:xml:ns:enum-token-1.0 | enum-tokendata-1.0.xsd |
| http://www.w3.org/2000/09/xmldsig# | xmldsig-core-schema.xsd |
| urn:tva:metadata:2007 | tva_metadata_3-1_v141.xsd |
| urn:tva:mpeg7:2005 | tva_mpeg7.xsd |
| urn:ietf:params:xml:ns:pdf:data-model | data-model.xsd, common-schema.xsd |
| urn:dvb:metadata:iptv:sdns:2008-1 | sdns_v1.4r10_modded.xsd |
| urn:tva:metadata:2005 | tva_metadata_3-1_v131.xsd |
| urn:dvb:mhp:2006 | mhpiptv.xsd |
| urn:dvb:mhp:2009 | mis_xmlait.xsd |
| http://www.example.com/flute | Flute_FDT.xsd |
| urn:tva:metadata:cs:ActionTypeCS:2004 | ActionTypeCS.xml |
| urn:tva:metadata:cs:AtmosphereCS:2005 | AtmosphereCS.xml |
| urn:tva:metadata:cs:AudioPurposeCS:2007 | AudioPurposeCS.xml |
| urn:tva:metadata:cs:CaptionCodingFormatCS:2007 | CaptionCodingFormatCS.xml |
| urn:tva:metadata:cs:ContentAlertCS:2005 | ContentAlertCS.xml |
| urn:tva:metadata:cs:ContentCommercialCS:2005-03 | ContentCommercialCS.xml |
| urn:tva:metadata:cs:ContentCS:2007 | ContentCS.xml |
| urn:tva:metadata:cs:DerivationReasonCS:2007 | DerivationReasonCS.xml |
| urn:tva:metadata:cs:FormatCS:2007 | FormatCS.xml |
| urn:tva:metadata:cs:HowRelatedCS:2007 | HowRelatedCS.xml |
| urn:tva:metadata:cs:IntendedAudienceCS:2005 | IntendedAudienceCS.xml |
| urn:tva:metadata:cs:IntentionCS:2005 | IntentionCS.xml |
| urn:tva:metadata:cs:MediaTypeCS:2005 | MediaTypeCS.xml |
| urn:tva:metadata:cs:OriginationCS:2005 | OriginationCS.xml |
| urn:tva:metadata:cs:PurchaseTypeCS:2004 | PurchaseTypeCS.xml |
| urn:mpeg:mpeg7:cs:RoleCS:2001 | RoleCS.xml |
| urn:tva:metadata:cs:TVARoleCS:2005 | TVARoleCS.xml |

| Schema Namespace | Schema Filename |
|-------------------------------------|-----------------|
| urn:tva:metadata:cs:UnitTypeCS:2007 | UnitTypeCS.xml |

Table 2 Imported XML schema files

A.2 Includes

The following are the schema files that are included into other schemas, i.e. they are not used independently to form XML documents. These schemas are defined by the Open IPTV Forum.

A.2.1 DRMPPrivateDataType

This schema is specified normatively in Volume 7 [OIPF_CSP2].

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <!-- schema filename is csp-DRMPPrivateDataType.xsd -->
  <xs:complexType name="DRMPPrivateDataType" abstract="true">
    <!--
    <xs:sequence>
      <any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    -->
    <xs:attribute name="mimeType" type="xs:string" use="optional"/>
    <!-- NOTE: DRMPPrivateDataType is an abstract type that can be extended and replaced by a specific instance type
    to carry messages for a particular DRM system. Derived types of <DRMPPrivateData> should include an
    <any> construct to be prepared for future extensibility, as is done for example for <MarlinPrivateData>
    in [CSP] -->
  </xs:complexType>
</xs:schema>
```

A.2.2 MarlinPrivateDataType

This schema is specified normatively in Volume 7 [OIPF_CSP2].

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <!-- schema filename is csp-MarlinPrivateDataType.xsd -->
  <xs:include schemaLocation="csp-DRMPPrivateDataType.xsd"/>
  <xs:complexType name="MarlinPrivateDataType">
    <xs:complexContent>
      <xs:extension base="DRMPPrivateDataType">
        <xs:sequence>
          <xs:choice>
            <xs:element name="MarlinLicense" type="xs:base64Binary"/>
            <xs:element name="MarlinToken" type="xs:base64Binary"/>
          </xs:choice>
          <xs:any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:schema>
```

A.2.3 HexBinaryPrivateDataType

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <!-- schema filename is csp-HexBinaryPrivateDataType.xsd -->
  <xs:include schemaLocation="csp-DRMPPrivateDataType.xsd"/>
  <xs:complexType name="HexBinaryPrivateDataType">
    <xs:complexContent>
      <xs:extension base="DRMPPrivateDataType">
        <xs:sequence>
          <xs:element name="Message" type="xs:hexBinary"/>
          <xs:any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:schema>
```

A.3 Redefines

The following are the schema files that have types which are used by the Open IPTV Forum through the use of redefine.

A.3.1 ce-html-profiles-1-0.xsd

This schema is specified normatively in Volume 5 [OIPF_DAE2].

Due to constraints within the XML schema syntax, this file is also modified to include an additional enumeration value in scalingType, "0.33x0.33".

```
<xs:simpleType name="scalingType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="arbitrary"/>
    <xs:enumeration value="quartersize"/>
    <xs:enumeration value="none"/>
    <xs:enumeration value="0.33x0.33"/>
  </xs:restriction>
</xs:simpleType>
```

A.4 Specification Schemas

A.4.1 urn:oipf:config:ig:2009

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipf:config:ig:2009"
xmlns:tns="urn:oipf:config:ig:2009"
xmlns:enum="urn:ietf:params:xml:ns:enum-token-1.0"
xmlns="http://www.w3.org/2001/XMLSchema">

  <!--schema filename is config-ig.xsd -->
  <xs:annotation>
    <xs:documentation xml:lang="en">
      This schema is copyrighted by the Open IPTV Forum ("OIPF") and distributed in conjunction
      with Release 2 of the IPTV Solution Specification.
    </xs:documentation>
  </xs:annotation>
```


Disclaimer

The Open IPTV Forum members accept no liability whatsoever for any use of this document. This specification provides multiple options for some features. The Open IPTV Forum Profiling specification will complement the Release 2 specifications by defining the Open IPTV Forum implementation and deployment profiles. Any implementation based on Open IPTV Forum specifications that does not follow the Profiling specifications cannot claim Open IPTV Forum compliance.

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```
</xs:documentation>
```

```
</xs:annotation>
```

```
<xs:import namespace="http://www.w3.org/XML/1998/namespace"
  schemaLocation="xml.xsd" />
```

```
<xs:import namespace="urn:ietf:params:xml:ns:enum-token-1.0"
  schemaLocation="imports/enum-token-1.0.xsd />
```

