

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

H.753

(11/2019)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

IPTV multimedia services and applications for IPTV –
IPTV metadata

Scene-based metadata for IPTV services

Recommendation ITU-T H.753



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Recommendation ITU-T H.753

Scene-based metadata for IPTV services

Summary

Recommendation ITU-T H.753 defines the metadata element and format for content distribution over an Internet protocol television (IPTV) terminal device and describes metadata management functions of scene-based metadata (SBM), which basically support the IPTV multimedia application frameworks that feature in the ITU-T H.760 series of Recommendations.

Scene-based metadata is based on ITU-T IPTV functional architecture and terminal devices defined in the ITU-T H.720-series and on services defined in Recommendation ITU-T H.750.

Recommendation ITU-T H.753 also describes the web-based functions for scene-based metadata service and the scene-based service workflow.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T H.753	2019-11-29	16	11.1002/1000/14112

Keywords

IPTV, metadata, SBM, scene, scene-based metadata.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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Recommendation ITU-T H.753

Scene-based metadata for IPTV services

1 Scope

This Recommendation specifies scene-based metadata for Internet protocol television (IPTV) services. Scene-based metadata description, metadata elements and format for content distribution are specified. Furthermore, the high-level interface for scene-based metadata service is also described.

The scope of this Recommendation includes:

- Scene-based metadata (SBM) elements
- SBM functions and interface description
- Scenario of IPTV scene-based media service

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T H.720] Recommendation ITU-T H.720 (2008), *Overview of IPTV terminal devices and end systems*.
- [ITU-T H.750] Recommendation ITU-T H.750 (2008), *High-level specification of metadata for IPTV services*.
- [ITU-T Y.1901] Recommendation ITU-T Y.1901 (2009), *Requirements for the support of IPTV services*.
- [ITU-T Y.1910] Recommendation ITU-T Y.1910 (2008), *IPTV functional architecture*.
- [IETF RFC 3986] IETF RFC 3986 (2005), *Uniform Resource Identifier (URI): Generic Syntax*.
<https://tools.ietf.org/html/rfc3986>
- [W3C XMLSchemaP2] W3C Recommendation (2004) *XML Schema Part 2: Datatypes Second Edition*.
<http://www.w3.org/TR/xmlschema-2/>

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 application [b-ITU-T Y.101]: A structured set of capabilities, which provide value-added functionality supported by one or more services.

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

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

NOTE – The end-user consumes the product or service. An end-user can optionally be a subscriber.

3.1.4 functional architecture [b-ITU-T Y.2012]: A set of functional entities and the reference points between them used to describe the structure of an NGN. These functional entities are separated by reference points, and thus, they define the distribution of functions.

3.1.5 functional entity [b-ITU-T Y.2012]: An entity that comprises an indivisible set of specific functions. Functional entities are logical concepts, while groupings of functional entities are used to describe practical, physical implementations.

3.1.6 home network (HN) [b-ITU-T H.622]: Home network is the collection of elements that process, manage, transport, and store information, thus enabling the connection and integration of multiple computing, control, monitoring, communication and entertainment devices in the home.

3.1.7 IPTV terminal device [ITU-T Y.1901]: A terminal device which has ITF functionality, e.g., STB.

3.1.8 IPTV terminal function (ITF) [ITU-T Y.1901]: The end-user function(s) associated with a) receiving and responding to network control channel messages regarding session set-up, maintenance, and tear-down, and b) receiving the content of an IP transport from the network and rendering.

3.1.9 linear TV [ITU-T Y.1901]: A television service in which a continuous stream flows in real time from the service provider to the terminal device and where the user cannot control the temporal order in which contents are viewed.

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

NOTE – EPG metadata has many applications and may vary in depth from merely identifying the content package title or information to populate an EPG to providing a complete index of different scenes in a movie or providing business rules detailing how the content package may be displayed, copied, or sold.

3.1.11 service provider [b-ITU-T M.1400]: A general reference to an operator that provides telecommunication services to customers and other users either on a tariff or contract basis. A service provider may or may not operate a network. A service provider may or may be a customer of another service provider.

NOTE – Typically, the service provider acquires or licenses content from content providers and packages this into a service that is consumed by the end-user.

3.1.12 subscriber [b-ITU-T M.3050.1]: The subscriber is responsible for concluding contracts for the services subscribed to and for paying for these services.

3.1.13 subtitles [ITU-T Y.1901]: Subtitles provide a real-time on-screen transcript of dialogue for the purpose of language translation or to clarify speech that is unclear.

NOTE – This service can be provided by means of either textual or graphical supplementary content. The subtitles and the dialogue are usually in different languages. The assumed audience for subtitling is hearing people who do not understand the language of the dialogue.

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

3.1.15 video on demand (VoD) [ITU-T Y.1901]: A service in which the end-user can, on demand, select and view a video content and where the end-user can control the temporal order in which the video content is viewed (e.g., the ability to start the viewing, pause, fast forward, rewind, etc.).

NOTE – The viewing may occur some time after the selection of the video content.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 delivery: In context of IPTV architecture, "delivery" is defined as sending contents to the end-user.

3.2.2 distribution: In context of IPTV architecture, "distribution" is defined as sending the content to appropriate intermediate locations to enable subsequent delivery.

3.2.3 hybrid terminal device: An IPTV terminal device that can also receive content from different types of transmission systems (e.g., terrestrial, satellite).

3.2.4 scene-on-demand (SoD): A service in which the end-user can, on demand, select and view a scene of video content

3.2.5 metadata generator: An entity generating metadata automatically using script, subtitles, crowdsourced information, and web information.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

API	Application Programming Interface
CDF	Content Delivery Function
DVB	Digital Video Broadcasting
EPG	Electronic Programme Guide
IP	Internet Protocol
IPTV	Internet Protocol Television
QoE	Quality of Experience
QoS	Quality of Service
RSDL	RESTful Service Description Language
SBM	Scene-Based Metadata
SDF	Scene Delivery Function
SDCF	Scene Delivery Client Function
SoD	Scene on Demand
SSF	Scene Storage Function
TD	Terminal Device
XML	Extensible Mark-up Language
URL	Uniform Resource Locator
VOD	Video on Demand

5 Conventions

In this Recommendation:

- The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.

- The keywords "is recommended" indicate a requirement which is recommended but which is not absolutely required. Thus, this requirement needs not be present to claim conformance.
- The keywords "can optionally" and "may" indicate an optional requirement which is permissible, without implying any sense of being recommended. These terms are not intended to imply that the vendor's implementation must provide the option and the feature can be optionally enabled by the network operator/service provider. Rather, it means the vendor may optionally provide the feature and still claim conformance with the specification.

6 Introduction

Due to various smart media devices such as smartphones, tablets, Internet protocol television (IPTV) terminal devices and smart TVs, people have started to consume multimedia contents everywhere and at any time.

Content providers hope that consumers will consume their own video contents more frequently in this environment. In addition, they want opportunities to provide additional services such as advertisements or a complementary information service.

For example, there are people who only want to watch a scene where a given hero appears. Likewise there are people who want to see a collection of scenes related to a specific topic. Scene-based metadata for IPTV services can satisfy such a desire for such people.

Scene-based metadata for IPTV services enables a user to receive various additional services by combining information including traditional IPTV services information. The scene-based metadata is able to provide an interactive video clip service or a related additional service by means of a story graph with a semantic clustering technique. Moreover, the scene-based metadata can provide new smart media services such as a media commerce and a context-aware advertising service by using the metadata extracted from a script, subtitles, or crowdsourced information.

The definition of IPTV is described in [ITU-T Y.1901] as multimedia services such as television, video, audio, text, graphics and data delivered over IP-based networks managed to support the required level of QoS/QoE, security, interactivity and reliability. The basic services such as broadcast services, on-demand services and portal services for IPTV are described in [ITU-T H.720]. In [ITU-T H.720] a broadcast service is called a linear TV service and an on-demand service is called a content on-demand service.

Figure 1 shows the IPTV domains, described in [ITU-T H.720], where a content provider is defined as an entity that owns or is licensed to sell content or content assets; a service provider is defined as a general reference to an operator that provides telecommunication services to customers and other users either on a tariff or contract basis; a network provider is defined as the organization that maintains and operates the network components required for IPTV functionality; and an end-user is defined as the actual user of the products or services as described in [ITU-T Y.1901].

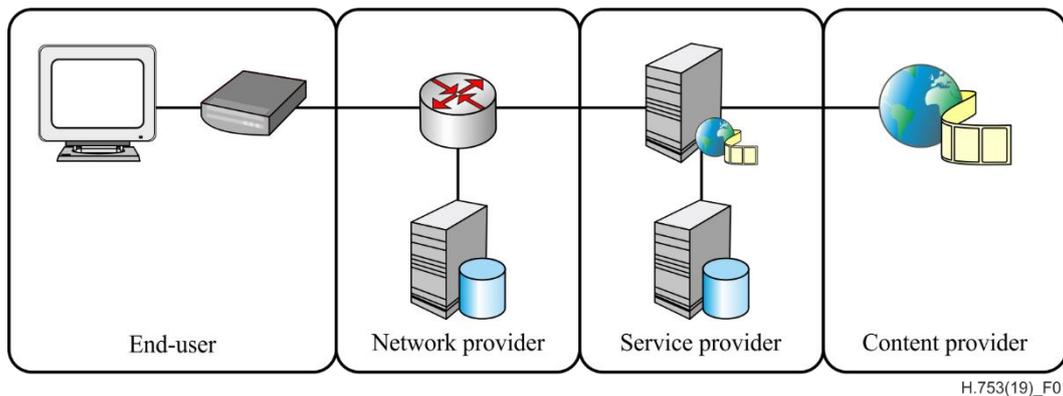


Figure 1 – IPTV domains [ITU-T Y.1910]

Figure 2 shows the IPTV architectural overview, described in [ITU-T Y.1910]. Content provider functions provide the content and associated metadata to content preparation functions. High-level specification of metadata for IPTV services is described in [ITU-T H.750]. IPTV metadata is the information on services and content processed by the service and content delivery infrastructure, providing a descriptive and structural framework for managing IPTV services. The types of metadata for IPTV are service and content metadata, user metadata, metadata for content provisioning and management, metadata aggregation management, and rights and security related metadata. Content metadata is produced by content providers and service providers. Content providers typically supply title, synopsis, genre and other descriptive metadata about the content, while service providers assign the time of delivery, cost and other information about the service as described in [ITU-T H.750].

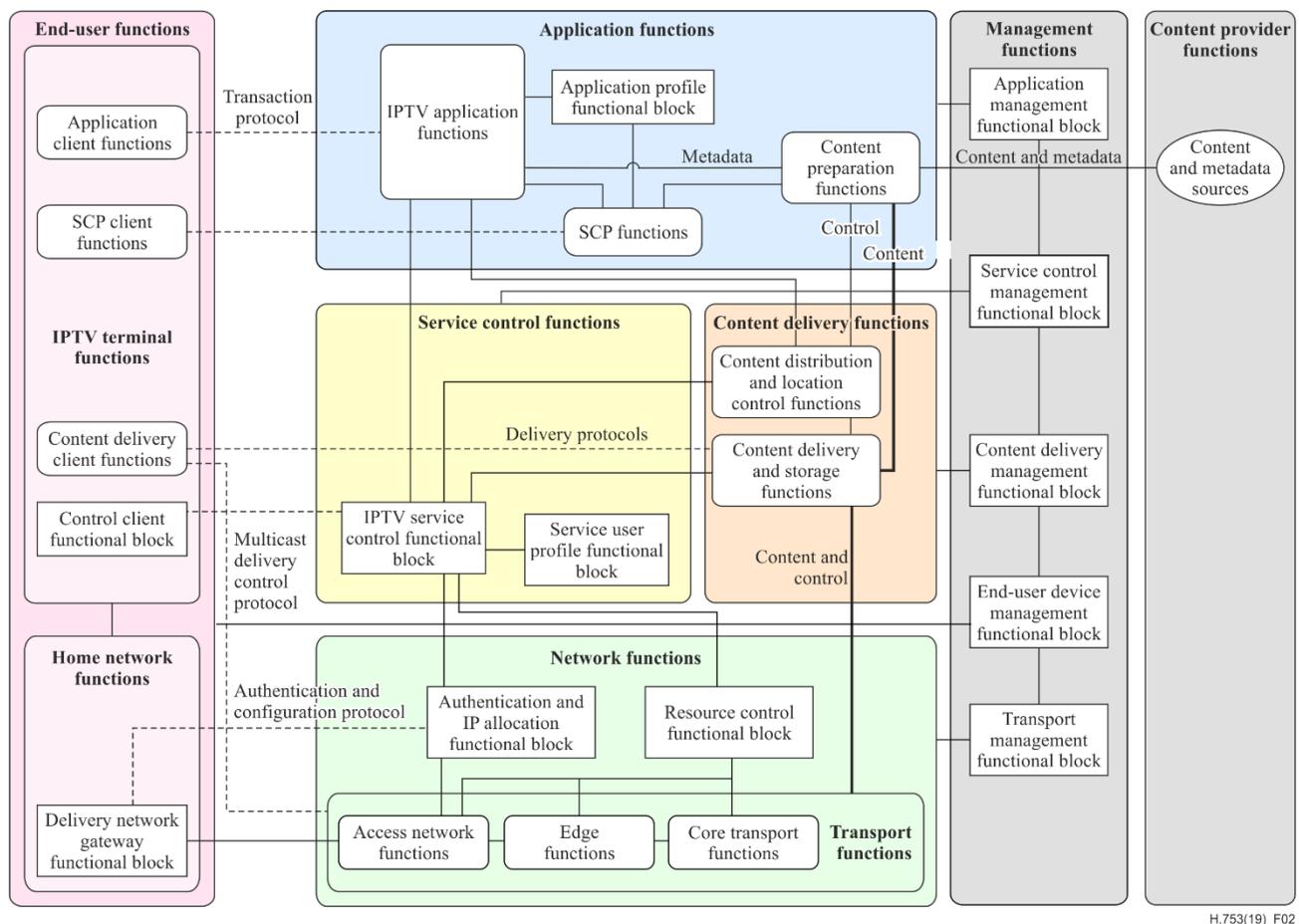


Figure 2 – IPTV architectural overview [ITU-T Y.1910]

Figure 3 provides updated IPTV architecture with the inclusion of scene-based IPTV services. Functions and functional blocks described in this clause are common to all architectural approaches as detailed in [ITU-T H.720] except where stated differently.

Key to figures:

- The dotted elliptical area represents additional sources related to Content.
- The dotted and rounded rectangular areas represent the functional blocks added to the IPTV architecture, as indicated in clause 5 of [ITU-T Y.1910].

In Figure 3, the following functions are added for scene-based IPTV services.

- **Scene delivery functions (SDF)**: perform cache and storage functionalities and deliver the scene according to the request from the end-user functions
- **Scene storage functions (SSF)**: store and cache the scene, process it under the control of content preparation functions
- **Scene delivery client functions (SDCF)**: receive and control the delivery of the scene from the scene delivery and storage functions (SDF and SSF).

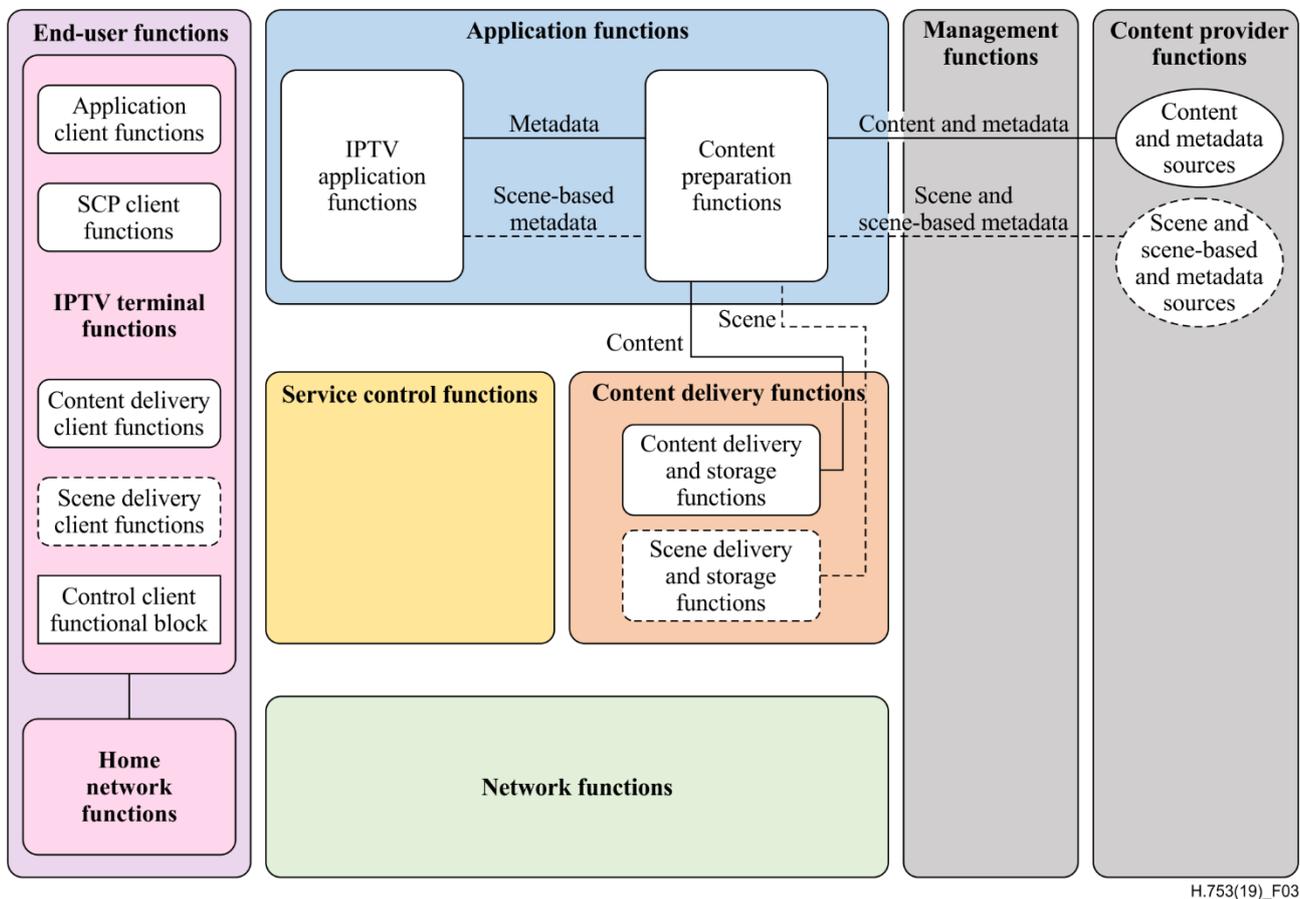


Figure 3 – Updated IPTV architecture for scene-based IPTV services

The IPTV services architecture can be extended to support scene-based content services. Existing functions in IPTV architecture contains the scene-based functions; the scene delivery client function (SDCF) are part of IPTV terminal functions and the SDF/SSF is placed as a part of content delivery functions (CDF) of the IPTV architecture. Moreover, the scene and scene-based metadata can be provided by content provider functions. Figure 4 illustrates scene-based IPTV services flows between a scene-based metadata (SBM) service platform and client-side SBM applications.

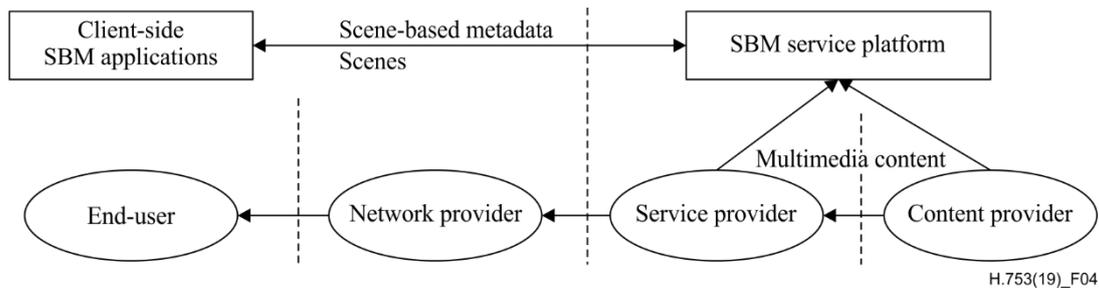


Figure 4 – Scene-based IPTV services overview

The client-side SBM applications can access the SBM service platform with a scene-based metadata function interface, which includes basic scene information, location information, music information, object information, and statics information about the scene. SDCF performs handling the request and receives metadata and scenes between client-side SBM applications and SBM service platform. These endpoints are typically categorized as web-based navigation servers maintained by the service provider or client-side applications running on the IPTV client. The SBM service platform is the entity responsible for aggregating SBM sets and scenes produced by content providers or service providers to describe services and scenes, as well as metadata sets generated or registered by metadata clients to describe context for scenes. These SBM sets are maintained in the database managed by the SBM service platform. The SBM maintained in the SBM service platform's database is accessed by, delivered to, or contributed from metadata clients through metadata delivery network and exchange protocols. The SDF and SSF support the roles of the SBM service platform. Therefore, the metadata information and metadata function interface are necessary to describe the scene-based content distribution service.

7 Scene-based metadata

This clause specifies the scheme of scene-based metadata and the content description model which the metadata is based on. The possible key factors include e.g., metadata for scene description such as SceneStartTime, SceneEndTime and SceneDuration.

Scene-based metadata (SBM) can represent a distinct part of an episode, can be identified, and can include time information such as when a scene starts and ends.

7.1 Content description model

Figure 5 shows the content description model of this Recommendation. This is similar to the content description model described in [b-ETSI TS 102 822-1], where a series of programmes can be ordered (e.g. episodes in a numerical order) and an episode can be divided into several scenes.

The term "scene" means a part of a logically divided episode.

Key to figures:

- The rectangular block represents the set of content and its metadata.
- The rectangular block with a diamond on the right side represents that it has multiple instances of the rectangular block connected with solid line.



Figure 5 – Content description model

7.2 Data types for scene-based metadata

Table 1 explains the data types used in this Recommendation.

Table 1 – Data types used in this Recommendation

Type	Name	Notes/Reference
xs:float	Float	Float is based on the IEEE single-precision 32-bit floating point type. Defined in [W3C XMLSchemaP2].
xs:ID	Identifier	Represents unique identifier. Defined in [W3C XMLSchemaP2].
xs:IDREF	Reference to Identifier	Represents a reference to xs:ID. Defined in [W3C XMLSchemaP2].
xs:nonNegativeInteger	Non-negative integer	An integer containing only non-negative values (0,1,2,...) Defined in [W3C XMLSchemaP2].
xs:positiveInteger	Positive integer	An integer containing only positive values (1,2,...) Defined in [W3C XMLSchemaP2].
xs:NMToken	NMToken	The NMToken data type can contain whitespace (e.g., line feeds, carriage returns, and tab)-replaced and collapsed strings, that have no leading or trailing spaces (#x20) and that have no space may appear within the value itself. Defined in [W3C XMLSchemaP2].
xs:NMToken enumeration	NMToken with enumeration restriction	Restricted NMToken values Defined in [W3C XMLSchemaP2].
xs:time	Time	The format of time is "hh:mm:ss" where: hh indicates the hour, mm indicates the minute, ss indicates the second. Defined in [W3C XMLSchemaP2].
xs:string	String	Used to specify the string value which data type can contain characters, line feeds, carriage returns, and tab characters. Defined in [W3C XMLSchemaP2]
URL	Uniform Resource Locator (URL)	Used to locate resources by describing its access mechanism. (e.g., its network "location"). Defined in [IETF RFC 3986] as URI= scheme ":" hier-part ["?" query] ["#" fragment].