```
<xs:element name="IGconfiguration" type="tns:IGconfigurationType" />
```

```
<xs:complexType name="IGconfigurationType">
```

```
<xs:sequence>
```

```
<xs:element name="AuthenticationSet"
```

```
  type="tns:AuthenticationSetType" maxOccurs="unbounded" />
```

```
<xs:element name="GatewayAuthentication" type="xs:boolean"
```

```
  minOccurs="0" />
```

```
<xs:any namespace="##other" processContents="skip"
```

```
  minOccurs="0" maxOccurs="unbounded" />
```

```
</xs:sequence>
```

```
</xs:complexType>
```

```
<xs:complexType name="AuthenticationSetType">
```

```
<xs:sequence>
```

```
<xs:element name="Identifier" type="tns:IMSPublicIdType" />
```

```
<xs:element name="Password" type="xs:string" />
```

```
<xs:element name="Alias" type="xs:string" />
```

```
<xs:sequence minOccurs="0">
```

```
<xs:element name="IMPI" type="xs:string" />
```

```
<xs:element name="SIPDigestPassword" type="xs:string" />
```

```
</xs:sequence>
```

```
</xs:sequence>
```

```
</xs:complexType>
```

```
<!-- ===== Definition for IMSPublicIdType =====>
```

```
<xs:complexType name="IMSPublicIdType">
```

```
<xs:choice>
```

```
<xs:element name="e164Number" type="enum:e164NumberType" />
```

```
<xs:element name="SIPURI" type="tns:SIPURIType" />
```

```
</xs:choice>
```

```
</xs:complexType>
```

```
<xs:simpleType name="SIPURIType">
```

```
<xs:annotation>
```

```
<xs:documentation xml:lang="en">
```

```
SIP URI pattern is defined based on the SIP URI
```

```
description provided in RFC 3261 (Section 2)
```

```

    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="string">
    <xs:pattern
      value="[sS][iI][pP][sS]?:(#[^?#]*)?([^\#]*)\([?([^\#]*)?(\#\.*)?" />
    </xs:restriction>
  </xs:simpleType>
</xs:schema>

```

A.4.2 urn:oipf:config:oitf:oitfCapabilities:2009

This schema is specified normatively in Volume 5 [OIPF_DAE2].

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
```

```
<xs:schema targetNamespace="urn:oipf:config:oitf:oitfCapabilities:2009" xmlns="urn:oipf:config:oitf:oitfCapabilities:2009"
xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified" attributeFormDefault="unqualified">
```

```
<!-- schema filename is config-oitf-oitfCapabilities.xsd -->
```

```
<!-- Redefined uiExtensionsType of the original schema as defined in Annex C of CEA-2014
```

```
(i.e. imports/ce-html-profiles-1-0.xsd) to add the new elements defined in Section 9.2
```

```
of Open IPTV Forum Solution Specification Volume 5 Declarative Application Environment Release 2).
```

```
-->
```

```
<xs:redefine schemaLocation="imports/ce-html-profiles-1-0.xsd">
```

```
<xs:complexType name="uiExtensionType">
```

```
<xs:complexContent>
```

```
<xs:extension base="uiExtensionType">
```

```
<xs:choice minOccurs="0" maxOccurs="unbounded">
```

```
<xs:element name="video_broadcast" type="videoBroadcastType"
minOccurs="0" maxOccurs="unbounded"/>
```

```
<xs:element name="overlaylocaltuner" type="overlayType"/>
```

```
<xs:element name="overlayIPbroadcast" type="overlayType"/>
```

```
<xs:element name="recording" type="pvrType"/>
```

```
<xs:element name="parentalcontrol" type="parentalControlType"/>
```

```
<xs:element name="extendedAVControl" type="xs:boolean"/>
```

```
<xs:element name="clientMetadata" type="metadataType"/>
```

```
<xs:element name="configurationChanges" type="xs:boolean"/>
```

```
<xs:element name="ims" type="xs:boolean"/>
```

```
<xs:element name="communication_services" type="xs:boolean"/>
```

```
<xs:element name="drm" type="drmType" minOccurs="0" maxOccurs="unbounded"/>
```

```
<xs:element name="remote_diagnostics" type="xs:boolean"/>
```

```
<xs:element name="pollingNotifications" type="xs:boolean"/>
```

```
<xs:element name="mdtf" type="xs:boolean"/>
```

```
</xs:choice>
```

```
</xs:extension>
```

```
</xs:complexContent>
```

```
</xs:complexType>
```

```
<!-- Redefined downloadType to add attribute manageDownloads -->
```

```
<xs:complexType name="downloadType">
```

```
<xs:simpleContent>
```

```
<xs:extension base="downloadType">
```

```
<xs:attribute name="manageDownloads" type="manageDownloadsType" default="none"/>
```

```
</xs:extension>
```

```
</xs:simpleContent>
```

```
</xs:complexType>
```

```
<!-- Redefined audioProfileType to add attribute DRMSystemID -->
```

```
<xs:complexType name="audioProfileType">
```

```
<xs:complexContent>
```

```
<xs:extension base="audioProfileType">
```

```
<xs:attribute name="DRMSystemID" type="xs:string"/>
```

```

        </xs:extension>
    </xs:complexContent>
</xs:complexType>
<!-- Redefined videoProfileType to add attribute DRMSystemID -->
<xs:complexType name="videoProfileType">
    <xs:complexContent>
        <xs:extension base="videoProfileType">
            <xs:attribute name="DRMSystemID" type="xs:string"/>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>
</xs:redefine>
<!-- ADDED: type definitions for the new xs:elements defined in Section 9.2 of the
Open IPTV forum Volume 5 Declarative Application Environment Release 2 specification-->
<xs:simpleType name="manageDownloadsType">
    <xs:restriction base="xs:string">
        <xs:enumeration value="none"/>
        <xs:enumeration value="initiator"/>
        <xs:enumeration value="samedomain"/>
        <xs:enumeration value="all"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="videoBroadcastType">
    <xs:attribute name="type" type="xs:string" use="required"/>
    <xs:attribute name="transport" type="xs:string"/>
    <xs:attribute name="nrstreams" type="xs:unsignedInt" default="1"/>
    <xs:attribute name="scaling" type="scalingType" default="arbitrary"/>
    <xs:attribute name="minSize" type="xs:unsignedInt" default="0"/>
    <xs:attribute name="postList" type="xs:boolean" default="false"/>
</xs:complexType>
<xs:complexType name="pvrType">
    <xs:simpleContent>
        <xs:extension base="xs:boolean">
            <xs:attribute name="ipBroadcast" type="xs:boolean" default="false"/>
            <xs:attribute name="manageRecordings" type="xs:string"/>
            <xs:attribute name="postList" type="xs:boolean" default="false"/>
        </xs:extension>
    </xs:simpleContent>
</xs:complexType>
<xs:complexType name="parentalControlType">
    <xs:simpleContent>
        <xs:extension base="xs:boolean">
            <xs:attribute name="schemes" type="xs:string"/>
        </xs:extension>
    </xs:simpleContent>
</xs:complexType>
<xs:complexType name="metadataType">
    <xs:simpleContent>
        <xs:extension base="xs:boolean">
            <xs:attribute name="type" type="xs:string"/>
        </xs:extension>
    </xs:simpleContent>
</xs:complexType>
<xs:complexType name="drmType">
    <xs:simpleContent>
        <xs:extension base="xs:string">
            <xs:attribute name="DRMSystemID" type="xs:string" use="required"/>
        </xs:extension>
    </xs:simpleContent>
</xs:complexType>

```

```

        <xs:attribute name="protectionGateways" type="xs:string"/>
    </xs:extension>
</xs:simpleContent>
</xs:complexType>
</xs:schema>

```

A.4.3 urn:oipt:csp:MIPPVControlMessage:2008

This schema is specified normatively in Volume 7 [OIPF_CSP2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipt:csp:MIPPVControlMessage:2008"
xmlns:tns="urn:oipt:csp:MIPPVControlMessage:2008" xmlns:xs="http://www.w3.org/2001/XMLSchema"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <!-- schema filename is csp-MIPPVControlMessage.xsd -->
  <xs:element name="MIPPVControlMessage">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="MarlinLicense" type="xs:base64Binary" minOccurs="0"/>
        <xs:element name="MarlinActionToken" minOccurs="0">
          <xs:complexType>
            <xs:simpleContent>
              <xs:extension base="xs:base64Binary">
                <xs:attribute name="absoluteAcquisitionTiming" type="xs:dateTime" use="optional"/>
                <xs:attribute name="relativeAcquisitionTiming" type="xs:duration" use="optional"/>
              </xs:extension>
            </xs:simpleContent>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>

```

A.4.4 urn:oipt-org:device:ag:1

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipt-org:device:ag:1" xmlns:tns="urn:oipt-org:device:ag:1"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <!-- schema filename is device-ag.xsd -->
  <xs:element name="agDescription">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="agDefaultURL" type="xs:anyURI"/>
        <xs:element name="agUIServerURL" type="xs:anyURI" minOccurs="0"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>

```

A.4.5 urn:oipt-org:device:cspg-dtcp:1

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipt-org:device:cspg-dtcp:1" xmlns:tns="urn:oipt-org:device:cspg-dtcp:1"
xmlns:xs="http://www.w3.org/2001/XMLSchema">

```

```

<!-- schema filename is device-cspg.xsd -->
<xs:element name="cspgdtcpDescription">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="DtcpPort" type="xs:integer"/>
      <xs:element name="HttpProxyPort" type="xs:integer"/>
      <xs:element name="RtspProxyPort" type="xs:integer"/>
      <xs:element name="DRMSystemID" type="xs:anyURI" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
</xs:schema>

```

A.4.6 urn:oiipf-org:device:ig:1

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oiipf-org:device:ig:1" xmlns:tns="urn:oiipf-org:device:ig:1"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <!-- schema filename is device-ig.xsd -->
  <xs:element name="igDescription">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="igURL" type="xs:anyURI"/>
      </xs:sequence>
      <xs:attribute name="SupportedMethod" type="tns:Hexadecimal16bit use="optional"/>
    </xs:complexType>
  </xs:element>
  <xs:simpleType name="Hexadecimal16bit">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-9a-fA-F]{1,4}"/>
    </xs:restriction>
  </xs:simpleType>
</xs:schema>

```

A.4.7 ChannelConfig

This schema corresponds to the Client Channel Listing format (ChannelConfig object) specified in Volume 5 [OIPF_DAE2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified">
  <xs:element name="ChannelConfig">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="ChannelList"/>
        <xs:sequence minOccurs="0">
          <xs:element ref="FavouriteLists"/>
          <xs:element ref="CurrentFavouriteList" minOccurs="0"/>
        </xs:sequence>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:element name="ChannelList">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="Channel" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>

```

```

</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="Channel">
  <xs:annotation>
    <xs:documentation>
      For a DVB digital channel use ONID+TSID+SID,
      for an ISDB (ARIB) digital channel use ONID+TSID+SID,
      for a ATSC terrestrial channel use SourceID,
      for analog channel use Freq and CNI (if available).
      The IPBroadcastID element is relevant for IPTV broadcasts, as defined in Section 7.5.
    </xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:choice>
        <xs:sequence>
          <xs:element ref="ONID"/>
          <xs:element ref="TSID"/>
          <xs:element ref="SID"/>
        </xs:sequence>
        <xs:element ref="SourceID"/>
      </xs:choice>
      <xs:sequence>
        <xs:element ref="Freq"/>
        <xs:element ref="CNI" minOccurs="0"/>
      </xs:sequence>
      <xs:element ref="IPBroadcastID"/>
    </xs:choice>
    <xs:element ref="Name"/>
    <xs:element ref="Favourite" minOccurs="0"/>
    <xs:element ref="Recordable" minOccurs="0"/>
    <xs:element ref="Locked" minOccurs="0"/>
    <xs:element ref="ManualBlock" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="CCID" type="xs:ID" use="required"/>
  <xs:attribute name="channelType" type="xs:string" default="TYPE_OTHER"/>
  <xs:attribute name="idType" type="xs:string" use="required"/>
  <xs:attribute name="TunerID" type="xs:ID" minOccurs="0"/>
</xs:complexType>
</xs:element>
<xs:element name="ONID" type="xs:integer"/>
<xs:element name="TSID" type="xs:integer"/>
<xs:element name="SID" type="xs:integer"/>
<xs:element name="SourceID" type="xs:integer"/>
<xs:element name="Freq" type="xs:integer"/>
<xs:element name="CNI" type="xs:integer"/>
<xs:element name="IPBroadcastID" type="xs:string"/>
<xs:element name="MajorChannel" type="xs:integer"/>
<xs:element name="MinorChannel" type="xs:integer"/>
<xs:element name="Name" type="xs:string"/>
<xs:element name="Favourite">
  <xs:complexType>
    <xs:attribute name="FavIDS" type="xs:IDREFS"/>
  </xs:complexType>
</xs:element>
<xs:element name="FavouriteLists">
  <xs:complexType>

```

```

<xs:sequence>
  <xs:element ref="FavouriteList" maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="FavouriteList">
  <xs:complexType>
    <xs:complexContent>
      <xs:extension base="FavName">
        <xs:attribute name="FavID" type="xs:ID" use="required"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
</xs:element>
<xs:complexType name="FavName">
  <xs:sequence>
    <xs:element ref="FavName"/>
  </xs:sequence>
</xs:complexType>
<xs:element name="FavName" type="xs:string"/>
<xs:element name="CurrentFavouriteList">
  <xs:complexType>
    <xs:attribute name="FavID" type="xs:IDREF" use="required"/>
  </xs:complexType>
</xs:element>
<xs:element name="Recordable" type="xs:boolean"/>
<xs:element name="Locked" type="xs:boolean"/>
<xs:element name="ManualBlock" type="xs:boolean"/>
</xs:schema>

```

A.4.8 urn:oipf:iptv:ContentAccessDownloadDescriptor:2008

This schema is specified normatively in Volume 5 [OIPF_DAE2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:tns="urn:oipf:iptv:ContentAccessDownloadDescriptor:2008"
  xmlns:xml="http://www.w3.org/XML/1998/namespace"
  targetNamespace="urn:oipf:iptv:ContentAccessDownloadDescriptor:2008"
  elementFormDefault="qualified" attributeFormDefault="unqualified">
  <!-- schema filename is iptv-ContentAccessDownloadDescriptor.xsd -->
  <!-- this schema redefines the generic Content Access Descriptor Schema iptv-
  AbstractContentAccessDescriptor.xsd as defined in Vol. 5 Annex E.3 by limiting the allowable
  values for attribute "TransferType" to "playable_download" and "full_download" -->
  <xs:redefine schemaLocation="iptv-AbstractContentAccessDescriptor.xsd">
    <xs:simpleType name="TransferTypeEnum">
      <xs:restriction base="tns:TransferTypeEnum">
        <xs:enumeration value="full_download"/>
        <xs:enumeration value="playable_download"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:redefine>
</xs:schema>