8 SBM elements and format

This clause specifies metadata for content distribution to ensure distribution efficacy and metadata interoperability. Contents produced by contents providers have become ubiquitous after the emergence of various devices such as IPTV terminal devices and mobile IPTV devices which provide online services. In this service environment, interoperability and sharing of content metadata is an important basis for content distribution.

8.1 Scene-based metadata (SBM) for basic elements

Table 2 describes the scene-based metadata (SBM) for basic elements. This SBM references several basic information items for scene identification and definition.

Table 2 – Scene-based metadata (SBM) for basic elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
SceneID	Identifies the scene	<IDREF>	e.g. "KBS1_T2017-02-01-10", (channel ID-program ID-episode ID-scene order)
SceneOrder	Describes the order of scene	<integer>	e.g. "5", "24"
SceneStartTime	Describes the time when the scene starts playing	<clock-value>	e.g. "00:53:38", "01:05:22"
SceneEndTime	Describes the time when the scene ends playing.	<clock-value>	e.g. "00:43:28", "01:13:45"
SceneDuration	Describes the duration of playing time for the scene.	<integer>	e.g. "45", "234" with the unit of seconds
SceneKeyframeImageURL	Describes the URL of the key frame image representing the scene.	<URL>	e.g. http://52.198.166.6:8000/2016-017-KBS1_T2016-02-01-DescendentOfSun-302/SCENE/CLIP/KBS1_T2016-02-01-02-SCENE_KEYFRAME.jpg
EpisodeID	Identifies the episode containing the scene.	<IDREF>	e.g. "KBS1_T2017-02-01", (channel ID-program ID-episode ID)
ProgramID	Identifies the program containing the scene.	<IDREF>	e.g. "KBS1_T2017-02", (channel ID-program ID)
ChannelID	Identifies the channel containing the scene.	<IDREF>	e.g. "KBS1_T2017", "CNN_T2017", "BBC_T2016"
ProgramName	Identifies the program name of the scene.	<string>	e.g. "Descendant of Sun"
EpisodeNumber	Describes the sequence number of the episode.	<integer>	e.g. 42
SceneTitle	Describes the title of the scene.	<string>	describes a scene with short phrase or sentence
SceneSynopsis	Describes the synopsis of the scene.	<text>	

Table 2 – Scene-based metadata (SBM) for basic elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
SceneSubtitle	Describes the subtitle of the scene	<text>	
SceneSearchKeyword	Describes the keyword for searching the scene.	<string>	Several key words can be defined separately with comma.
HashTag	Describes hash tag for searching a scene.	<string>	e.g. "#Surgery", "#Paris"
SceneURL	Describes the URL of the scene where it is located.	<URL>	e.g. http://52.198.166.6:8000/2016-017-KBS1_T2016-02-01-DescendentOfSun-302/SCENE/CLIP/KBS1_T2016-02-01-02-SCENE_CLIP.mp4
ProgramHomePageURL	Describes the URL of the program homepage where it is located.	<URL>	e.g. http://program.sbs.co.kr/builder/programMainList.do?pgm_id=22000006886
SceneResolution	Describes the resolution of the scene.	<integer>	e.g. 31: 270p 32: 360p 33: 480p 34: 720p 35: 1080p
SceneType	Describes the type of the scene.	<string>	e.g.T2: Trailer T3: studio sketch TZ: video scene TH: Highlights TI: Interview
SceneCategory	Describes the category of the scene.	<integer>	e.g. 10: Drama 20: Entertainment 30: Music 40: current events 50: Education 60: Life 70: Sports 80: Games 90: Child 100: News
SceneSubCategory	Describes the sub-category of the scene.	<integer>	e.g. 71: Baseball 72: Football 73: Basketball

Table 2 – Scene-based metadata (SBM) for basic elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
TargetNation	Describes the nations to which the scene is targeted.	<string>	e.g. KR,JP,CN (The national code conforms to ISO 3166-1 two-character country code.)
TargetAge	Describes the ages to which the scene is targeted.	<integer>	e.g. 0: Allows all ages 7: Allows at least 7 years 12: Allows at least 12 years 15: Allows at least 15 years 19: Allows at least 19 years
CharacterName	Describes the names of characters who are present in the scene.	<string>	e.g. "Si-Jin", "Dae-Yeong"
ActorName	Describes the names of actors who are present in the scene.	<string>	e.g. "Scarlett Ingrid Johansson", "Robert Downey Jr."
ServiceCategory	Describes the category of service that is provided with based on the scene.	<integer>	e.g. 01: Online shopping 02: Location based service 03: Music service
ServiceTimeOffSet	Describes the starting offset of the service.	<clock-value>	e.g. "00:23:13", "01:30:46"
SceneUploadingDate	Describes the date of uploading a scene.	<date>	e.g. "2017-07-02"
BroadcastingDate	Describes the first broadcasting date of its episode	<date>	e.g. 2017-08-25, 2017-09-15
BraodcastingTime	Describes the broadcasting time of the program containing the scene	<clock-value>	e.g. "00:53:38", "01:05:22"
BroadcastingDay	Describes the broadcasting day of the week	<sting>	e.g. "Monday", "Thursday"
CodecType	Describes the type of Codec for the scene.	<string>	e.g. "MPEG2", "MPEG4", "DivX", "WMA", "ASF"
PreviousSceneURL	URL that allows for jumping to the previous scene from the current scene.	<URL>	e.g. http://52.198.166.6: 8000/2016-017- KBS1_T2016-02-01- DescendentOfSun- 302/KBS1_T2016-02- 01-01

Table 2 – Scene-based metadata (SBM) for basic elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
NextSceneURL	URL that allows for jumping to the next scene from the current scene.	<URL>	e.g. http://52.198.166.6:8000/2016-017-KBS1_T2016-02-01-DescendentOfSun-302/KBS1_T2016-02-01-02

8.2 Scene-based metadata (SBM) for location elements

Table 3 describes scene-based metadata (SBM) for location elements. This SBM references several items of location information where the scene is present.

Table 3 – Scene-based metadata (SBM) for location elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
LocationName	Describes the name of the location where the scene is present.	<string>	e.g. "Seoul", "Shanghai", "Tokyo"
LocationAddress	Describes the address of the location where the scene is present.	<string>	e.g. the Street name
LocationURL	Describes the URL of the location linked to the current scene in order to provide more detailed information.	<URL>	e.g. https://www.whitehouse.gov/

8.3 Scene-based metadata (SBM) for music elements

Table 4 describes the scene-based metadata (SBM) for music elements. This SBM references several items of music information where the scene is present.

Table 4 – Scene-based metadata (SBM) for music elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
MusicTitles	Describes the title of the music that is being played in the scene.	<string>	e.g. "You are my everything", "Who are you?"
MusicGenre	Describes the genre of the music that is being played in the scene.	<string>	e.g. "Blues", "Jazz", "Hip hop"
MusicSinger	Describes the singer of the music that is being played in the scene.	<string>	e.g. the Singer name

Table 4 – Scene-based metadata (SBM) for music elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
MusicURL	Describes the URL of the music that is being played as background music in the scene.	<URL>	e.g. "http://music.naver.com/album/index.nhn?albumId=623671", "http://music.naver.com/artist/home.nhn?artistId=419995"
MusicLyrics	Describes the lyrics of the music that is being played as background music in the scene.	<text>	
MusicVideoURL	Describes the URL of the music video that is being played as background music in the scene.	<URL>	e.g. "http://tv.naver.com/v/1943434/list/67096"

8.4 Scene-based metadata (SBM) for object elements

Table 5 describes the scene-based metadata (SBM) for object elements. This SBM references several items of object information where the scene is present.

Table 5 – Scene-based metadata (SBM) for object elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
ObjectID	Identifies the object.	<IDREF>	
ObjectName	Describes the name of the object that is bound to the present scene.	<string>	e.g. "Homeo table", "INO earrings"
ObjectCategory	Describes the category of the object that is bound to the present scene.	<string>	e.g. "Bag", "Clothing", "Accessory"
ObjectBrand	Describes the brand of the object that is bound to the present scene.	<string>	e.g. "Jtiara", "Paul's Boutique"
ObjectCompany	Describes the company of the object that is bound to the present scene.	<string>	e.g. "S&K global",
ObjectNumber	Describes the number of the object that is bound to the present scene.	<string>	e.g. the Singer name
ObjectColor	Describes the colour of the object that is bound to the present scene.	<string>	e.g. "White", "Black"
ObjectPrice	Describes the price of the object that is bound to the present scene.	<string>	e.g. "\$45.6", "\$690"
ObjectImageURL	Describes the image URL of the object that is bound to the present scene.	<URL>	e.g. "http://www.ssg.com/item/itemView.ssg?itemId=0000004553455&siteNo=6004&salestrNo=6005"

Table 5 – Scene-based metadata (SBM) for object elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
ObjectSteelCutImageURL	Describes the steel cut image of the object that is bound to the present scene.	<URL>	e.g. The Thumbnail image
ObjectShoppinURL	Describes the shopping URL of the object that is bound to the present scene.	<URL>	e.g. online shopping homepage website.
ObjectReleaseDate	Describes the released date of the object that is bound to the present scene.	<date>	e.g. 2017-05-25, 2016-09-14
ObjectCountry	Describes the manufacturing country of the object that is bound to the present scene.	<string>	e.g. "KR" or "Korea"
ObjectSize	Describes the size of the object that is bound to the present scene.	<string>	e.g. "width" and "height" (real size)
WearOnActorName	Describes the name of actor who wears the object.	<string>	e.g. "Hye-kyo Song", "Joon-ki Song"
WearOnActorRoleName	Describes the role name of actor who wears the object	<string>	e.g. "Mo-yeon Kang", "Si-jin Rue"

8.5 Scene-based metadata (SBM) for statistics elements

Table 6 describes the scene-based metadata (SBM) for statistics elements. This SBM references several items of statistics information where the scene is present.

Table 6 – Scene-based metadata (SBM) for statistics elements

Element / Attribute	Definition/Semantics	Support/type	Remarks
ClickCount	Describes the number of visits to the scene.	<integer>	e.g. 34,498, 456,789
GoodRatingCount	Describes the number giving a positive evaluation of the scene.	<integer>	e.g. 792,345, 330,901
BadRatingCount	Describes the number giving a negative evaluation of the scene.	<integer>	e.g. 832,316, 140,508

9 SBM management functions

This clause describes metadata management functions of SBM for a media service platform that allows an operator to access to metadata and video contents.

Figure 6 shows the IPTV terminal device (TD) functional architecture recommended in [ITU-T H.720] updated for the scene delivery client functions that include basic scene, location, music, object and statistics information.

According to [ITU-T H.720], the media client functions are implicitly described in clause 9.1.1 of [ITU-T Y.1910]. The content delivery client function has responsibility for the content reception, and its logically related function, the content delivery function, has content processing functionalities such as transcoding. Therefore, media client functions are located in content delivery client functions.

According to [ITU-T H.720], the media control functional entity controls video and audio components and other components such as de-multiplexing, encoding, metadata handling, content storing and play/reproduction of content including streaming data.

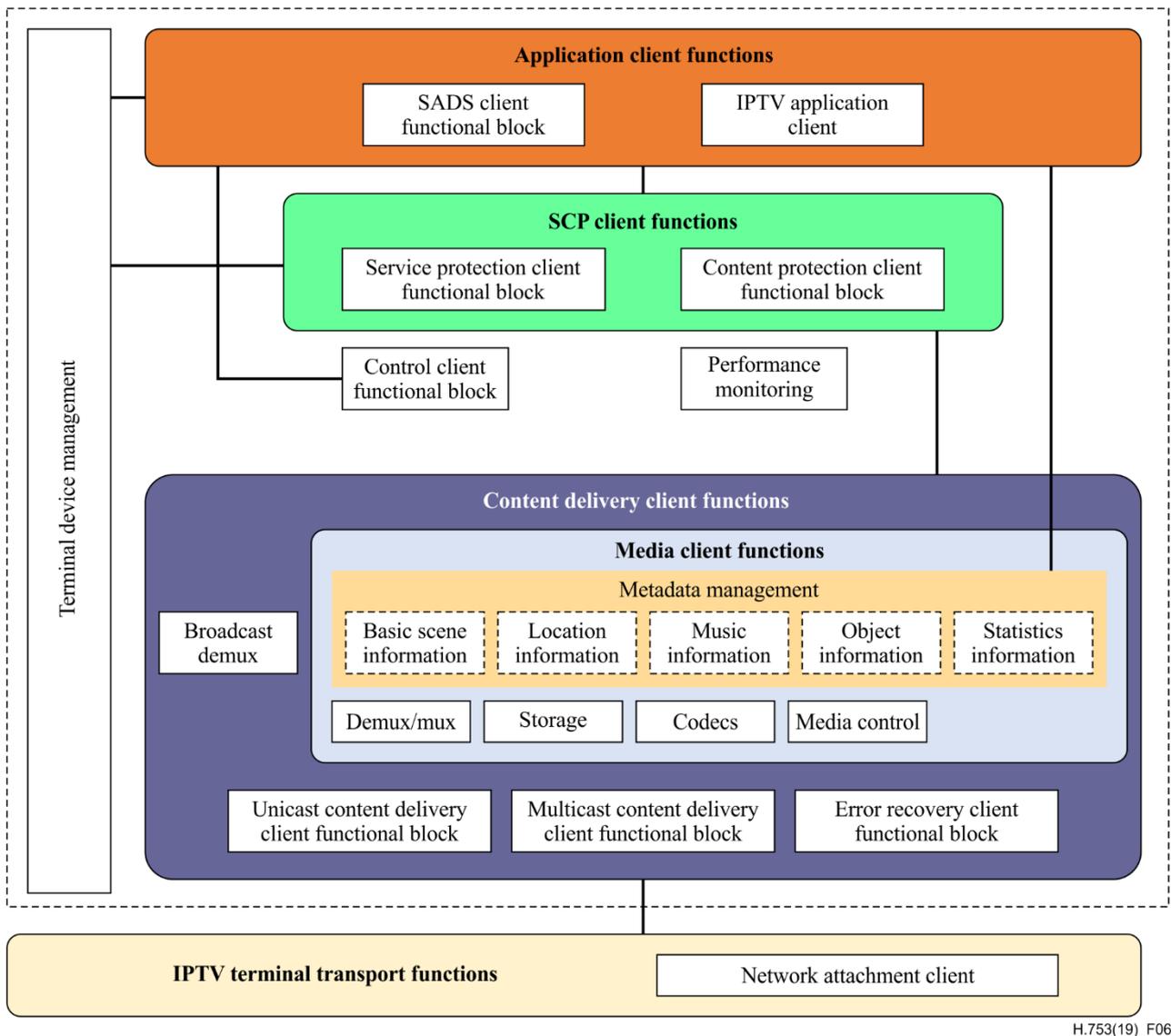


Figure 6 – Updated functional architecture block diagram of IPTV terminal devices for scene-based IPTV services

9.1 Basic scene information functions

Basic scene information functions are the functions between SBM service platform and client-side SBM applications.

The requesting and providing of the basic scene information between IPTV TD and content or service provider, or between the IPTV network and IPTV TD are performed through these interfaces.

Tables 7 to 42 show function parameters and function return values. The 'M' and 'O' in the 'Support' column of returned values tables denote 'mandatory' and 'optional' respectively.

9.1.1 Whole program retrieval function (ProgramList)

ProgramList is the function for requesting the whole program list that a content or service provider can deliver through IP network.

The content or service provider can provide a channel ID, a program ID or episode ID through this interface.

Table 7 – Parameter of the ProgramList function

Parameter	Description	Type
None	There is no parameter for this function.	

Table 8 – Returned values of the ProgramList function

Returned value	Description	Type	Support
[[Denotes the starting of the list.		
ProgramID	Identifies the program containing the scene.	<IDREF>	M
ProgramName	Identifies the program name of the scene.	<string>	M
ChannelID	Identifies the channel containing the scene.	<IDREF>	M
EpisodeCount	Describes the total number of episodes.	<integer>	M
ProgramHomePageURL	Describes the URL of the program homepage where it is located.	<URL>	O
TargetNation	Describes the nations to which the scene is targeted.	<string>	O
TargetAge	Describes the ages to which the scene is targeted.	<string>	O
}, ...]	Denotes the set of the returned values that is repeated and the ending of the list.		

9.1.2 Whole episode retrieval function (EpisodeList)

EpisodeList is the function for requesting the whole episode list that the content or service provider can deliver through IP network.

The content or service provider can provide an episode ID or sequence number of the episode.

Table 9 – Parameter of the EpisodeList function

Parameter	Description	Type
ProgramID	Identifies the program containing the scene.	<string>

Table 10 – Returned values of the EpisodeList function

Returned value	Description	Type	Support
[[Denotes the starting of the list.		
EpisodeID	Identifies the episode containing the scene.	<IDREF>	M
BroadcastingDate	Describes the first broadcasting date of its episode.	< date>	O
BroadcastingTime	Describes the broadcasting time of the program containing the scene.	<clock-value>	O
storyline	Describes the story of the corresponding episode.	<text>	O
}, ...]	Denotes the set of the returned values is repeated and the ending of the list.		

9.1.3 Whole scene retrieval function (SceneList)

SceneList is the function for requesting the whole scene ID list of a specific episode that the content or service provider can deliver through IP network.

The content or service provider can provide scene ID, the order of scene, or the title of the scene.

Table 11 – Parameter of the SceneList function

Parameter	Description	Type
EpisodeID	Identifies the episode containing the scene.	<IDREF>

Table 12 – Returned values of the SceneList function

Returned value	Description	Type	Support
[[Denotes the starting of the list.		
SceneID	Identifies the scene.	<IDREF>	M
SceneTitle	Describes the title of the scene.	< string >	O
SceneOrder	Describes the order of scene.	< integer >	M
}, ...]	Denotes the set of the returned values is repeated and the ending of the list.		

9.1.4 SBM of a specific episode retrieval function (SceneListByEpisodeID)

SceneListByEpisodeID is the function for requesting SBM of a specific episode that the content or service provider can deliver through IP network.

The content or service provider can provide an ID, a title, a synopsis, an URL of a key image, an order, etc. of the scene for the requested episode through this interface.

Table 13 – Parameter of the SceneListByEpisodeID function

Parameter	Description	Type
EpisodeID	Identifies the episode containing the scene.	<IDREF>

Table 14 – Returned values of the SceneListByEpisodeID function

Returned value	Description	Type	Support
[[Denotes the starting of the list.		
SceneID	Identifies the scene.	<IDREF>	M
SceneTitle	Describes the title of the scene.	<string>	O
SceneOrder	Describes the order of scene.	<integer>	M
SceneStartTime	Describes the time when the scene starts playing.	<clock-value>	M
SceneEndTime	Describes the time when the scene ends playing.	<clock-value>	M
SceneDuration	Describes the duration of playing time for the scene.	<integer>	M

Table 14 – Returned values of the SceneListByEpisodeID function

Returned value	Description	Type	Support
SceneKeyFrameImageURL	Describes the URL of the key frame image representing the scene.	<URL>	O
SceneURL	Describes the URL of the scene where it is located.	<URL>	O
SceneResolution	Describes the resolution of the scene.	< integer>	O
SceneType	Describes the type of the scene.	< string>	O
PreviousSceneURL	URL that allows for jumping to the previous scene from the current scene.	<URL>	O
NextSceneURL	URL that allows for jumping to the next scene from the current scene.	<URL>	O
ServiceCategory	Describes the category of service that is provided with based on the scene.	<integer>	O
}, ...]	Denotes the set of the returned values is repeated and the ending of the list.		

9.1.5 SBM of a specific scene retrieval function (SceneBySceneID)

SceneBySceneID is the function for requesting SBM of a specific scene ID that the content or service provider can deliver through IP network.

Table 15 – Parameter of the SceneBySceneID function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>

Table 16 – Returned values of the SceneBySceneID function

Returned value	Description	Type	Support
SceneOrder	Describes the order of scene.	<integer>	M
SceneStartTime	Describes the time when the scene starts playing.	<clock-value>	M
SceneEndTime	Describes the time when the scene ends playing.	<clock-value>	M
SceneDuration	Describes the duration of playing time for the scene.	<integer>	M
SceneKeyframeImageURL	Describes the URL of the key frame image representing the scene.	<URL>	O
EpisodeID	Identifies the episode containing the scene.	<IDREF>	M
ProgramID	Identifies the program containing the scene.	<IDREF>	M
ChannelID	Identifies the channel containing the scene.	<IDREF>	M
ProgramName	Identifies the program name of the scene.	<string>	O
EpisodeNumber	Describes the sequence number of the episode.	<integer>	O
SceneTitle	Describes the title of the scene.	<string>	O

Table 16 – Returned values of the SceneBySceneID function

Returned value	Description	Type	Support
SceneSynopsis	Describes the synopsis of the scene.	<text>	O
SceneSubtitle	Describes the subtitle of the scene.	<text>	O
SceneSearchKeyword	Describes the keyword for searching the scene.	<string>	O
HashTag	Describes hash tag for searching a scene.	<string>	O
SceneURL	Describes the URL of the scene where it is located.	<URL>	O
ProgramHomePageURL	Describes the URL of the program homepage where it is located.	<URL>	O
SceneResolution	Describes the resolution of the scene.	<integer>	O
SceneType	Describes the type of the scene.	<string>	O
SceneCategory	Describes the category of the scene.	<integer>	O
SceneSubCategory	Describes the sub-category of the scene.	<integer>	O
TargetNation	Describes the nations to which the scene is targeted.	<string>	O
TargetAge	Describes the ages to which the scene is targeted.	<integer>	O
CharacterName	Describes the names of characters who are present in the scene.	<string>	O
ActorName	Describes the names of actors who are present in the scene.	<integer>	O
ServiceCategory	Describes the category of service that is provided with based on the scene.	<clock-value>	O
ServiceTimeOffSet	Describes the starting offset of the service.	<date>	O
SceneUploadingDate	Describes the date of uploading a scene.	<date>	O
BroadcastingDate	Describes the first broadcasting date of its episode.	<date>	O
BraodcastingTime	Describes the broadcasting time of the program containing the scene.	<clock-value>	O
BroadcastingDay	Describes the broadcasting day of the week.	<string>	O
CodecType	Describes the type of Codec for the scene.	<string>	O
PreviousSceneURL	URL that allows for jumping to the previous scene from the current scene.	<URL>	O
NextSceneURL	URL that allows for jumping to the next scene from the current scene.	<URL>	O

9.1.6 Whole SBM retrieval function (SceneList)

SceneList is the function for requesting of the whole SBM that the content or service provider can deliver through IP network.

All SBM sets and scenes that are stored in a SBM service platform can be provided through this interface.

Table 17 – Parameter of the SceneList function

Parameter	Description	Type
EpisodeID	Identifies the episode containing the scene.	<IDREF>

Table 18 – Returned values of the SceneList function

Returned value	Description	Type	Support
[[Denotes the starting of the list.		
SceneID	Identifies the scene.	<IDREF>	M
SceneTitle	Describes the title of the scene.	<string>	O
SceneSubtitle	Describes the subtitle of the scene.	<text>	
SceneOrder	Describes the order of the scene.	<integer>	M
SceneKeyFrameImageURL	Describes the URL of the key frame image representing the scene.	<URL>	O
SceneType	Describes the type of the scene.	<string>	O
}, ...]	Denotes the set of the returned values is repeated and the ending of the list.		