```

A.4.9 urn:oipf:iptv:ContentAccessStreamingDescriptor:2008

This schema is specified normatively in Volume 5 [OIPF_DAE2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:tns="urn:oipf:iptv:ContentAccessStreamingDescriptor:2008"
  xmlns:xm1="http://www.w3.org/XML/1998/namespace"
  targetNamespace="urn:oipf:iptv:ContentAccessStreamingDescriptor:2008"
  elementFormDefault="qualified" attributeFormDefault="unqualified">
  <!-- schema filename is iptv-ContentAccessStreamingDescriptor.xsd -->
  <!-- this schema redefines the generic Content Access Descriptor Schema iptv-
    AbstractContentAccessDescriptor.xsd as defined in Vol. 5 Annex E.3 by limiting the allowable
    values for attribute "TransferType" to "streaming" -->
  <xs:redefine schemaLocation="iptv-AbstractContentAccessDescriptor.xsd">
    <xs:simpleType name="TransferTypeEnum">
      <xs:restriction base="tns:TransferTypeEnum">
        <xs:enumeration value="streaming"/>
      </xs:restriction>
    </xs:simpleType>
  </xs:redefine>
</xs:schema>

```

A.4.10 urn:oipf:iptv:AbstractContentAccessDescriptor:2008

This schema is specified normatively in Volume 5 [OIPF_DAE2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified" attributeFormDefault="unqualified">
  <!-- schema filename is iptv-AbstractContentAccessDescriptor.xsd -->
  <!-- this is the generic (i.e. "abstract") content access descriptor XML Schema that forms the
    basis for the XML Schemas of document types: application/vnd.oipf.ContentAccessDownload+xml and
    application/vnd.oipf.ContentAccessStreaming+xml. This schema includes the definition for
    abstract type "DRMPrivateDataType" (as defined in Open IPTV Forum Solution Specification Volume
    3 Metadata Release 2) and its specific instance type "MarlinPrivateDataType" or
    "HexBinaryPrivateDataType" (as defined in Open IPTV Forum Solution Specification Volume 7
    Authentication, Content Protection and Service Protection Release 2) -->
  <xs:import namespace="http://www.w3.org/XML/1998/namespace"
    schemaLocation="http://www.w3.org/2001/xml.xsd"/>
  <xs:include schemaLocation="csp-MarlinPrivateDataType.xsd"/>
  <xs:include schemaLocation="csp-DRMPrivateDataType.xsd"/>
  <xs:include schemaLocation="csp-HexBinaryPrivateDataType.xsd"/>

  <xs:element name="Contents" type="ContentsType"/>
  <xs:complexType name="ContentsType">
    <xs:sequence>
      <xs:element name="ContentItem" type="ContentItemType" minOccurs="1"
        maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ContentItemType">
    <xs:sequence>
      <xs:element name="Title" type="TitleType" minOccurs="1"/>
      <xs:element name="Synopsis" type="SynopsisType" minOccurs="0"/>
      <xs:element name="OriginSite" type="xs:anyURI" minOccurs="1"/>
      <xs:element name="OriginSiteName" type="xs:string" minOccurs="0"/>
      <xs:element name="ContentID" type="xs:string" minOccurs="0"/>
      <xs:element name="ContentURL" type="ContentURLType" minOccurs="1"
        maxOccurs="unbounded"/>
      <xs:element name="MetadataURL" type="xs:anyURI" minOccurs="0"/>
      <xs:element name="NotifyURL" type="xs:anyURI" minOccurs="0"/>
      <xs:element name="IconURL" type="xs:anyURI" minOccurs="0"/>
      <xs:element name="ParentalRating" type="ParentalRatingType" minOccurs="0"

```



```

        maxOccurs="unbounded"/>
    <xs:element name="DRMControlInformation" type="DRMControlInformationType"
        minOccurs="0" maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="TitleType">
    <xs:simpleContent>
        <xs:extension base="xs:string">
            <xs:attribute ref="xml:lang"/>
        </xs:extension>
    </xs:simpleContent>
</xs:complexType>
<xs:complexType name="SynopsisType">
    <xs:simpleContent>
        <xs:extension base="xs:string">
            <xs:attribute ref="xml:lang"/>
        </xs:extension>
    </xs:simpleContent>
</xs:complexType>
<xs:complexType name="ContentURLType">
    <xs:simpleContent>
        <xs:extension base="xs:anyURI">
            <xs:attribute name="DRMSystemID" type="xs:string" use="optional"/>
            <xs:attribute name="TransferType" type="TransferTypeEnum" use="required"/>
            <xs:attribute name="MD5Hash" type="xs:string" use="optional"/>
            <xs:attribute name="Duration" type="xs:time" use="optional"/>
            <xs:attribute name="Size" type="xs:integer" use="required"/>
            <xs:attribute name="MIMETYPE" type="xs:string" use="required"/>
            <xs:attribute name="MediaFormat" type="xs:string" use="optional"/>
            <xs:attribute name="VideoCoding" type="xs:string" use="optional"/>
            <xs:attribute name="AudioCoding" type="xs:string" use="optional"/>
        </xs:extension>
    </xs:simpleContent>
</xs:complexType>
<!-- The TransferType is a string in this generic content access descriptor. The values of the
TransferTypeEnum are restricted in the document instance types
"application/vnd.oipf.ContentAccessDownloadDescriptor" and
"application/vnd.oipf.ContentAccessStreamingDescriptor" as defined in Annexes E.1 and E.2.-->
    <xs:simpleType name="TransferTypeEnum">
        <xs:restriction base="xs:string"/>
    </xs:simpleType>
<xs:complexType name="ParentalRatingType">
    <xs:simpleContent>
        <xs:extension base="xs:string">
            <xs:attribute name="Scheme" type="xs:string" use="optional"/>
            <xs:attribute name="Region" type="xs:string" use="optional"/>
        </xs:extension>
    </xs:simpleContent>
</xs:complexType>

<xs:complexType name="DRMControlInformationType">
    <xs:sequence>
        <xs:element name="DRMSystemID" type="xs:string"/>
        <xs:element name="DRMContentID" type="xs:string"/>
        <xs:element name="RightsIssuerURL" type="xs:anyURI" minOccurs="0"/>
        <xs:element name="SilentRightsURL" type="xs:anyURI" minOccurs="0"/>
        <xs:element name="PreviewRightsURL" type="xs:anyURI" minOccurs="0"/>
        <xs:element name="DoNotRecord" type="xs:boolean" minOccurs="0"/>
        <xs:element name="DoNotTimeShift" type="xs:boolean" minOccurs="0"/>
        <xs:element ref="DRMGenericData" minOccurs="0" maxOccurs="unbounded"/>
        <xs:element ref="DRMPrivateData" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

```

```

<xs:element name="DRMGenericData" type="DRMGenericDataType"/>
<xs:element name="DRMPrivateData" type="DRMPrivateDataType"/>

<xs:complexType name="DRMGenericDataType">
  <xs:sequence>
    <xs:any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

<xs:element name="MarlinPrivateData" type="MarlinPrivateDataType"
substitutionGroup="DRMPrivateData"/>
<xs:element name="HexBinaryPrivateData" type="HexBinaryPrivateDataType"
substitutionGroup="DRMPrivateData"/>

</xs:schema>

```

A.4.11 urn:oiptv:iptv:IPTVProfile:2008

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oiptv:iptv:IPTVProfile:2008" xmlns:tns="urn:oiptv:iptv:IPTVProfile:2008"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:ueprofile="urn:oiptv:iptv:UEProfile:2008"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <!-- schema filename is iptv-IPTVProfile.xsd -->
  <xs:import namespace="urn:oiptv:iptv:UEProfile:2008" schemaLocation="iptv-UEProfile.xsd"/>
  <xs:element name="IPTVProfile">
    <xs:annotation>
      <xs:documentation>
        XML Schema for representing the IPTV Profile object
      </xs:documentation>
    </xs:annotation>
    <xs:complexType>
      <xs:sequence>
        <xs:element name="UEProfile" type="ueprofile:tUEProfile" minOccurs="0"/>
        <xs:element name="GlobalSettings" type="tns:tGlobalSettings"/>
        <xs:element name="BCProfile" type="tns:tBCProfile" minOccurs="0"/>
        <xs:element name="CoDProfile" type="tns:tCoDProfile" minOccurs="0"/>
        <xs:element name="PVRProfile" type="tns:tPVRProfile" minOccurs="0"/>
        <xs:element name="Extension" type="tns:tExtension" minOccurs="0"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="ProfileId" type="xs:ID"/>
      <xs:anyAttribute/>
    </xs:complexType>
  </xs:element>
  <xs:complexType name="tBCProfile">
    <xs:sequence>
      <xs:element name="BCServicePackage" type="tns:tBCServicePackage" maxOccurs="unbounded"/>
      <xs:element name="Extension" type="tns:tExtension" minOccurs="0"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="tBCServicePackage">
    <xs:sequence>
      <xs:element name="BCPackageId" type="tns:tBCServicePackageID"/>
      <xs:element name="Description" type="tns:tBCServicePackageDescription" minOccurs="0"/>
      <xs:element name="BCService" type="tns:tBCService" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="Extension" type="tns:tExtension" minOccurs="0"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>

```

```

    </xs:sequence>
</xs:complexType>
<xs:simpleType name="tBCServicePackageID" final="list restriction">
  <xs:restriction base="xs:string">
    <xs:minLength value="0"/>
    <xs:maxLength value="16"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="tBCServicePackageDescription" final="list restriction">
  <xs:restriction base="xs:string">
    <xs:minLength value="0"/>
    <xs:maxLength value="64"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="tBCService">
  <xs:sequence>
    <xs:element name="ParentalControl" type="tns:tParentalControlLevel" minOccurs="0"/>
    <xs:element name="BCServiceId" type="tns:tBCServiceID"/>
    <xs:element name="QualityDefinition" type="tns:tQualityDefinition" minOccurs="0"/>
    <xs:element name="Extension" type="tns:tExtension" minOccurs="0"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="tBCServiceID" final="list restriction">
  <xs:restriction base="xs:string">
    <xs:minLength value="0"/>
    <xs:maxLength value="16"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="tQualityDefinition" final="list restriction">
  <xs:restriction base="xs:unsignedByte">
    <xs:minInclusive value="0"/>
    <xs:maxInclusive value="1"/>
    <xs:enumeration value="0">
      <xs:annotation>
        <xs:documentation>
          <xs:label xml:lang="en">SD</xs:label>
          <xs:definition xml:lang="en">
            Standard Definition
          </xs:definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="1">
      <xs:annotation>
        <xs:documentation>
          <xs:label xml:lang="en">HD</xs:label>
          <xs:definition xml:lang="en">
            High Definition
          </xs:definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="tCoDProfile">
  <xs:sequence>

```