9.1.7 SBM of a specific time retrieval function (SceneByTime)

SceneByTime is the function for requesting the SBM for a specific time of a scene that the content or service provider can deliver through IP network.

The specified time can be a relative time interval from starting playing time.

Table 19 – Parameter of the SceneByTime function

Parameter	Description	Type
ProgramID	Identifies the program containing the scene.	<IDREF>
EpisodeID	Identifies the episode containing the scene.	<IDREF>
ServiceTime	Specifies the time that is in the interval of a specific scene to be searched.	<clock-value>

Table 20 – Returned values of the SceneByTime function

Returned value	Description	Type	Support
SceneID	Identifies the scene.	<IDREF>	M
SceneOrder	Describes the order of scene.	<integer>	M
SceneStartTime	Describes the time when the scene starts playing..	<clock-value>	M
SceneEndTime	Describes the time when the scene ends playing.	<clock-value>	M
SceneDuration	Describes the duration of playing time for the scene.	<integer>	M
SceneKeyframeImageURL	Describes the URL of the key frame image representing the scene.	<URL>	O

Table 20 – Returned values of the SceneByTime function

Returned value	Description	Type	Support
EpisodeID	Identifies the episode containing the scene.	<IDREF>	M
ProgramID	Identifies the program containing the scene.	<IDREF>	M
ChannelID	Identifies the channel containing the scene.	<IDREF>	M
ProgramName	Identifies the program name of the scene.	<string>	O
EpisodeNumber	Describes the sequence number of the episode.	<integer>	M
SceneTitle	Describes the title of the scene.	<string>	O
SceneSynopsis	Describes the synopsis of the scene.	<text>	O
SceneSubtitle	Describes the subtitle of the scene.	<text>	O
SceneSearchKeyword	Describes the keyword for searching the scene.	<string>	O
HashTag	Describes hash tag for searching a scene.	<string>	O
SceneURL	Describes the URL of the scene where it is located.	<URL>	O
ProgramHomePageURL	Describes the URL of the program homepage where it is located.	<URL>	O
SceneResolution	Describes the resolution of the scene.	<integer>	O
SceneType	Describes the type of the scene.	<string>	O
SceneCategory	Describes the category of the scene.	<integer>	O
SceneSubCategory	Describes the sub-category of the scene.	<integer>	O
TargetNation	Describes the nations to which the scene is targeted.	<string>	O
TargetAge	Describes the ages to which the scene is targeted.	<integer>	O
CharacterName	Describes the names of characters who are present in the scene.	<string>	O
ActorName	Describes the names of actors who are present in the scene.	<integer>	O
ServiceCategory	Describes the category of service that is provided with based on the scene.	<clock-value>	O
ServiceTimeOffSet	Describes the starting offset of the service.	<date>	O
SceneUploadingDate	Describes the date of uploading a scene.	<date>	O
BroadcastingDate	Describes the first broadcasting date of its episode.	<date>	O
BraodcastingTime	Describes the broadcasting time of the program containing the scene.	<clock-value>	O
BroadcastingDay	Describes the broadcasting day of the week.	<string>	O
CodecType	Describes the type of Codec for the scene.	<string>	O
PreviousSceneURL	URL that allows for jumping to the previous scene from the current scene.	<URL>	O
NextSceneURL	URL that allows for jumping to the next scene from the current scene.	<URL>	O

9.1.8 Scene list with a specific keyword retrieval function (SceneListByKeyword)

SceneListByKeyword is the function for requesting the scene list with a specific keyword that the content or service provider can deliver through IP network.

The keyword can be manually produced or automatically generated by a metadata generator.

Table 21 – Parameter of the SceneListByKeyword function

Parameter	Description	Type
SceneSearchKeyword	Describes the keyword for searching the scene.	<string>

Table 22 – Returned values of the SceneListByKeyword function

Returned value	Description	Type	Support
[[Denotes the starting of the list.		
ProgramID	Identifies the program containing the scene.	<IDREF>	M
EpisodeID	Identifies the episode containing the scene.	<IDREF>	M
SceneID	Identifies the scene.	<IDREF>	M
SceneTitle	Describes the title of the scene.	<string>	O
SceneOrder	Describes the order of scene.	<integer>	M
SceneStartTime	Describes the time when the scene starts playing.	<clock-value>	M
SceneEndTime	Describes the time when the scene ends playing.	<clock-value>	M
SceneDuration	Describes the duration of playing time for the scene.	<integer>	M
SceneKeyFrameImageURL	Describes the URL of the key frame image representing the scene.	<URL>	O
SceneURL	Describes the URL of the scene where it is located.	<URL>	O
SceneResolution	Describes the resolution of the scene.	<integer>	O
SceneType	Describes the type of the scene.	<string>	O
PreviousSceneURL	URL that allows for jumping to the previous scene from the current scene.	<URL>	O
NextSceneURL	URL that allows for jumping to the next scene from the current scene.	<URL>	O
}, ...]	Denotes the set of the returned values is repeated and the ending of the list.		

9.1.9 Related scene retrieval function (SimilarSceneList)

SimilarSceneList is the function for requesting the related scene for a specific scene that the content or service provider can deliver through IP network.

The content or service provider can provide SBM of several similar scenes through this interface.

Table 23 – Parameter of the SimilarSceneList function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>

Table 24 – Returned values of the SimilarSceneList function

Returned value	Description	Type	Support
[[Denotes the starting of the list.		
SceneID	Identifies the scene.	<IDREF>	M
SceneOrder	Describes the order of scene.	<integer>	M
SceneKeyframeImageURL	Describes the URL of the key frame image representing the scene.	<IDREF>	O
SceneTitle	Describes the title of the scene.	<string>	O
SceneURL	Describes the URL of the scene where it is located.	<IDREF>	O
Similar_scene_ID	Represents list of identifier information of similar scenes.	<IDREF>	M
}, ...]	Denotes the set of the returned values is repeated and the ending of the list.		

9.1.10 Most related SBM retrieval function (BestSceneList)

BestSceneList is the function for requesting of the most related scene for a specific scene that the content or service provider can deliver through IP network.

The content or service provider can provide SBM of most similar scenes through this interface.

Table 25 – Parameter of the BestSceneList function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>
ProgramID	Identifies the program containing the scene.	<IDREF>
EpisodeID	Identifies the episode containing the scene.	<IDREF>
BestSceneNumber	Specifies the number of most similar scene searches.	<integer>

Table 26 – Returned values of the BestSceneList function

Returned value	Description	Type	Support
[[Denotes the starting of the list.		
SceneID	Identifies the scene.	<IDREF>	M
EpisodeID	Identifies the episode containing the scene.	<IDREF>	M
ProgramID	Identifies the program containing the scene.	<IDREF>	M
RankingNumber	Represents the sequence number of similarity.	<integer>	M
SceneOrder	Describes the order of scene.	<integer>	M
SceneTitle	Describes the title of the scene.	<string>	O
SceneKeyFrameImageURL	Describes the URL of the key frame image representing the scene.	<IDREF>	O
SceneUploadingDate	Describes the date of uploading a scene.	<date>	O
SceneSearchKeyword	Describes the keyword for searching the scene.	<string>	O
ClickCount	Describes the number of visits to the scene.	<integer>	O

Table 26 – Returned values of the BestSceneList function

Returned value	Description	Type	Support
GoodRatingCount	Describes the number giving a good evaluation of the scene.	<integer>	O
BadRatingCount	Describes the number giving a bad evaluation of the scene.	<integer>	O
}, ...]	Denotes the set of the returned values is repeated and the ending of the list.		

9.1.11 URL of scene clip retrieval function (SceneClipBySceneID)

SceneClipBySceneID is the function for requesting the URL of a specific scene clip that the content or service provider can deliver through IP network.

The content or service provider can provide an URL or a path of the scene clip through this interface.

Table 27 – Parameter of the SceneClipBySceneID function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>

Table 28 – Returned values of the SceneClipBySceneID function

Returned value	Description	Type	Support
ProgramID	Identifies the program containing the scene.	<IDREF>	M
EpisodeID	Identifies the episode containing the scene.	<IDREF>	M
SceneID	Identifies the scene.	<IDREF>	M
SceneOrder	Describes the order of scene.	<integer>	M
SceneTitle	Describes the title of the scene.	<string>	O
SceneSynopsis	Describes the synopsis of the scene.	<text>	O
SceneStartTime	Describes the time when the scene starts playing.	<clock-value>	M
SceneEndTime	Describes the time when the scene ends playing.	<clock-value>	M
SceneDuration	Describes the duration of playing time for the scene.	<integer>	M
SceneKeyFrameImageURL	Describes the URL of the key frame image representing the scene.	<URL>	O
SceneURL	Describes the URL of the scene where it is located.	<URL>	O
SceneResolution	Describes the resolution of the scene.	< integer>	O
SceneType	Describes the type of the scene.	< string>	O
PreviousSceneURL	URL that allows for jumping to the previous scene from the current scene.	<URL>	O

Table 28 – Returned values of the SceneClipBySceneID function

Returned value	Description	Type	Support
NextSceneURL	URL that allows for jumping to the next scene from the current scene.	<URL>	O
ServiceCategory	Describes the category of service that is provided with based on the scene.	<integer>	O

9.1.12 URL of scene key frame image retrieval function (KeyFrameImageBySceneID)

KeyFrameImageBySceneID is the function for requesting the URL of a specific scene key frame that the content or service provider can deliver through IP network.

The content or service provider can provide an URL or a path of the scene key frame through this interface.

Table 29 – Parameter of the KeyFrameImageBySceneID function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>

Table 30 – Returned values of the KeyFrameImageBySceneID function

Returned value	Description	Type	Support
SceneKeyframeImageURL	Describes the URL of the key frame image representing the scene.	<URL>	M

9.1.13 Title of a specific scene retrieval function (SceneTitleBySceneID)

SceneTitleBySceneID is the function for requesting the title of a specific scene that the content or service provider can deliver through IP network.

Table 31 – Parameter of the SceneTitleBySceneID function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>

Table 32 – Returned values of the SceneTitleBySceneID function

Returned value	Description	Type	Support
SceneTitle	Describes the title of the scene.	<string>	M
SceneSynopsis	Describes the synopsis of the scene.	<text>	O
SceneSubtitle	Describes the subtitle of the scene.	<text>	O
HashTag	Describes hash tag for searching a scene.	<string>	O
SceneCategory	Describes the category of the scene.	<integer>	O
SceneSubCategory	Describes the sub-category of the scene.	<integer>	O
ServiceCategory	Describes the category of service that is provided with based on the scene.	<integer>	O
ChannelID	Identifies the channel containing the scene.	<IDREF>	O

9.2 Location information functions

9.2.1 Location information meta retrieval function (LocationMetaBySceneID)

LocationMetaBySceneID is the function for requesting the location information for a specific scene that the content or service provider can deliver through IP network.

The content or service provider can provide the name, the address and the URL of the location through this interface.

Table 33 – Parameter of the LocationMetaBySceneID function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>

Table 34 – Returned values of the LocationMetaBySceneID function

Returned value	Description	Type	Support
LocationName	Describes the name of location where the scene is present.	<string>	O
LocationAddress	Describes the address of location where the scene is present.	<string>	O
LocationURL	Describes the URL of the location linked to the current scene in order to provide more detail information.	<URL>	O

9.3 Music information functions

9.3.1 Music information meta retrieval function (MusicMetaBySceneID)

MusicMetaBySceneID is the function for requesting the music information for a specific scene that the content or service provider can deliver through IP network.

The content or service provider can provide the title, the artist and the URL of the music through this interface.