```

<xs:element name="ParentalControl" type="tns:tParentalControlLevel" minOccurs="0"/>
<xs:element name="Extension" type="tns:tExtension" minOccurs="0"/>
<xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
<xs:simpleType name="tParentalControlLevel" final="list restriction">
  <xs:restriction base="xs:unsignedByte">
    <xs:minInclusive value="0"/>
    <xs:maxInclusive value="5"/>
    <xs:enumeration value="0">
      <xs:annotation>
        <xs:documentation>
          <xs:label xml:lang="en">ALL</xs:label>
          <xs:definition xml:lang="en">
            All contents
          </xs:definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="1">
      <xs:annotation>
        <xs:documentation>
          <xs:label xml:lang="en">Level 1</xs:label>
          <xs:definition xml:lang="en">
            Level 1 contents
          </xs:definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="2">
      <xs:annotation>
        <xs:documentation>
          <xs:label xml:lang="en">Level 2</xs:label>
          <xs:definition xml:lang="en">
            Up to level 2
          </xs:definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="3">
      <xs:annotation>
        <xs:documentation>
          <xs:label xml:lang="en">Level 3</xs:label>
          <xs:definition xml:lang="en">
            Up to level 3
          </xs:definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="4">
      <xs:annotation>
        <xs:documentation>
          <xs:label xml:lang="en">Level 4</xs:label>
          <xs:definition xml:lang="en">
            Up to level 4
          </xs:definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>

```

```

    </xs:annotation>
  </xs:enumeration>
  <xs:enumeration value="5">
    <xs:annotation>
      <xs:documentation>
        <xs:label xml:lang="en">Level 5</xs:label>
        <xs:definition xml:lang="en">
          Up to level 5
        </xs:definition>
      </xs:documentation>
    </xs:annotation>
  </xs:enumeration>
</xs:restriction>
</xs:simpleType>
<xs:complexType name="tPVRProfile">
  <xs:sequence>
    <xs:annotation>
      <xs:documentation>
        Unit of the StorageLimitInVolume element is the
        GigaOctet
      </xs:documentation>
    </xs:annotation>
    <xs:element name="PVRPreference" type="tns:tPVRPreference"/>
    <xs:element name="StorageLimitInTime" type="tns:tStorageLimitInTime" minOccurs="0"/>
    <xs:element name="StorageLimitInVolume" type="tns:tStorageLimitInVolume" minOccurs="0"/>
    <xs:element name="Extension" type="tns:tExtension" minOccurs="0"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="tPVRPreference" final="list restriction">
  <xs:restriction base="xs:unsignedByte">
    <xs:minInclusive value="0"/>
    <xs:maxInclusive value="1"/>
    <xs:enumeration value="0">
      <xs:annotation>
        <xs:documentation>
          <xs:label xml:lang="en">Network</xs:label>
          <xs:definition xml:lang="en">
            Recording is done in the network
          </xs:definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="1">
      <xs:annotation>
        <xs:documentation>
          <xs:label xml:lang="en">User_Equipment</xs:label>
          <xs:definition xml:lang="en">
            Recording is done on the user equipment
          </xs:definition>
        </xs:documentation>
      </xs:annotation>
    </xs:enumeration>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="tStorageLimitInTime">
  <xs:restriction base="xs:duration">

```

```

        <xs:minInclusive value="PT0H"/>
        <xs:maxInclusive value="PT1000000000H"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="tStorageLimitInVolume">
    <xs:restriction base="xs:nonNegativeInteger"/>
</xs:simpleType>
<xs:complexType name="tGlobalSettings">
    <xs:sequence>
        <xs:element name="LanguagePreference" type="tns:tLanguage" minOccurs="0"/>
        <xs:element name="UsersActionRecodable" type="tns:tUserActionRecordable"/>
        <xs:element name="Extension" type="tns:tExtension" minOccurs="0"/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="tLanguage">
    <xs:restriction base="xs:string">
        <xs:annotation>
            <xs:documentation>
                <xs:definition xml:lang="en">
                    ISO 639-2 Language code
                </xs:definition>
            </xs:documentation>
        </xs:annotation>
        <xs:minLength value="3"/>
        <xs:maxLength value="3"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="tExtension">
    <xs:sequence>
        <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="tUserActionRecordable">
    <xs:restriction base="xs:boolean"/>
</xs:simpleType>
</xs:schema>

```

A.4.12 SynchronizeType

This schema is specified normatively in Volume 5 [OIPF_DAE2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
attributeFormDefault="unqualified">
    <!-- schema filename is iptv-SynchronizeType.xsd -->
    <xs:element name="synchronizelist" type="SynchronizeType"/>
    <xs:complexType name="SynchronizeType">
        <xs:sequence>
            <xs:element name="content" type="ContentType" minOccurs="1" maxOccurs="1"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ContentType">
        <xs:sequence>
            <xs:element name="content_ID" type="xs:string" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
</xs:schema>

```

A.4.13 urn:oipf:iptv:UEProfile:2010

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipf:iptv:UEProfile:2010" xmlns:tns="urn:oipf:iptv:UEProfile:2010"
xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:tva="urn:tva:metadata:2007" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <!-- schema filename is iptv-UEProfile.xsd -->
  <xs:annotation>
    <xs:documentation xml:lang="en">
      This schema is copyrighted by the Open IPTV Forum ("OIPF") and distributed in conjunction
      with Release 2 of the IPTV Solution Specification.

      Disclaimer
      The Open IPTV Forum members accept no liability whatsoever for any use of this document.
      This specification provides multiple options for some features. The Open IPTV Forum Profiling
      specification will complement the Release 2 specifications by defining the Open IPTV Forum
      implementation and deployment profiles. Any implementation based on Open IPTV Forum
      specifications that does not follow the Profiling specifications cannot claim Open IPTV Forum
      compliance.

      Copyright Notification
      No part may be reproduced except as authorized by written permission.
      Any form of reproduction and/or distribution of these works is prohibited.
      Copyright 2010 © Members of the Open IPTV Forum
      All rights reserved.
    </xs:documentation>
  </xs:annotation>
  <xs:import namespace="urn:tva:metadata:2007" schemaLocation="imports/tva_metadata_3-1_v141.xsd"/>
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Defines the capabilities of the UE that is currently
      associated with the user
    </xs:documentation>
  </xs:annotation>
  <xs:element name="UEInformation" type="tns:tUEProfile"/>
  <xs:complexType name="tUEProfile">
    <xs:sequence>
      <xs:element name="UserEquipmentID" type="tns:tUEID"/>
      <xs:element name="UserEquipmentClass" type="tns:tUserEquipmentClass"/>
      <xs:element name="Resolution" type="tns:tResolution" minOccurs="0"/>
      <xs:element name="SupportedEncodings" type="tns:tSupportedEncodings"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="IPEncapsulations" type="tns:tIPEncapsulations"
        minOccurs="0" maxOccurs="unbounded"/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="tUEID" final="list restriction">
    <xs:annotation>
      <xs:documentation>
        <xs:label xml:lang="en">User Equipment ID</xs:label>
        <xs:definition xml:lang="en">
          Unique Identifier for the UE(to be specified)
        </xs:definition>
      </xs:documentation>
    </xs:annotation>
  </xs:simpleType>
</xs:schema>
```

```

<xs:restriction base="xs:string">
  <xs:minLength value="0"/>
  <xs:maxLength value="16"/>
</xs:restriction>
</xs:simpleType>
<xs:simpleType name="tUserEquipmentClass" final="list restriction">
  <xs:annotation>
    <xs:documentation>
      <xs:label xml:lang="en">User Equipment class</xs:label>
      <xs:definition xml:lang="en">
        Specifies the type of UE
      </xs:definition>
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="OITF-TV"/>
    <xs:enumeration value="OITF-STB"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="tResolution">
  <xs:attribute name="HorizontalSize" type="xs:integer">
    <xs:annotation>
      <xs:documentation>
        horizontal size in pixels of the screen
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="VerticalSize" type="xs:integer">
    <xs:annotation>
      <xs:documentation>
        vertical size in pixels of the screen
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="Rotate" type="xs:boolean">
    <xs:annotation>
      <xs:documentation>
        set to TRUE if the screen can be rotated (horizontal
        becomes vertical)
      </xs:documentation>
    </xs:annotation>
  </xs:attribute>
</xs:complexType>
<xs:complexType name="tSupportedContentProtection">
  <xs:annotation>
    <xs:documentation>
      <xs:label xml:lang="en">Content Protection</xs:label>
      <xs:definition xml:lang="en">
        Specifies the supported content protection system (eg. "urn:dvb:casystemid:19188")
        with optionally the gateway (eg. "CI+" or "DTCP-IP") and supported protected formats
      </xs:definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="ProtectedFormat" type="tns:tProtectedFormat"
      minOccurs="0" maxOccurs="unbounded"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>

```



```

</xs:sequence>
<xs:attribute name="ContentProtectionSystemID" type="xs:string" use="required"/>
<xs:attribute name="CSPG" type="tns:tCSPG" use="optional"/>
<xs:anyAttribute namespace="##any" processContents="lax"/>
</xs:complexType>
<xs:simpleType name="tCSPG">
  <xs:annotation>
    <xs:documentation>
      <xs:label xml:lang="en">CSPG type</xs:label>
      <xs:definition xml:lang="en">
        Specifies the type of CSPG
      </xs:definition>
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="OIPF-CI+"/>
    <xs:enumeration value="OIPF-DTCP-IP"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="tProtectedFormat">
  <xs:annotation>
    <xs:documentation>
      <xs:label xml:lang="en">Protected Format</xs:label>
      <xs:definition xml:lang="en">
        Specifies the supported Protected Format
      </xs:definition>
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="BBTS"/>
    <xs:enumeration value="PF"/>
    <xs:enumeration value="PDCF"/>
    <xs:enumeration value="MPIMP"/>
    <xs:enumeration value="DCF"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="tSupportedEncodings">
  <xs:annotation>
    <xs:documentation>
      <xs:label xml:lang="en">encodings</xs:label>
      <xs:definition xml:lang="en">
        Specifies the supported audio and video encodings
        (eg. MPEG2,H264 AC3, AAC etc)
      </xs:definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="AudioEncoding" type="tns:tAudioEncoding"
      minOccurs="0" maxOccurs="unbounded"/>
    <xs:element name="VideoEncoding" type="tns:tVideoEncoding"
      minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="tAudioEncoding">
  <xs:annotation>
    <xs:documentation>
      <xs:label xml:lang="en">Audio Encoding</xs:label>

```

```

    <xs:definition xml:lang="en">
      Specifies supported audio encoding Properties
    </xs:definition>
  </xs:documentation>
</xs:annotation>
<xs:sequence>
  <xs:element name="Encoding" type="tva:ControlledTermType"/>
  <xs:any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="tVideoEncoding">
  <xs:annotation>
    <xs:documentation>
      <xs:label xml:lang="en">Video Encoding</xs:label>
      <xs:definition xml:lang="en">
        Specifies supported video encoding properties
      </xs:definition>
    </xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="Encoding" type="tva:ControlledTermType"/>
    <xs:element name="SupportedFrameRate" type="tva:FrameRateType"
      minOccurs="0" maxOccurs="unbounded"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="tIPEncapsulations">
  <xs:annotation>
    <xs:documentation>
      <xs:label xml:lang="en">encapsulation</xs:label>
      <xs:definition xml:lang="en">
        Specifies the IP encapsulation that is supported on
        the device (UDP/RTP, UDP/M2TS, UDP/RTP/M2TS)
      </xs:definition>
    </xs:documentation>
  </xs:annotation>
  <xs:restriction base="xs:string">
    <xs:enumeration value="UDP/RTP"/>
    <xs:enumeration value="UDP/M2TS"/>
    <xs:enumeration value="UDP/RTP/M2TS"/>
  </xs:restriction>
</xs:simpleType>
</xs:schema>

```

A.4.14 urn:oipf:service:oitfpresence:2008

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipf:service:oitfpresence:2008" xmlns:tns="urn:oipf:service:oitfpresence:2008"
  xmlns:xs="http://www.w3.org/2001/XMLSchema" xmlns:pdm="urn:ietf:params:xml:ns:pidf:data-model"
  xmlns:profile="urn:oipf:iptv:IPTVProfile:2008" elementFormDefault="qualified" attributeFormDefault="unqualified"
  version="0.1">
  <!-- schema filename is service-oitfpresence.xsd -->
  <xs:import namespace="urn:ietf:params:xml:ns:pidf:data-model" schemaLocation="imports/data-model.xsd"/>
  <!-- OMA extensions to PIDF tuple element for IPTV Presence services-->
  <xs:import namespace="urn:oipf:iptv:IPTVProfile:2008" schemaLocation="iptv-IPTVProfile.xsd"/>
  <!-- Import of the IPTV Profile elements -->

```

```

<!-- list of definition of TISPAN element -->
<xs:simpleType name="tCurrentBCProgramID" final="list restriction">
  <xs:restriction base="xs:string">
    <xs:minLength value="0"/>
    <xs:maxLength value="16"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="tCurrentContentID" final="list restriction">
  <xs:restriction base="xs:string">
    <xs:minLength value="0"/>
    <xs:maxLength value="16"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="tBCServicePresence">
  <xs:sequence>
    <xs:element name="CurrentBCServiceID" type="profile:tBCServiceID" minOccurs="0"/>
    <xs:element name="CurrentBCProgramID" type="tns:tCurrentBCProgramID" minOccurs="0"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="tCoDServicePresence">
  <xs:sequence>
    <xs:element name="CurrentCoDContentID" type="tns:tCurrentContentID" minOccurs="0"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="tNPVRServicePresence">
  <xs:sequence>
    <xs:element name="CurrentNPVRContentID" type="tns:tCurrentContentID" minOccurs="0"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<!-- end TISPAN basic element definition -->
<xs:simpleType name="hybridTechnologyType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="DVB-T"/>
    <xs:enumeration value="DVB-H"/>
    <xs:enumeration value="DVB-S"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="IPTVHybridType">
  <xs:sequence>
    <xs:element name="watchedBroadcast" type="tns:hybridContentType"/>
    <xs:element ref="pdm:deviceId"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="Technology" type="tns:hybridTechnologyType"/>
</xs:complexType>
<xs:complexType name="hybridContentType">
  <xs:sequence>
    <xs:element name="currentChannel" type="xs:string"/>
    <xs:element name="currentProgram" type="xs:string"/>
    <xs:element name="serviceID" type="xs:string"/>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:element name="IPTVHybridService">

```

```

<xs:complexType>
  <xs:sequence maxOccurs="unbounded">
    <xs:element name="IPTVHybrid" type="tns:IPTVHybridType"/>
  </xs:sequence>
</xs:complexType>
</xs:element>
</xs:schema>

```

A.4.15 urn:oipf:PVR:2009

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:tns="urn:oipf:PVR:2009"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:ueprofile="urn:oipf:iptv:UEProfile:2008"
  xmlns:iptvprofile="urn:oipf:iptv:IPTVProfile:2008"
  targetNamespace="urn:oipf:PVR:2009" elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <xs:import namespace="urn:oipf:iptv:UEProfile:2008"
    schemaLocation="imports/iptv-UEProfile.xsd"/>
  <xs:import namespace="urn:oipf:iptv:IPTVProfile:2008"
    schemaLocation="imports/iptv-IPTVProfile.xsd"/>
  <xs:element name="PVR">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="ServiceType" type="tns:ctServiceType"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:complexType name="ctServiceType">
    <xs:choice>
      <xs:element name="CaptureRequest" type="tns:ctCaptureRequest"
        maxOccurs="unbounded"/>
      <xs:element name="RecordRequest" type="tns:ctRecordRequest"
        maxOccurs="unbounded"/>
    </xs:choice>
  </xs:complexType>
  <xs:complexType name="ctCaptureRequest"><!--LPVR Capture request/response-->
    <xs:sequence>
      <xs:element name="RequestType" type="tns:stRequestType"/>
      <xs:element name="ProgramID" type="xs:string"/>
      <xs:element name="BCServiceID" type="iptvprofile:tBCServiceID"/>
      <xs:element name="ProgramStartTime" type="xs:dateTime"/>
      <xs:element name="ProgramDuration" type="xs:duration"/>
      <xs:element name="StorageRecMode" type="tns:stStorageRecMode"/>
      <xs:element name="TargetDeviceID" type="ueprofile:tUEID"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="ctLPVRRecordRequest"><!--LPVR Record request/response-->
    <xs:sequence>
      <xs:element name="RequestType" type="tns:stRequestType"/>
      <xs:element name="ProgramID" type="xs:string"/>
      <xs:element name="BCServiceID" type="iptvprofile:tBCServiceID"/>
      <xs:element name="ProgramStartTime" type="xs:dateTime"/>
      <xs:element name="ProgramDuration" type="xs:duration"/>
      <xs:element name="StorageRequirement" type="tns:ctStorageRequirement"
        minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>

```

```

</xs:complexType>
<xs:complexType name="ctNPVRRecordRequest"><!-- NPVR Record request/response-->
  <xs:sequence>
    <xs:element name="RequestType" type="tns:stRequestType"/>
    <xs:element name="ProgramID" type="xs:string"/>
    <xs:element name="BCServiceID" type="iptvprofile:tBCServiceID"/>
    <xs:element name="ProgramStartTime" type="xs:dateTime"/>
    <xs:element name="ProgramDuration" type="xs:duration"/>
    <xs:element name="StorageRequirement" type="tns:ctStorageRequirement"
      minOccurs="0"/>
    <xs:element name="RequestStatus" type="tns:tRequestStatus" minOccurs="0"/>
    <xs:element name="CRID" type="xs:string" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>
<xs:simpleType name="stRequestType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="SetUp"/>
    <xs:enumeration value="Cancel"/>
    <xs:enumeration value="Update"/>
    <xs:enumeration value="Retrieval"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="stStorageRecMode">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Local"/>
    <xs:enumeration value="Network"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="ctStorageRequirement">
  <xs:simpleContent>
    <xs:extension base="xs:int">
      <xs:attribute name="unit" type="xs:string" use="optional" default="KB"/>
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
<xs:simpleType name="tRequestStatus">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Recording Started"/>
    <xs:enumeration value="Recording Completed"/>
    <xs:enumeration value="Recording Deleted"/>
  </xs:restriction>
</xs:simpleType>
</xs:schema>

```

A.4.16 urn:oipf:PVR:report:2009

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:tns="urn:oipf:PVR:report:2009"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  targetNamespace="urn:oipf:PVR:report:2009" elementFormDefault="qualified"
  attributeFormDefault="unqualified">
  <xs:element name="PVRResult">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="RecordResult" type="tns:tRecordResult"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>

```

```

        <xs:element name="CRID" type="xs:string"/>
        <xs:element name="SpareStorage" type="xs:double"/>
    </xs:sequence>
</xs:complexType>
</xs:element>
<xs:simpleType name="tRecordResult">
    <xs:restriction base="xs:string">
        <xs:enumeration value="Completed"/>
        <xs:enumeration value="Error"/>
    </xs:restriction>
</xs:simpleType>
</xs:schema>

```

A.4.17 urn:oipf:iptv:IPTVAction:2009

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipf:iptv:IPTVAction:2009"
  xmlns:tns="urn:oipf:iptv:IPTVAction:2009"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:bc="urn:org:etsi:ngn:params:xml:ns:iptvbcserviceactiondata"
  xmlns:co="urn:org:etsi:ngn:params:xml:ns:iptvcodserviceactiondata"
  xmlns:np="urn:org:etsi:ngn:params:xml:ns:iptvnprserviceactiondata"
  elementFormDefault="qualified" attributeFormDefault="unqualified">

  <xs:import namespace="urn:org:etsi:ngn:params:xml:ns:iptvbcserviceactiondata"
    schemaLocation="imports/iptvbcserviceactiondata.xsd"/>

  <xs:import namespace="urn:org:etsi:ngn:params:xml:ns:iptvcodserviceactiondata"
    schemaLocation="imports/iptvcodserviceactiondata.xsd"/>

  <xs:import namespace="urn:org:etsi:ngn:params:xml:ns:iptvnprserviceactiondata"
    schemaLocation="imports/iptvnprserviceactiondata.xsd"/>

  <xs:element name="IPTVAction" type="tns:IPTVActionType"/>

  <xs:complexType name="IPTVActionType">
    <xs:choice>
      <xs:element name="Notify" type="tns:NotifyType"/>
      <xs:element name="Record" type="tns:RecordType"/>
      <xs:element name="SwitchToTM" type="tns:SwitchToTMType"/>
      <xs:element name="SwitchToBC" type="tns:SwitchToBCType"/>
    </xs:choice>
  </xs:complexType>
  <xs:complexType name="NotifyType">
    <xs:choice>
      <xs:element ref="bc:IPTVBcActionData" />
      <xs:element ref="co:IPTVCoDActionData" />
      <xs:element ref="np:IPTVNpvrActionData" />
    </xs:choice>
  </xs:complexType>
  <xs:complexType name="RecordType">
    <xs:choice>
      <xs:element ref="bc:IPTVBcActionData" />
      <xs:element ref="np:IPTVNpvrActionData" />
    </xs:choice>
  </xs:complexType>

```