Table 35 – Parameter of the MusicMetaBySceneID function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>

Table 36 – Returned values of the MusicMetaBySceneID function

Returned value	Description	Type	Support
MusicTitles	Describes the title of the music that is being played in the scene.	<string>	O
MusicGenre	Describes the genre of the music that is being played in the scene.	<string>	O
MusicSinger	Describes the singer of the music that is being played in the scene.	<string>	O

Table 36 – Returned values of the MusicMetaBySceneID function

Returned value	Description	Type	Support
MusicURL	Describes the URL of the music that is being played as background music in the scene.	<URL>	O
MusicLyrics	Describes the lyrics of the music that is being played as background music in the scene.	<text>	O
MusicVideoURL	Describes the URL of the music video that is being played as background music in the scene.	<URL>	O

9.4 Object information functions

9.4.1 Object information meta retrieval function (ObjectBySceneID)

ObjectBySceneID is the function for requesting the object information for a specific scene that the content or service provider can deliver through IP network.

The content or service provider can provide the object ID, the name, the colour and the size of the object through this interface.

Table 37 – Parameter of the ObjectBySceneID function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>
ProgramID	Identifies the program containing the scene.	<IDREF>
EpisodeID	Identifies the episode containing the scene.	<IDREF>

Table 38 – Returned values of the ObjectBySceneID function

Returned value	Description	Type	Support
SceneID	Identifies the scene.	<IDREF>	O
ObjectID	Identifies the object.	<IDREF>	O
ObjectName	Describes the name of object that is bound to the present scene.	<string>	O
ObjectCategory	Describes the category of object that is bound to the present scene.	<string>	O
ObjectColor	Describes the colour of object that is bound to the present scene.	<string>	O
ObjectSize	Describes the size of object that is bound to the present scene.	<string>	O

9.4.2 SBM of a specific object retrieval function (SceneWithObject)

SceneWithObject is the function for requesting the SBM for a specific object that the content or service provider can deliver through IP network.

The content or service provider can provide the scene ID, the title and the starting time of the scene through this interface.

Table 39 – Parameter of the SceneWithObject function

Parameter	Description	Type
ObjectID	Identifies the object.	<IDREF>
ProgramID	Identifies the program containing the scene.	<IDREF>
EpisodeID	Identifies the episode containing the scene.	<IDREF>

Table 40 – Returned values of the SceneWithObject function

Returned value	Description	Type	Support
SceneID	Identifies the scene.	<IDREF>	O
SceneKeyFrameImageURL	Describes the URL of the key frame image representing the scene.	<URL>	O
SceneOrder	Describes the order of scene.	<integer>	O
SceneTitle	Describes the title of the scene.	<string>	O
SceneSynopsis	Describes the synopsis of the scene.	<text>	O
SceneDuration	Describes the duration of playing time for the scene.	<integer>	O
SceneURL	Describes the URL of the scene where it is located.	<URL>	O

9.5 Statistics information functions

9.5.1 Statistics information meta retrieval function (StasticsMetaBySceneIDList)

StasticsMetaBySceneIDList is the function for requesting the statistics information for a specific scene that the content or service provider can deliver through IP network.

The content or service provider can provide the number of visits, the number giving a positive evaluation and the number giving a negative evaluation of the scene through this interface.

Table 41 – Parameter of the StasticsMetaBySceneIDList function

Parameter	Description	Type
SceneID	Identifies the scene.	<IDREF>

Table 42 – Returned values of the StasticsMetaBySceneIDList function

Returned value	Description	Type	Support
ClickCount	Describes the number of visits to the scene.	<integer>	O
GoodRatingCount	Describes the number of making a good evaluation of the scene.	<integer>	O
BadRatingCount	Describes the number of making a bad evaluation of the scene.	<integer>	O

Appendix I

Examples of SBM for IPTV overall workflow with Recommendation ITU-T H.753

(This appendix does not form an integral part of this Recommendation.)

I.1 Use case 1: Scene-based VOD clip service workflow

These days consumers view TV programmes or movies on the new emerging smart devices such as smart phones or tablets instead of traditional TV. In addition, watching a video on demand (VOD) clip instead of a full video is a new trend.

Figure I.1 shows a use case of a scene-based VOD clip service.

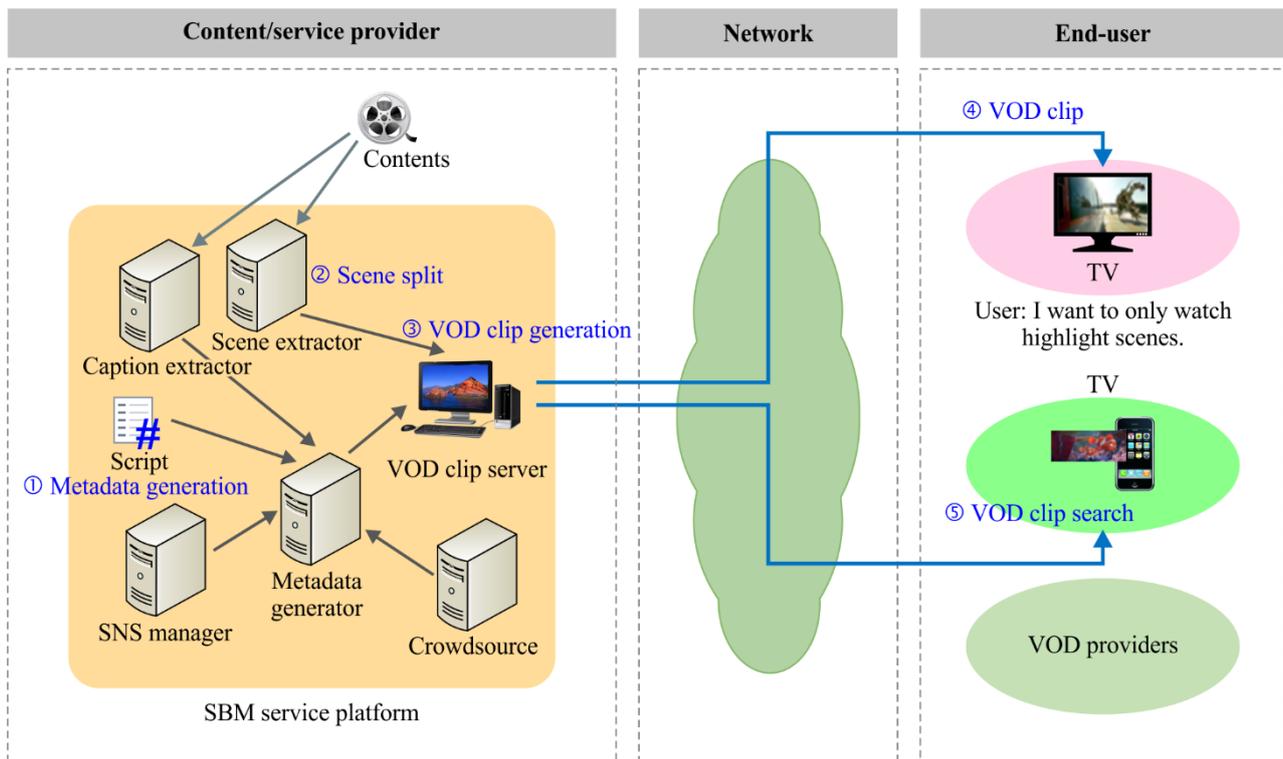
Step 1: A metadata generator generates SBM by using a script, crowdsourced data and the scene information.

Step 2: The scene extractor divides broadcast contents into a series of shots and it then binds the scenes with semantic units from script analysis.

Step 3: The VOD clip server encodes the split scenes into VOD clips and can generate a video story expressed with a story graph.

Step 4: The contents and the VOD clips are provided to a user via an IPTV network.

Step 5: A user can search a VOD clip on the second screen device.



H.753(19)_FI.1

Figure I.1 – Scene-based VOD clip service

I.2 Use case 2: Scene-based additional service workflow

While consumers watch a TV programme on a traditional TV they survey or search additional information on the second screen. Operators can provide additional services such as product advertisement and mesh-up services using SBM.

Figure I.2 shows a use case of a scene-based additional service.

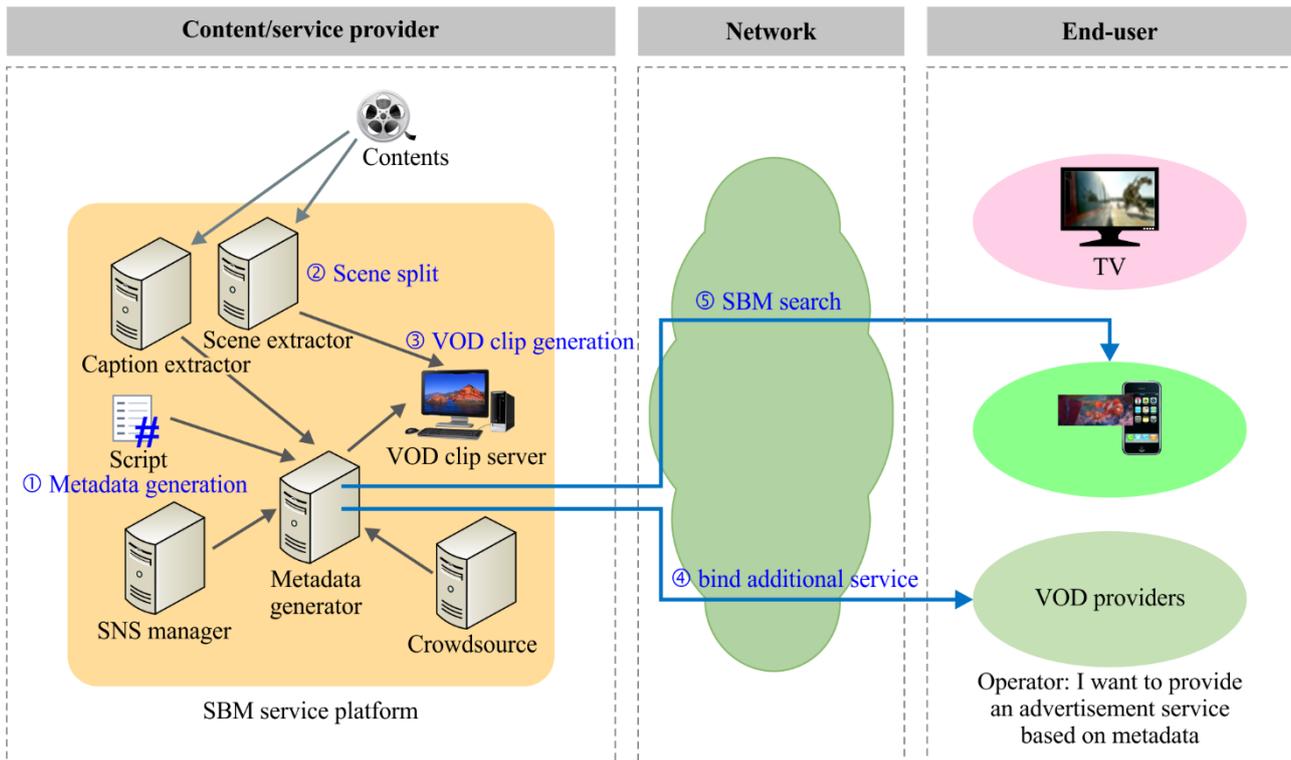
Step 1: A metadata generator generates SBM by using a script, crowdsourced data and the scene information.

Step 2: The scene extractor divides broadcast contents into a series of shots and then it binds the scenes with semantic units from script analysis.

Step 3: The VOD clip server encodes the split scenes into VOD clips and can generate a video story expressed with a story graph.

Step 4: The operators binds an additional service based on the SBM.

Step 5: A user can search a SBM and additional service on the second screen device.



H.753(19)_Fl.2

Figure I.2 – Scene-based additional service

Appendix II

An example of web-based APIs for scene-based metadata service

(This appendix does not form an integral part of this Recommendation.)