```

<xs:complexType name="SwitchToTMTType">
  <xs:choice>
    <xs:element ref="bc:IPTVBcActionData" />
  </xs:choice>
</xs:complexType>
<xs:complexType name="SwitchToBCType">
  <xs:choice>
    <xs:element ref="bc:IPTVBcActionData" />
  </xs:choice>
</xs:complexType>
</xs:schema>

```

A.4.18 urn:oipf:service:RelatedMaterial:2010

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipf:service:RelatedMaterial:2010"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:tva="urn:tva:metadata:2008"
  xmlns:mpeg7="urn:tva:mpeg7:2008">

  <xs:import namespace="urn:tva:metadata:2008"
    schemaLocation="tva_metadata_3-1_v151.xsd"/>
  <xs:import namespace="urn:tva:mpeg7:2008"
    schemaLocation="tva_mpeg7_2008.xsd"/>

  <complexType name="RelatedMaterialType">
    <sequence>
      <element name="HowRelated" type="tva:ControlledTermType" minOccurs="0"/>
      <element name="Format" type="tva:ControlledTermType" minOccurs="0"/>
      <choice>
        <element name="MediaLocator" type="mpeg7:MediaLocatorType"/>
        <element name="SegmentReference" type="tva:SegmentReferenceType"/>
      </choice>
      <element name="PromotionalText" type="mpeg7:TextualType" minOccurs="0"
        maxOccurs="unbounded"/>
      <element name="PromotionalMedia" type="mpeg7:TitleMediaType" minOccurs="0"
        maxOccurs="unbounded"/>
      <element name="SourceMediaLocator" type="mpeg7:MediaLocatorType"
        minOccurs="0"/>
      <element name="Position_Size" type="xs:string"/>
    </sequence>
  </complexType>
</xs:schema>

```

A.4.19 urn:oipf:service:PurchaseRequest:2010

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<!--the namespace for OIPF is "urn:oipf:service:PurchaseRequest:2010" -->
<xs:schema targetNamespace="urn:oipf:service:PurchaseRequest:2010"
  xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <!--list of definition of element-->
  <!--"SelectedDigitalMediaURI" sets as the content of <MediaUri> in
    <MediaLocator> of RelatedMaterial -->

```

```

<!--"UserID" sets as <IMPU> -->
<complexType name="PurchaseDigitalMediaRequestType">
  <sequence>
    <element name="SelectedDigitalMediaURI" type="xs:anyURI"/>
    <element name="UserID" type="xs:string"/>
  </sequence>
</complexType>
</xs:schema>

```

A.4.20 urn:oipf:WhatsOnTv:2009

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs=http://www.w3.org/2001/XMLSchema
  xmlns:tns="urn:oipf:WhatsOnTv:2009"
  xmlns:pss="urn:org:etsi:ngn:params:xml:ns:PssContentSwitchData"
  xmlns:mbms="urn:org:etsi:ngn:params:xml:ns:MbmsContentSwitchData"
  targetNamespace="urn:oipf:WhatsOnTv:2009" elementFormDefault="qualified"
  attributeFormDefault="unqualified">

  <xs:import namespace="urn:org:etsi:ngn:params:xml:ns:PssContentSwitchData"
    schemaLocation="imports/PssSwitchData.xsd"/>
  <xs:import namespace="urn:org:etsi:ngn:params:xml:ns:MbmsContentSwitchData"
    schemaLocation="imports/MbmsSwitchData.xsd"/>
  <xs:element name="WhatsOnTvResponse" type="tns:WhatsOnTvResponseType"/>
  <xs:complexType name="WhatsOnTvResponseType">
    <xs:sequence>
      <xs:element name="User" type="tns:UserType" minOccurs="0"
        maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="UserType">
    <xs:sequence>
      <xs:element name="name" type="xs:string"/>
      <xs:element name="content" type="tns:WatchedContentType" minOccurs="0"
        maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="WatchedContentType">
    <xs:choice>
      <xs:element name="PssWatchedContent" type="tns:PssWatchedContentType"/>
      <xs:element name="MbmsWatchedContent" type="tns:MbmsWatchedContentType"/>
    </xs:choice>
  </xs:complexType>
  <xs:complexType name="PssWatchedContentType">
    <xs:sequence>
      <xs:element ref="pss:PssSwitchData"/>
      <xs:element name="DeviceId" type="xs:string"/>
      <xs:element name="SessionId" type="xs:string"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="MbmsWatchedContentType">
    <xs:sequence>
      <xs:element ref="mbms:MbmsSwitchData"/>
      <xs:element name="DeviceId" type="xs:string"/>
      <xs:element name="SessionId" type="xs:string"/>
    </xs:sequence>
  </xs:complexType>

```



```

</xs:complexType>
</xs:schema>

```

A.4.21 urn:oipf:iptv:parentalcontrol

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="org:oipf:iptv:parentalcontrol"
  xmlns:tns="org:oipf:iptv:parentalcontrol"
  xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
  attributeFormDefault="unqualified">

  <xs:import namespace="urn:oipf:iptv:parentalcontrol"
    schemalocation="iptvparentalcontrol.xsd" />
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Defines the command for parental control
      associated with the controller
    </xs:documentation>
  </xs:annotation>

  <xs:element name="IPTVParentalControl" type="tns:tIPTVParentalControl" />
  <xs:complexType name="tIPTVParentalControl">
    <xs:sequence>
      <xs:element name="PC-Command" type="tns:tPCCommand" />
      <xs:element name="PC-ChannelChangedTo" type="tns:tPCChannelChangedTo" />
      <xs:element name="PC-ContentControlled" type="tns:tPCContentControlled" />
      <xs:any namespace="##other" processContents="lax"
        minOccurs="0" maxOccurs="unbounded" />
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="tPCCommand" final="list restriction">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Channel Change" />
      <xs:enumeration value="Session Teardown" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tPCChannelChangedTo" final="list restriction">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Identifier of a new channel to which the controlled user shall change.
      </xs:documentation>
    </xs:annotation>
    <xs:restriction base="xs:string">
      <xs:minLength value="0" />
      <xs:maxLength value="16" />
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="tPCContentControlled" final="list restriction">
    <xs:annotation>
      <xs:documentation xml:lang="en">
        Identifier of the content being controlled by the controller. May be BC
        service ID or content ID.
      </xs:documentation>
    </xs:annotation>
  </xs:simpleType>

```

```

</xs:annotation>
<xs:restriction base="xs:string">
  <xs:minLength value="0" />
  <xs:maxLength value="16" />
</xs:restriction>
</xs:simpleType>
</xs:schema>

```

A.4.22 urn:oipf:reminder:2009

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified" attributeFormDefault="unqualified"
  targetNamespace="urn:oipf:reminder:2009" xmlns:tns="urn:oipf:reminder:2009"
  xmlns:tva="urn:tva:metadata:2007" xmlns:ig="urn:oipf:config:ig:2009">
  <xs:import namespace="urn:tva:metadata:2007"
    schemaLocation="imports/tva_metadata_3-1_v141.xsd"/>
  <xs:import namespace="urn:oipf:config:ig:2009" schemaLocation="config-ig.xsd">
    <xs:annotation>
      <xs:documentation>
        Imported to obtain user identify information
        Note: the type definitions should be moved to an "OIPFtypes" schema so
        that it can be imported by all schemas
      </xs:documentation>
    </xs:annotation>
  </xs:import>
  <xs:element name="ReminderList">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="Reminder" type="tns:ReminderType" minOccurs="0"
          maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
  <xs:complexType name="ReminderType">
    <xs:sequence>
      <xs:element name="Creator" type="ig:IMSPublicIdType"/>
      <xs:element name="Created" type="xs:dateTime"/>
      <xs:choice>
        <xs:element name="ProgramIdentifier" type="tva:CRIDType"/>
        <xs:element name="SeriesIdentifier" type="tva:EpisodeOfType"/>
      </xs:choice>
      <xs:element name="AnnouncementTime" type="xs:duration"/>
    </xs:sequence>
    <xs:attribute name="id" type="xs:string" use="required"/>
  </xs:complexType>
</xs:schema>

```

A.4.23 urn:oipf:bookmark:2009

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  elementFormDefault="qualified" attributeFormDefault="unqualified"
  targetNamespace="urn:oipf:bookmark:2009" xmlns:tns="urn:oipf:bookmark:2009"

```

```

xmlns:tva="urn:tva:metadata:2007" xmlns:ig="urn:oiptf:config:ig:2008">
<xs:import namespace="urn:tva:metadata:2007"
  schemaLocation="imports/tva_metadata_3-1_v141.xsd"/>
<xs:import namespace="urn:oiptf:config:ig:2008" schemaLocation="config-ig.xsd">
  <xs:annotation>
    <xs:documentation>
      Imported to obtain user identify information
      Note: the type definitions should be moved to an "OIPFtypes" schema so
        that it can be imported by all schemas
    </xs:documentation>
  </xs:annotation>
</xs:import>
<xs:element name="BookmarkList">
  <xs:complexType>
    <xs:sequence>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element name="CoDProgramIdentifier" type="tva:CRIDType"/>
        <!--Bookmarking a CoD-->
        <xs:element name="SCProgramIdentifier" type="tva:CRIDType"/>
        <!--Bookmarking a scheduled content-->
      </xs:choice>
      <xs:sequence>
        <xs:element name="Bookmark" type="tns:BookmarkType" minOccurs="0"
          maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<xs:complexType name="BookmarkType">
  <xs:sequence>
    <xs:element name="Creator" type="ig:IMSPublicIdType"/>
    <xs:element name="Created" type="xs:dateTime"/>
    <xs:element name="NetworkReplayLocation" type="xs:string" minOccurs="0"
      maxOccurs="1"/>
    <xs:element name="OffsetPosition" type="xs:duration"/>
    <xs:element name="Tag" type="xs:string" minOccurs="0"/>
    <xs:element name="Rank" type="xs:string" minOccurs="0"/>
    <xs:element name="Comment" type="xs:string" minOccurs="0"/>
    <xs:element name="Expires" type="xs:dateTime" minOccurs="0"/>
    <xs:element name="Sharing" type="xs:boolean"/>
    <xs:element name="RetrievalCount" type="xs:nonNegativeInteger"
      minOccurs="0"/>
    <xs:element name="RetrievalTime" type="xs:dateTime" minOccurs="0"
      maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="id" type="xs:string" use="required"/>
</xs:complexType>
</xs:schema>

```

A.4.24 urn:oiptf:transfer:2009

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oiptf:transfer:2009" xmlns:tns="Session transfer"
  xmlns:bmkt="urn:oiptf:bookmark:2009"
  xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
  attributeFormDefault="unqualified">

```

```

<xs:import namespace="urn:oipf:bookmark:2009"
  schemaLocation="BookmarkList.xsd"/>
<xs:element name="Sessiontransfer">
  <xs:annotation>
    <xs:documentation>This describes information elements needed to support
      session transfer</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="session-bookmark" type="bmk:BookmarkType"/>
    <xs:element name="transferee" type="string" />
    <xs:documentation> this element is populated with the same information
      included in the Request URI of the REFER Request </xs:documentation>
    <xs:element name="any" type="any"/>
  </xs:sequence>
</xs:element>
</xs:schema>

```

A.4.25 org:oipf:iptv:pchcontentswitch

This schema is specified normatively in Volume 4 [OIPF_PROT2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="org:oipf:iptv:pchcontentswitch"
  xmlns:tns="org:oipf:iptv:pchcontentswitch"
  xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
  attributeFormDefault="unqualified">

  <xs:element name="PChContentSwitchControl">
    <xs:complexType>
      <xs:attribute name="PChId" type="xs:anyURI" use="required"/>
      <xs:sequence>
        <xs:element name="PChContentItem" type="tPChContentItem" minOccurs="1"
          maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>
  </xs:element>

  <xs:complexType name="tPChContentItem">
    <xs:sequence>
      <xs:choice>
        <xs:element name="CoDProgramIdentifier" type="tva:CRIDType"/>
        <!--Switch to CoD-->
        <xs:element name="SCProgramIdentifier" type="tva:CRIDType"/>
        <!--Switch to scheduled content-->
      </xs:choice>
      <xs:element name="SwitchTime" type="xs:dateTime" />
    </xs:sequence>
  </xs:complexType>
</xs:schema>

```

A.4.26 urn:oipf:service:sdns:2010

This schema is specified normatively in Volume 3 [OIPF_META2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipf:service:sdns:2010"
  xmlns:tns="urn:oipf:service:sdns:2010" xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:tva="urn:tva:metadata:2007" xmlns:dvb="urn:dvb:metadata:iptv:sdns:2008-1"

```

```

xmlns:dvbmhp="urn:dvb:mhp:2006" xmlns:oiplib="urn:oiplib:service:bcg:2010"
xmlns:mis="urn:dvb:mhp:2009">
<!-- schema filename is service-sdns.xsd -->
<xs:import namespace="urn:tva:metadata:2007"
  schemaLocation="imports/tva_metadata_3-1_v141.xsd"/>
<xs:import namespace="urn:dvb:metadata:iptv:sdns:2008-1"
  schemaLocation="imports/sdns_v1.4r10_modded.xsd"/>
<xs:import namespace="urn:dvb:mhp:2006" schemaLocation="imports/mhpiptv.xsd"/>
<xs:import namespace="urn:oiplib:service:bcg:2010" schemaLocation="service-bcg.xsd"/>
<xs:import namespace="urn:dvb:mhp:2009" schemaLocation="imports/mis_xmlait.xsd"/>
<xs:complexType name="ServiceProvider">
  <xs:sequence>
    <xs:element name="ServiceProvider" maxOccurs="unbounded">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="Name" type="dvb:MultilingualType" maxOccurs="unbounded"/>
          <xs:element name="Description" type="dvb:MultilingualType" minOccurs="0"
            maxOccurs="unbounded"/>
          <xs:element name="EmergencyNotificationService"
            type="tns:EmergencyNotificationServiceType" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute name="DomainName" type="dvb:DomainType" use="required"/>
        <xs:attribute name="Version" type="dvb:Version" use="required"/>
        <xs:attribute name="LogoURI" type="xs:anyURI" use="optional"/>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="EmergencyNotificationServiceType">
  <xs:choice>
    <xs:element name="SDPURL" type="xs:anyURI"/>
    <xs:element name="inlineSDP" type="tns:inlineSDPType"/>
    <xs:element name="SDPRef" type="tns:SDPRefType"/>
  </xs:choice>
</xs:complexType>
<xs:simpleType name="inlineSDPType">
  <!-- Note: the InlinedSDP below must be embedded in a CDATA section -->
  <xs:restriction base="xs:string"/>
</xs:simpleType>
<xs:complexType name="SDPRefType">
  <xs:sequence>
    <xs:element name="SDPStream" type="tns:inlineSDPType"/>
    <xs:element name="SDPURI" type="xs:anyURI"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Application">
  <xs:complexContent>
    <xs:extension base="dvbmhp:Application">
      <xs:sequence>
        <xs:element name="fluteSessionDescriptor" type="tns:FLUTESessionDescriptor"
          minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
<xs:complexType name="OIPFApplication">
  <xs:complexContent>

```

```

    <xs:extension base="mis:Application">
      <xs:sequence>
        <xs:element name="fluteSessionDescriptor" type="tns:FLUTESessionDescriptor"
          minOccurs="0" maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
<xs:complexType name="FLUTESessionDescriptor">
  <xs:sequence>
    <xs:element name="senderIP" type="xs:string"/>
    <xs:element name="numChannels" type="xs:unsignedInt"/>
    <xs:element name="destIP" type="xs:string"/>
    <xs:element name="TSI" type="xs:unsignedInt"/>
    <xs:element name="sessionTimeParam" type="xs:string"/>
    <xs:element name="lang" type="xs:string"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="OIPFIPServiceType">
  <xs:complexContent>
    <xs:extension base="mis:IPServiceType">
      <xs:sequence>
        <xs:element name="TimeToRenegotiate" type="xs:duration" minOccurs="0"/>
        <xs:element name="PurchaseItem" type="oipfbcg:PurchaseItemType" minOccurs="0"/>
        <xs:element name="FileFormat" type="tva:ControlledTermType" minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
</xs:schema>

```

A.4.27 urn:oipf:service:bcg:2010

This schema is specified normatively in Volume 3 [OIPF_META2].

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema targetNamespace="urn:oipf:service:bcg:2010"
  xmlns:tns="urn:oipf:service:bcg:2010"
  xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:tva="urn:tva:metadata:2007"
  elementFormDefault="qualified" attributeFormDefault="unqualified">
  <!-- schema filename is service-bcg.xsd -->
  <xs:import namespace="urn:tva:metadata:2007"
    schemaLocation="imports/tva_metadata_3-1_v141.xsd"/>
  <xs:include schemaLocation="csp-MarlinPrivateDataType.xsd"/>
  <xs:include schemaLocation="csp-DRMPrivateDataType.xsd"/>
  <xs:include schemaLocation="csp-HexBinaryPrivateDataType.xsd"/>

  <xs:complexType name="PurchaseItemType">
    <xs:complexContent>
      <xs:extension base="tva:PurchaseItemType">
        <xs:sequence>
          <xs:element name="DRMControlInformation" type="tns:DRMControlInformationType"
            minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

```

```

<xs:complexType name="DRMControllInformationType">
  <xs:sequence>
    <xs:element name="DRMSystemID" type="xs:anyURI"/>
    <xs:element name="DRMContentID" type="xs:anyURI"/>
    <xs:element name="RightsIssuerURL" type="xs:anyURI" minOccurs="0"/>
    <xs:element name="SilentRightsURL" type="xs:anyURI" minOccurs="0"/>
    <xs:element name="PreviewRightsURL" type="xs:anyURI" minOccurs="0"/>
    <xs:element name="DoNotRecord" type="xs:boolean" minOccurs="0"/>
    <xs:element name="DoNotTimeShift" type="xs:boolean" minOccurs="0"/>
    <xs:element ref="tns:DRMGenericData" minOccurs="0" maxOccurs="unbounded"/>
    <xs:element ref="tns:DRMPrivateData" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

<xs:element name="DRMGenericData" type="tns:DRMGenericDataType"/>
<xs:element name="DRMPrivateData" type="tns:DRMPrivateDataType"/>
<xs:element name="MarlinPrivateData" type="tns:MarlinPrivateDataType"
  substitutionGroup="tns:DRMPrivateData"/>
<xs:element name="HexBinaryPrivateData" type="tns:HexBinaryPrivateDataType"
  substitutionGroup="tns:DRMPrivateData"/>

<xs:complexType name="DRMGenericDataType">
  <xs:sequence>
    <xs:any namespace="##any" processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="OnDemandProgramType">
  <xs:complexContent>
    <xs:extension base="tva:OnDemandProgramType">
      <xs:sequence>
        <xs:element name="Protocol" type="tva:ControlledTermType" minOccurs="0"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>

<xs:complexType name="ProgramDescriptionType">
  <xs:sequence>
    <xs:element name="ProgramInformationTable" type="tva:ProgramInformationTableType"
      minOccurs="0"/>
    <xs:element name="GroupInformationTable" type="tva:GroupInformationTableType"
      minOccurs="0"/>
    <xs:element name="ProgramLocationTable" type="tva:ProgramLocationTableType"
      minOccurs="0"/>
    <xs:element name="ServiceInformationTable" type="tva:ServiceInformationTableType"
      minOccurs="0"/>
    <xs:element name="CreditsInformationTable" type="tva:CreditsInformationTableType"
      minOccurs="0"/>
    <xs:element name="ProgramReviewTable" type="tva:ProgramReviewTableType"
      minOccurs="0"/>
    <xs:element name="SegmentInformationTable" type="tva:SegmentInformationTableType"
      minOccurs="0"/>
    <xs:element name="PurchaseInformationTable" type="tva:PurchaseInformationTableType"
      minOccurs="0"/>
    <xs:element name="NotificationInformationTable"

```

```

        type="tns:NotificationInformationTableType" minOccurs="0"/>
    </xs:sequence>
</xs:complexType>

<xs:complexType name="NotificationInformationTableType">
    <xs:sequence>
        <xs:element name="NotificationService" type="oipf:NotificationServiceType"
            minOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

<xs:complexType name="NotificationServiceType">
    <xs:complexContent>
        <xs:extension base="tva:ServiceInformationType">
            <xs:sequence>
                <xs:element name="NotificationServiceCategory"
                    type="oipf:NotificationServiceCategorytype"/>
            </xs:sequence>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>

<xs:complexType name="ProgramInformationType">
    <xs:complexContent>
        <xs:extension base="tva:ProgramInformationType">
            <xs:sequence>
                <xs:element name="DoNotBookmark" type="xs:boolean" default="false"
                    minOccurs="0"/>
            </xs:sequence>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>

<xs:complexType name="ServiceInformationType">
    <xs:complexContent>
        <xs:extension base="tva:ServiceInformationType">
            <xs:sequence>
                <xs:element name="DoNotBookmark" type="xs:boolean" default="false"
                    minOccurs="0"/>
            </xs:sequence>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>
</xs:schema>

```

A.5 Classification Schemes

A.5.1 urn:oipf:cs:AudioCodingFormatCS:2008

This schema is specified normatively in Volume 3 [OIPF_META2].