As can be seen in Figure II.1, a web-based API for media service allows client-side SBM applications to access an SBM service platform. The APIs can request basic scene information, location information, music information, and object information in the scene through the APIs, which are described with restful service description language (RSDL).

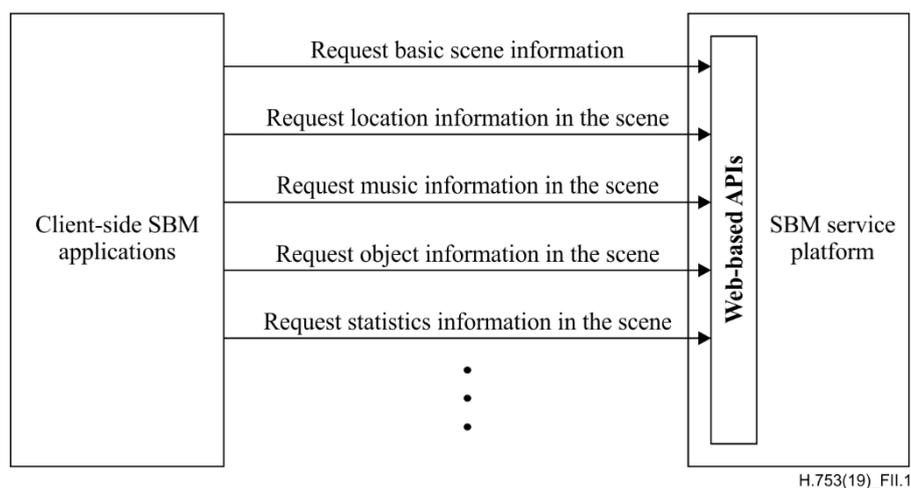


Figure II.1 – Example of web-based API for IPTV services

RSDL is an XML vocabulary for designing and documenting hypermedia-driven RESTful services. RSDL takes a purist hypermedia-driven approach to REST design, requiring that a service have a single entry point and focusing the design on resources, links and media types.

II.1 Basic scene information functions

II.1.1 Whole programme retrieval function: ProgramList

```
<link rel="get" href="/api/ProgramList">
  <request>
    <http_method>GET</http_method>
  </request>
  <responses>
    <response_set>
      <response type="IDREF">
        <name>ProgramID</name>
      </response>
      <response type="string">
        <name>ProgramName</name>
      </response>
      <response type="IDREF">
        <name>ChannelID</name>
      </response>
      <response type="integer">
        <name>EpisodeCount</name>
      </response>
      <response type="URL">
        <name>ProgramHomePageURL</name>
      </response>
      <response type="string">
        <name>TargetNation</name>
      </response>
    </response_set>
  </responses>
</link>
```

```

        </response>
        <response type="string">
            <name>TargetAge</name>
        </response>
        <response type="array">
            <name>ActorName</name>
            <name>CharacterName</name>
        </response>
    </response_set>
</responses>
</link>

```

II.1.2 Whole episode retrieval function: EpisodeList

```

<link rel="get" href="/api/EpisodeList">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>ProgramID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="IDREF">
        <name>EpisodeID</name>
      </response>
      <response type="date">
        <name>BroadcastingDate</name>
      </response>
      <response type="clock-value">
        <name>BroadcastingTime</name>
      </response>
      <response type="text">
        <name>storyline</name>
      </response>
    </response_set>
  </responses>
</link>

```

II.1.3 Whole scene retrieval function: SceneList

```

<link rel="get" href="/api/SceneList">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>EpisodeID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="IDREF">
        <name>SceneID</name>
      </response>
      <response type="string">
        <name>SceneTitle</name>
      </response>
      <response type="integer">
        <name>SceneOrder</name>
      </response>
    </response_set>
  </responses>
</link>

```

```

        </response>
      </response_set>
    </responses>
  </link>

```

II.1.4 SBM of a specific episode retrieval function: SceneListByEpisodeID

```

<link rel="get" href="/api/scene/meta/SceneListByEpisodeID">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>EpisodeID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="IDREF">
        <name>SceneID</name>
      </response>
      <response type="string">
        <name>SceneTitle</name>
      </response>
      <response type="integer">
        <name>SceneOrder</name>
      </response>
      <response type="clock-value">
        <name>SceneStartTime</name>
      </response>
      <response type="clock-value">
        <name>SceneEndTime</name>
      </response>
      <response type="integer">
        <name>SceneDuration</name>
      </response>
      <response type="URL">
        <name>SceneKeyFrameImageURL</name>
      </response>
      <response type="URL">
        <name>SceneURL</name>
      </response>
      <response type="integer">
        <name>SceneResolution</name>
      </response>
      <response type="string">
        <name>SceneType</name>
      </response>
      <response type="URL">
        <name>PreviousSceneURL</name>
      </response>
      <response type="URL">
        <name>NextSceneURL</name>
      </response>
      <response type="integer">
        <name>ServiceCategory</name>
      </response>
    </response_set>
  </responses>
</link>

```

II.1.5 SBM of a specific scene retrieval function: SceneBySceneID

```

<link rel="get" href="/api/scene/meta/SceneBySceneID">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>SceneID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="IDREF">
        <name>SceneID</name>
      </response>
      <response type="integer">
        <name>SceneOrder</name>
      </response>
      <response type="clock-value">
        <name>SceneStartTime</name>
      </response>
      <response type="clock-value">
        <name>SceneEndTime</name>
      </response>
      <response type="integer">
        <name>SceneDuration</name>
      </response>
      <response type="URL">
        <name>SceneKeyframeImageURL</name>
      </response>
      <response type="IDREF">
        <name>EpisodeID</name>
      </response>
      <response type="IDREF">
        <name>ProgramID</name>
      </response>
      <response type="IDREF">
        <name>ChannelID</name>
      </response>
      <response type="string">
        <name>ProgramName</name>
      </response>
      <response type="integer">
        <name>EpisodeNumber</name>
      </response>
      <response type="string">
        <name>SceneTitle</name>
      </response>
      <response type="text">
        <name>SceneSynopsis</name>
      </response>
      <response type="text">
        <name>SceneSubtitle</name>
      </response>
      <response type="string">
        <name>SceneSearchKeyword</name>
      </response>
      <response type="string">
        <name>HashTag</name>
      </response>
      <response type="URL">
        <name>SceneURL</name>
      </response>
    </response_set>
  </responses>
</link>

```

```

    <response type="URL">
      <name>ProgramHomePageURL</name>
    </response>
    <response type="integer">
      <name>SceneResolution</name>
    </response>
    <response type="string">
      <name>SceneType</name>
    </response>
    <response type="integer">
      <name>SceneCategory</name>
    </response>
    <response type="integer">
      <name>SceneSubCategory</name>
    </response>
    <response type="string">
      <name>TargetNation</name>
    </response>
    <response type="integer">
      <name>TargetAge</name>
    </response>
    <response type="string">
      <name>CharacterName</name>
    </response>
    <response type="string">
      <name>ActorName</name>
    </response>
    <response type="integer">
      <name>ServiceCategory</name>
    </response>
    <response type="clock-value">
      <name>ServiceTimeOffSet</name>
    </response>
    <response type="date">
      <name>SceneUploadingDate</name>
    </response>
    <response type="date">
      <name>BroadcastingDate</name>
    </response>
    <response type="clock-value">
      <name>BraodcastingTime</name>
    </response>
    <response type="sting">
      <name>BroadcastingDay</name>
    </response>
    <response type="string">
      <name>CodecType</name>
    </response>
    <response type="URL">
      <name>PreviousSceneURL</name>
    </response>
    <response type="URL">
      <name>NextSceneURL</name>
    </response>
  </response_set>
</responses>
</link>

```

II.1.6 Whole SBM retrieval function: SceneList

```

<link rel="get" href="/api/scene/SceneList">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>

```

```

        <parameter type="IDREF" required="true">
            <name>EpisodeID</name>
        </parameter>
    </parameters_set>
</url>
</request>
<responses>
    <response_set>
        <response type="IDREF">
            <name>SceneID</name>
        </response>
        <response type="string">
            <name>SceneTitle</name>
        </response>
        <response type="text">
            <name>SceneSubtitle</name>
        </response>
        <response type="integer">
            <name>SceneOrder</name>
        </response>
        <response type="URL">
            <name>SceneKeyFrameImageURL</name>
        </response>
        <response type="string">
            <name>SceneType</name>
        </response>
    </response_set>
</responses>
</link>

```

II.1.7 SBM of a specific time retrieval function: SceneByTime

```

<link rel="get" href="/api/scene/meta/SceneByTime">
    <request>
        <http_method>GET</http_method>
        <url>
            <parameters_set>
                <parameter type="IDREF" required="true">
                    <name>ProgramID</name>
                </parameter>
                <parameter type="IDREF" required="true">
                    <name>EpisodeID</name>
                </parameter>
                <parameter type="clock-value" required="true">
                    <name>ServiceTime</name>
                </parameter>
            </parameters_set>
        </url>
    </request>
    <responses>
        <response_set>
            <response type="IDREF">
                <name>SceneID</name>
            </response>
            <response type="integer">
                <name>SceneOrder</name>
            </response>
            <response type="clock-value">
                <name>SceneStartTime</name>
            </response>
            <response type="clock-value">
                <name>SceneEndTime</name>
            </response>
            <response type="integer">
                <name>SceneDuration</name>
            </response>
        </response_set>
    </responses>
</link>

```

```

</response>
<response type="URL">
  <name>SceneKeyframeImageURL</name>
</response>
<response type="IDREF">
  <name>EpisodeID</name>
</response>
<response type="IDREF">
  <name>ProgramID</name>
</response>
<response type="IDREF">
  <name>ChannelID</name>
</response>
<response type="string">
  <name>ProgramName</name>
</response>
<response type="integer">
  <name>EpisodeNumber</name>
</response>
<response type="string">
  <name>SceneTitle</name>
</response>
<response type="text">
  <name>SceneSynopsis</name>
</response>
<response type="text">
  <name>SceneSubtitle</name>
</response>
<response type="string">
  <name>SceneSearchKeyword</name>
</response>
<response type="string">
  <name>HashTag</name>
</response>
<response type="URL">
  <name>SceneURL</name>
</response>
<response type="URL">
  <name>ProgramHomePageURL</name>
</response>
<response type="integer">
  <name>SceneResolution</name>
</response>
<response type="string">
  <name>SceneType</name>
</response>
<response type="integer">
  <name>SceneCategory</name>
</response>
<response type="integer">
  <name>SceneSubCategory</name>
</response>
<response type="string">
  <name>TargetNation</name>
</response>
<response type="integer">
  <name>TargetAge</name>
</response>
<response type="string">
  <name>CharacterName</name>
</response>
<response type="string">
  <name>ActorName</name>
</response>

```

```

    <response type="integer">
      <name>ServiceCategory</name>
    </response>
    <response type="clock-value">
      <name>ServiceTimeOffSet</name>
    </response>
    <response type="date">
      <name>SceneUploadingDate</name>
    </response>
    <response type="date">
      <name>BroadcastingDate</name>
    </response>
    <response type="clock-value">
      <name>BraodcastingTime</name>
    </response>
    <response type="sting">
      <name>BroadcastingDay</name>
    </response>
    <response type="string">
      <name>CodecType</name>
    </response>
    <response type="URL">
      <name>PreviousSceneURL</name>
    </response>
    <response type="URL">
      <name>NextSceneURL</name>
    </response>
  </response_set>
</responses>
</link>

```

II.1.8 Scene list with a specific keyword retrieval function: SceneListByKeyword

```

<link rel="get" href="/api/scene/SceneListByKeyword">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="string" required="true">
          <name>SceneSearchKeyword</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="IDREF">
        <name>ProgramID</name>
      </response>
      <response type="IDREF">
        <name>EpisodeID</name>
      </response>
      <response type="IDREF">
        <name>SceneID</name>
      </response>
      <response type="string">
        <name>SceneTitle</name>
      </response>
      <response type="integer">
        <name>SceneOrder</name>
      </response>
      <response type="clock-value">
        <name>SceneStartTIme</name>
      </response>
      <response type="clock-value">