```

<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:cs:AudioCodingFormatCS:2008">
    <!-- schema filename is cs-AudioCodingFormatCS.xml -->
    <Term termId="HE_AAC">
        <Name xml:lang="en">HE_AAC</Name>
    </Term>

```



```

    <Definition xml:lang="en">HE-AAC and AAC audio coding</Definition>
  </Term>
  <Term termId="AC3">
    <Name xml:lang="en">AC3</Name>
    <Definition xml:lang="en">AC3 audio coding</Definition>
  </Term>
  <Term termId="MPEG1_L2">
    <Name xml:lang="en">MPEG1_L2</Name>
    <Definition xml:lang="en">MPEG-1 Layer II audio coding</Definition>
  </Term>
  <Term termId="MPEG1_L3">
    <Name xml:lang="en">MPEG1_L3</Name>
    <Definition xml:lang="en">MPEG-1 Layer III audio coding</Definition>
  </Term>
  <Term termId="WAV">
    <Name xml:lang="en">WAV</Name>
    <Definition xml:lang="en">WAV audio coding</Definition>
  </Term>
</ClassificationScheme>

```

A.5.2 urn:oipf:cs:AVMediaFormatCS:2008

This schema is specified normatively in Volume 3 [OIPF_META2].

```

<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:cs:AVMediaFormatCS:2008">
  <!-- schema filename is cs-AVMediaFormatCS.xml -->
  <Term termId="TS">
    <Name xml:lang="en">TS</Name>
    <Definition xml:lang="en">MPEG-2 transport stream</Definition>
  </Term>
  <Term termId="TS_BBTS">
    <Name xml:lang="en">TS_BBTS</Name>
    <Definition xml:lang="en">MPEG-2 transport stream, Marlin BB TS with AES encryption</Definition>
  </Term>
  <Term termId="TS_PF">
    <Name xml:lang="en">TS_PF</Name>
    <Definition xml:lang="en">MPEG-2 protected transport stream</Definition>
  </Term>
  <Term termId="TTS">
    <Name xml:lang="en">TTS</Name>
    <Definition xml:lang="en">MPEG-2 time stamped transport stream</Definition>
  </Term>
  <Term termId="TTS_BBTS">
    <Name xml:lang="en">TTS_BBTS</Name>
    <Definition xml:lang="en">MPEG-2 time stamped transport stream, Marlin BB TS with AES encryption</Definition>
  </Term>
  <Term termId="TTS_PF">
    <Name xml:lang="en">TTS_PF</Name>
    <Definition xml:lang="en">MPEG-2 time stamped protected transport stream</Definition>
  </Term>
  <Term termId="MP4">
    <Name xml:lang="en">MP4</Name>
    <Definition xml:lang="en">MP4 File Format</Definition>
  </Term>
  <Term termId="MP4_PDCF">
    <Name xml:lang="en">MP4_PDCF</Name>
    <Definition xml:lang="en">MP4 File Format, OMA PDCF</Definition>
  </Term>

```

```

</Term>
<Term termId="MP4_MIPMP">
  <Name xml:lang="en">MP4_MIPMP</Name>
  <Definition xml:lang="en">MP4 File Format, Marlin IP MP format</Definition>
</Term>
<Term termId="MP4_DCF">
  <Name xml:lang="en">MP4_DCF</Name>
  <Definition xml:lang="en">MP4 File Format, OMA DCF</Definition>
</Term>
</ClassificationScheme>

```

A.5.3 urn:oipt:cs:GermanyFSKCS:2008

This schema is specified normatively in Volume 3 [OIPF_META2].

```

<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipt:cs:GermanyFSKCS"
domain="//CreationInformation/Classification/ParentalGuidance/ParentalRating">
  <!-- schema filename is cs-GermanyFSKCS.xml -->
  <Description xml:lang="en">Thesaurus for movie rating</Description>
  <Term termId="0">
    <Name xml:lang="en">0</Name>
    <Definition xml:lang="en">Released without age restriction</Definition>
  </Term>
  <Term termId="6">
    <Name xml:lang="en">6</Name>
    <Definition xml:lang="en">Released to age 6 or older</Definition>
  </Term>
  <Term termId="12">
    <Name xml:lang="en">12</Name>
    <Definition xml:lang="en">Released to age 12 or older and to age 6 or older with parental guidance</Definition>
  </Term>
  <Term termId="16">
    <Name xml:lang="en">16</Name>
    <Definition xml:lang="en">Released to age 16 or older</Definition>
  </Term>
  <Term termId="18">
    <Name xml:lang="en">18</Name>
    <Definition xml:lang="en">No release to youths (released to age 18 or older)</Definition>
  </Term>
</ClassificationScheme>

```

A.5.4 urn:oipt:cs:ProtocolCS:2010

This schema is specified normatively in Volume 3 [OIPF_META2].

```

<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipt:cs:ProtocolCS:2010">
  <!-- schema file is cs-ProtocolCS.xml -->
  <Term termId="sip-igmp-rtp-udp">
    <Name xml:lang="en">sip-igmp-rtp-udp </Name>
    <Definition xml:lang="en">Scheduled Content over RTP</Definition>
  </Term>
  <Term termId="sip-igmp-udp">
    <Name xml:lang="en">sip-igmp-udp</Name>
    <Definition xml:lang="en">Scheduled Content over UDP</Definition>
  </Term>
  <Term termId="sip-rtsp-rtp-udp">

```

```

    <Name xml:lang="en">sip-rtsp-rtp-udp</Name>
    <Definition xml:lang="en">Managed CoD Streaming over RTP</Definition>
  </Term>
  <Term termId="sip-rtsp-udp">
    <Name xml:lang="en">sip-rtsp-udp</Name>
    <Definition xml:lang="en">Managed CoD Streaming over direct UDP</Definition>
  </Term>
  <Term termId="igmp-rtp-udp">
    <Name xml:lang="en">igmp-rtp-udp </Name>
    <Definition xml:lang="en">Unmanaged Scheduled Content over RTP</Definition>
  </Term>
  <Term termId="igmp-udp">
    <Name xml:lang="en">igmp-udp</Name>
    <Definition xml:lang="en">Unmanaged Scheduled Content over UDP</Definition>
  </Term>
  <Term termId="rtsp-rtp-udp">
    <Name xml:lang="en">rtsp-rtp-udp</Name>
    <Definition xml:lang="en">Unmanaged CoD Streaming over RTP</Definition>
  </Term>
  <Term termId="http-get">
    <Name xml:lang="en">http-get</Name>
    <Definition xml:lang="en">
      Managed/Unmanaged CoD Streaming/Download over HTTP
    </Definition>
  </Term>
</ClassificationScheme>

```

A.5.5 urn:oipf:cs:VisualCodingFormatCS:2008

This schema is specified normatively in Volume 3 [OIPF_META2].

```

<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:cs:VisualCodingFormatCS:2008">
  <!-- schema filename is cs-VisualCodingFormatCS.xml -->
  <Term termId="AVC_HD_25">
    <Name xml:lang="en">AVC_HD_25</Name>
    <Definition xml:lang="en">H.264/AVC video coding, High Definition, 25Hz systems</Definition>
  </Term>
  <Term termId="AVC_HD_30">
    <Name xml:lang="en">AVC_HD_30</Name>
    <Definition xml:lang="en">H.264/AVC video coding, High Definition, 30Hz systems</Definition>
  </Term>
  <Term termId="AVC_SD_25">
    <Name xml:lang="en">AVC_SD_25</Name>
    <Definition xml:lang="en">H.264/AVC video coding, Standard Definition, 25Hz systems</Definition>
  </Term>
  <Term termId="AVC_SD_30">
    <Name xml:lang="en">AVC_SD_30</Name>
    <Definition xml:lang="en">H.264/AVC video coding, Standard Definition, 30Hz systems</Definition>
  </Term>
  <Term termId="MPEG2_HD_25">
    <Name xml:lang="en">MPEG2_HD_25</Name>
    <Definition xml:lang="en">MPEG-2 video coding, High Definition, 25Hz systems</Definition>
  </Term>
  <Term termId="MPEG2_SD_25">
    <Name xml:lang="en">MPEG2_SD_25</Name>
    <Definition xml:lang="en">MPEG-2 video coding, Standard Definition, 25Hz systems</Definition>
  </Term>

```

```
</ClassificationScheme>
```

A.5.6 urn:oipf:cs:ApplicationTypeCS:2009

This schema is specified normatively in Volume 3 [OIPF_META2].

```
<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:cs:ApplicationTypeCS:2009">
  <!-- schema filename is cs-ApplicationTypeCS.xml -->
  <Term termId="PAE">
    <Name xml:lang="en">PAE Application</Name>
    <Definition xml:lang="en">Application requires OIPF Procedural Application Environment</Definition>
  </Term>
  <Term termId="DAE">
    <Name xml:lang="en">DAE Application</Name>
    <Definition xml:lang="en">Application requires OIPF Declarative Application Environment</Definition>
    <Term termId="XHTML">
      <Name xml:lang="en">XHTML Application</Name>
      <Definition xml:lang="en">XHTML Type of DAE Application</Definition>
    </Term>
    <Term termId="SVG">
      <Name xml:lang="en">SVG Application</Name>
      <Definition xml:lang="en">SVG Type of DAE Application</Definition>
    </Term>
  </Term>
</ClassificationScheme>
```

A.5.7 urn:oipf:cs:ApplicationUsageCS:2010

This schema is specified normatively in Volume 3 [OIPF_META2].

```
<?xml version="1.0" encoding="UTF-8"?>
<ClassificationScheme uri="urn:oipf:cs:ApplicationUsageCS:2010">
  <!-- schema file is cs-ApplicationUsageCS.xml -->
  <Term termId="servicediscovery">
    <Name xml:lang="en">Service Discovery</Name>
    <Definition xml:lang="en">
      Application provides Service Discovery information
    </Definition>
  </Term>
  <Term termId="vod">
    <Name xml:lang="en">VoD Guide Application</Name>
    <Definition xml:lang="en">Application providing VoD content guide</Definition>
  </Term>
  <Term termId="epg">
    <Name xml:lang="en">EPG Guide Application</Name>
    <Definition xml:lang="en">Application providing EPG content guide</Definition>
  </Term>
  <Term termId="communication">
    <Name xml:lang="en">Communication Application</Name>
    <Definition xml:lang="en">Application providing communication services.</Definition>
  </Term>
  <Term termId="hni-igi">
    <Name xml:lang="en">HNI-IGI Application</Name>
    <Definition xml:lang="en">
      Application providing non-native HNI-IGI functionality.
    </Definition>
  </Term>
```

```
<Term termId="ngnotification">
  <Name xml:lang="en">NG Notification Application</Name>
  <Definition xml:lang="en">
    Application providing NG notification services.
  </Definition>
</Term>
</ClassificationScheme>
```