```

```

        <name>SceneEndTime</name>
    </response>
    <response type="integer">
        <name>SceneDuration</name>
    </response>
    <response type="URL">
        <name>SceneKeyFrameImageURL</name>
    </response>
    <response type="URL">
        <name>SceneURL</name>
    </response>
    <response type="integer">
        <name>SceneResolution</name>
    </response>
    <response type="string">
        <name>SceneType</name>
    </response>
    <response type="URL">
        <name>PreviousSceneURL</name>
    </response>
    <response type="URL">
        <name>NextSceneURL</name>
    </response>
</response_set>
</responses>
</link>

```

II.1.9 Related scene retrieval function: SimilarSceneList

```

<link rel="get" href="/api/scene/SimilarSceneList">
    <request>
        <http_method>GET</http_method>
        <url>
            <parameters_set>
                <parameter type="IDREF" required="true">
                    <name>SceneID</name>
                </parameter>
            </parameters_set>
        </url>
    </request>
    <responses>
        <response_set>
            <response type="IDREF">
                <name>SceneID</name>
            </response>
            <response type="integer">
                <name>SceneOrder</name>
            </response>
            <response type="URL">
                <name>SceneKeyframeImageURL</name>
            </response>
            <response type="string">
                <name>SceneTitle</name>
            </response>
            <response type="URL">
                <name>SceneURL</name>
            </response>
            <response type="array">
                <name>Similar_scene_ID</name>
            </response>
        </response_set>
    </responses>
</link>

```

II.1.10 Most related SBM retrieval function: BestSceneList

```
<link rel="get" href="/api/scene/BestSceneList">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>SceneID</name>
        </parameter>
        <parameter type="IDREF" required="true">
          <name>ProgramID</name>
        </parameter>
        <parameter type="IDREF" required="true">
          <name>EpisodeID</name>
        </parameter>
        <parameter type="integer" required="true">
          <name>BestSceneNumber</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="IDREF">
        <name>SceneID</name>
      </response>
      <response type="IDREF">
        <name>EpisodeID</name>
      </response>
      <response type="IDREF">
        <name>ProgramID</name>
      </response>
      <response type="integer">
        <name>RankingNumber</name>
      </response>
      <response type="integer">
        <name>SceneOrder</name>
      </response>
      <response type="string">
        <name>SceneTitle</name>
      </response>
      <response type="URL">
        <name>SceneKeyFrameImageURL</name>
      </response>
      <response type="date">
        <name>SceneUploadingDate</name>
      </response>
      <response type="string">
        <name>SceneSearchKeyword</name>
      </response>
      <response type="integer">
        <name>ClickCount</name>
      </response>
      <response type="integer">
        <name>GoodRatingCount</name>
      </response>
      <response type="integer">
        <name>BadRatingCount</name>
      </response>
    </response_set>
  </responses>
</link>
```

II.1.11 URL of scene clip retrieval function: SceneClipBySceneID

```
<link rel="get" href="/api/scene/SceneClipBySceneID">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>SceneID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="IDREF">
        <name>ProgramID</name>
      </response>
      <response type="IDREF">
        <name>EpisodeID</name>
      </response>
      <response type="IDREF">
        <name>SceneID</name>
      </response>
      <response type="integer">
        <name>SceneOrder</name>
      </response>
      <response type="string">
        <name>SceneTitle</name>
      </response>
      <response type="text">
        <name>SceneSynopsis</name>
      </response>
      <response type="clock-value">
        <name>SceneStartTime</name>
      </response>
      <response type="clock-value">
        <name>SceneEndTime</name>
      </response>
      <response type="integer">
        <name>SceneDuration</name>
      </response>
      <response type="URL">
        <name>SceneKeyFrameImageURL</name>
      </response>
      <response type="URL">
        <name>SceneURL</name>
      </response>
      <response type="integer">
        <name>SceneResolution</name>
      </response>
      <response type="string">
        <name>SceneType</name>
      </response>
      <response type="URL">
        <name>PreviousSceneURL</name>
      </response>
      <response type="URL">
        <name>NextSceneURL</name>
      </response>
      <response type="integer">
        <name>ServiceCategory</name>
      </response>
    </response_set>
  </responses>
</link>
```

</link>

II.1.12 URL of scene key frame image retrieval function: KeyFrameImageBySceneID

```
<link rel="get" href="/api/scene/KeyFrameImageBySceneID">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>SceneID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="URL">
        <name>SceneKeyframeImageURL</name>
      </response>
    </response_set>
  </responses>
</link>
```

II.1.13 Title of a specific scene retrieval function: SceneTitleBySceneID

```
<link rel="get" href="/api/scene/SceneTitleBySceneID">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>SceneID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response type="string">
      <name>SceneTitle</name>
    </response>
    <response type="text">
      <name>SceneSynopsis</name>
    </response>
    <response type="text">
      <name>SceneSubtitle</name>
    </response>
    <response type="string">
      <name>HashTag</name>
    </response>
    <response type="integer">
      <name>SceneCategory</name>
    </response>
    <response type="integer">
      <name>SceneSubCategory</name>
    </response>
    <response type="integer">
      <name>ServiceCategory</name>
    </response>
    <response type="IDREF">
      <name>ChannelID</name>
    </response>
  </responses>
</link>
```

II.2 Location information functions

II.2.1 Location information meta retrieval function: LocationMetaBySceneID

```
<link rel="get" href="/api/scene/LocationMetaBySceneID">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>SceneID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response type="string">
      <name>LocationName</name>
    </response>
    <response type="string">
      <name>LocationAddress</name>
    </response>
    <response type="URL">
      <name>LocationURL</name>
    </response>
  </responses>
</link>
```

II.3 Music information functions

II.3.1 Music information meta retrieval function: MusicMetaBySceneID

```
<link rel="get" href="/api/scene/MusicMetaBySceneID">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>SceneID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response type="string">
      <name>MusicTitles</name>
    </response>
    <response type="string">
      <name>MusicGenre</name>
    </response>
    <response type="string">
      <name>MusicSinger</name>
    </response>
    <response type="URL">
      <name>MusicURL</name>
    </response>
    <response type="text">
      <name>MusicLyrics</name>
    </response>
    <response type="URL">
      <name>MusicVideoURL</name>
    </response>
  </responses>
</link>
```

II.4 Object information functions

II.4.1 Object information meta retrieval function: ObjectBySceneID

```
<link rel="get" href="/api/scene/ObjectBySceneID">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>SceneID</name>
        </parameter>
        <parameter type="IDREF" required="true">
          <name>ProgramID</name>
        </parameter>
        <parameter type="IDREF" required="true">
          <name>EpisodeID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="IDREF">
        <name>SceneID</name>
      </response>
      <response type="IDREF">
        <name>ObjectID</name>
      </response>
      <response type="string">
        <name>ObjectName</name>
      </response>
      <response type="string">
        <name>ObjectCategory</name>
      </response>
      <response type="string">
        <name>ObjectColor</name>
      </response>
      <response type="string">
        <name>ObjectSize</name>
      </response>
    </response_set>
  </responses>
</link>
```

II.4.2 SBM of a specific object retrieval function: SceneWithObject

```
<link rel="get" href="/api/scene/SceneWithObject">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>ObjectID</name>
        </parameter>
        <parameter type="IDREF" required="true">
          <name>EpisodeID</name>
        </parameter>
        <parameter type="IDREF" required="true">
          <name>ProgramID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
```

```

    <response_set>
      <response type="IDREF">
        <name>SceneID</name>
      </response>
      <response type="URL">
        <name>SceneKeyFrameImageURL</name>
      </response>
      <response type="integer">
        <name>SceneOrder</name>
      </response>
      <response type="string">
        <name>SceneTitle</name>
      </response>
      <response type="text">
        <name>SceneSynopsis</name>
      </response>
      <response type="integer">
        <name>SceneDuration</name>
      </response>
      <response type="URL">
        <name>SceneURL</name>
      </response>
    </response_set>
  </responses>
</link>

```

II.5 Statistics information functions

II.5.1 Statistics information meta retrieval function: StatisticsMetaBySceneID

```

<link rel="get" href="/api/scene/meta/StatisticsMetaBySceneID">
  <request>
    <http_method>GET</http_method>
    <url>
      <parameters_set>
        <parameter type="IDREF" required="true">
          <name>SceneID</name>
        </parameter>
      </parameters_set>
    </url>
  </request>
  <responses>
    <response_set>
      <response type="integer">
        <name>ClickCount</name>
      </response>
      <response type="integer">
        <name>GoodRatingCount</name>
      </response>
      <response type="integer">
        <name>BadRatingCount</name>
      </response>
    </response_set>
  </responses>
</link>

```

Appendix III

RSDL schema

(This appendix does not form an integral part of this Recommendation.)

This XML schema is based on Pasternak's work [b-RSDL] and it was adapted to SBM web-based API.

```
<xs:element name="url" type="Url"/>
  <xs:complexType name="Url">
    <xs:sequence>
      <xs:element ref="parameters_set" maxOccurs="unbounded" minOccurs="0">
        <xs:annotation>
          <xs:appinfo>
            <jaxb:property name="ParametersSets"/>
          </xs:appinfo>
        </xs:annotation>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
  <xs:element name="request" type="Request"/>
  <xs:complexType name="Request">
    <xs:sequence>
      <xs:element name="http_method" type="HttpMethod" minOccurs="1"
maxOccurs="1"/>
      <xs:element ref="url" minOccurs="0" maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>
  <xs:simpleType name="HttpMethod">
    <xs:restriction base="xs:string">
      <xs:enumeration value="GET"/>
    </xs:restriction>
  </xs:simpleType>
  <xs:element name="parameter" type="Parameter"/>
  <xs:complexType name="Parameter">
    <xs:complexContent>
      <xs:extension base="BaseResource">
        <xs:sequence>
          <xs:element name="value" type="xs:string" minOccurs="1"
maxOccurs="1"/>
          <xs:element ref="parameters_set" minOccurs="0" maxOccurs="1"/>
        </xs:sequence>
        <xs:attribute name="IDREF" type="xs:string" />
        <xs:attribute name="integer" type="xs:integer" />
        <xs:attribute name="clock-value" type="xs:time" />
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:element name="responses" type="Response"/>
  <xs:complexType name="Response">
    <xs:sequence>
      <xs:element name="response_set" type="ResponseSet" />
    </xs:sequence>
  </xs:complexType>
  <xs:element name="response_set" type="Response"/>
  <xs:complexType name="Response">
    <xs:sequence>
      <xs:element name="response" type="Response" />
    </xs:sequence>
  </xs:complexType>
```

```

<xs:element name="response" type="Response"/>
  <xs:complexType name="Response">
    <xs:sequence>
    </xs:sequence>
  </xs:complexType>
<xs:element name="response_set" type="ResponseSet"/>
  <xs:complexType name="ResponseSet">
    <xs:sequence>
      <xs:element ref="response" maxOccurs="unbounded" minOccurs="0">
        <xs:annotation>
          <xs:appinfo>
            <jaxb:property name="Response"/>
          </xs:appinfo>
        </xs:annotation>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
  <xs:element name="response" type="Response"/>
  <xs:complexType name="Response">
    <xs:complexContent>
      <xs:extension base="BaseResource">
        <xs:sequence>
          <xs:element name="value" type="xs:string" minOccurs="1"
maxOccurs="1"/>
          <xs:element ref="response_set"/>
        </xs:sequence>
        <xs:attribute name="IDREF" type="xs:string" />
        <xs:attribute name="integer" type="xs:integer" />
        <xs:attribute name="clock-value" type="xs:time" />
        <xs:attribute name="URL" type="xs:string" />
        <xs:attribute name="text" type="xs:string" />
        <xs:attribute name="date" type="xs:date" />
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

```

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