# Draft ETSI RTS 182 027 V3.1.3 (2009-01)

*Technical Specification*

**Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Architecture; IPTV functions supported by the IMS subsystem**

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Samsung Electronics America, Inc. et al. v. Koninklijke KPN NV PTAB-IPR2025-00502

Reference
RTS/TISPAN-02070-NGN-R3

Keywords
architecture, IMS, IP, TV

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# Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).



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# 1 Scope

The present document specifies the architecture and functions of an IPTV system that makes use of the NGN IMS architecture and its features, implementing the requirements defined in TS 181 014 [13A] and TS 181 016 [13B].

The present document has taken IPTV solutions defined by other organizations (such as DVB, ATIS IIF etc) into account. It is based on an IMS based architecture and where appropriate the aforementioned solutions are referenced.

By relying on common components the resulting architecture can coexist with other TISPAN NGN services.

# 2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

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## 2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".

[2] ETSI TS 123 506: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Stage 2 description [3GPP TS 23.228 Release 7, modified]".

[3] ETSI ES 282 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".

[4] ETSI TS 133 220: "Universal Mobile Telecommunications System (UMTS); Generic Authentication Architecture (GAA); Generic bootstrapping architecture (3GPP TS 33.220)".

[5] ETSI TS 187 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Security; Security Architecture".



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[6] ETSI TS 102 034: "Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks".

[7] ITU-T Recommendation P.10/G.100 "Vocabulary for performance and quality of service " - New Appendix I - Definition of Quality of Experience (QoE).

[8] ETSI ES 282 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-system (RACS); Functional Architecture".

[9] ETSI TS 183 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN simulation services: Communication Diversion (CDIV); Protocol specification".

[10] ETSI TS 182 008: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Presence Service; Architecture and functional description (Endorsement of 3GPP TS 23.141 and OMA-AD-Presence-SIMPLE-V1-0)".

[11] ETSI ES 282 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture".

[12] Void.

[13] ETSI ES 283 030: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Presence Service Capability; Protocol Specification [3GPP TS 24.141 V7.0.0, modified and OMA-TS-Presence_SIMPLE-V1_0, modified]".

[13A] ETSI TS 181 014: “Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements for network transport capabilities to support IPTV services”.

[13B] ETSI TS 181 016: “Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Service Layer Requirements to integrate NGN services and IPTV”.

[13C] ETSI TS 122 340: ”Universal Mobile Telecommunications System (UMTS); IP Multimedia Subsystem (IMS) messaging; Stage 1 (3GPP TS 22.340 version 7.0.0 Release 7)”.

## 2.2 Informative references

[14] DSL Forum Technical Report TR-126: "Triple-play Services Quality of Experience (QoE) Requirements".

[15] Void.

[16] ETSI ES 282 010: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Charging management Endorsement of 3GPP TS 32.240 Release 7, 3GPP TS 32.260 Release 7, 3GPP TS 32.297 Release 7, 3GPPTS 32.298 Release 7 and 3GPP TS 32.299 Release 7, modified".

[17] ETSI TR 182 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Organization of user data".

[18] ETSI ES 204 915: "Open Service Access (OSA); Application Programming Interface (API); (Parlay 6.0)".

[19] ETSI ES 202 504: " Open Service Access (OSA); Parlay X Web Services; (Parlay X 3)".

[20] 3GPP TS 29.198: "Technical Specification Group Core Network and Terminals; Open Service Access (OSA); Application Programming Interface (API); (Release 7)".

[21] 3GPP TS 29.199: "Technical Specification Group Core Network and Terminals; Open Service Access (OSA); Parlay X Web Services; (Release 7)".



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[22] 3GPP TS 23.002: " Technical Specification Group Services and Systems Aspects; Network Architecture; (Release 8)".

[23] 3GPP TS 23.218: " Technical Specification Group Core Network and Terminals; IP Multimedia (IM) session handling; IM call model; Stage 2 (Release 8)".

[24] 3GPP TR 23.810: " Technical Specification Group Services and System Aspects; Study on Architecture Impacts of Service Brokering; (Release 8)".

[25] Toshiro Nunome; Shuji Tasaka, "An Application–Level QoS Comparison of Inter–Destination Synchronization Schemes for Continuous Media Multicasting", IEICE transactions on communications, ISSN 0916-8516, Vol. 87 (2004), No. 10, pp. 3057-3067 (11).

[26] SCTE-130 part 1: "Advertising Systems Overview".

[27] SCTE-130 part 2: "Core Data Elements".

[28] SCTE-130 part 3: "Ad Management Service interface".

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**content control**: procedure for controlling content delivery (e.g. starting content delivery, playback of content (such as pause, fast and slow playback, reverse playback. rewinding, jumping forwards or backwards), stopping content delivery), and content management (e.g. digital rights management, program scheduling management, delivery management).

**content delivery**: procedure for delivering multimedia contents.

**offset:** value indicating the elapsed time between the beginning of content and the current reading position of the reading cursor in that same streamed content

**park TV:** feature that would enable a user (on a UE) make an impulsive request to record ongoing BC service/programme from a particular point in time

NOTE: This recording point is also referred to as a bookmark.

**park and pickup TV:** feature that would enable a user (on a UE) to Park TV and subsequently Pickup TV

**pickup TV:** feature that would enable a user (on a UE) retrieve or request BC service/programme that was recorded and bookmarked via an impulsive record request

NOTE: The IPTV content can be retrieved from the bookmarked location or recording point on same or different UE at a later point in time.

**programme:** entry in the Electronic Programme Guide

## 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

| | |
|---|---|
| BC | BroadCast |
| CoD | Content on Demand |
| CSF | Content Security Functions |
| ECF | Elementary Control Function |
| EF | Elementary Functions |
| EFF | Elementary Forwarding Function |
| EPG | Electronic Programme Guide |



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| | |
|---|---|
| GAA | Generic Authentication Architecture |
| GBA | Generic Bootstrapping Architecture |
| HD | High Definition |
| IGMP | Internet Group Management Protocol |
| IMS | IP Multimedia Subsystem |
| MCF | Media Control Function |
| MCN | Media Channel Negotiation |
| MDF | Media Delivery Function |
| MF | Media Function |
| MSAS | Media Synchronization Application Server |
| NASS | Network Attachment SubSystem |
| NGN | Next Generation Network |
| N-PVR | Network-Personal Video Recorder |
| PSC | Personalized Stream Composition |
| PVR | Personal Video Recorder |
| QoE | Quality of Experience |
| QoS | Quality Of Service |
| RACS | Resource and Admission Control Subsystem |
| SC | Synchronization Client |
| SCF | Service Control Function |
| SD | Standard Definition |
| SDF | Service Discovery Function |
| SIP | Session Initiation Protocol |
| SLF | Subscription Locator Function |
| SSF | Service Selection Function |
| TPF | Transport Processing Functions |
| UE | User Equipment |
| UPSF | User Profile Server Function |
| URI | Uniform Resource Identifier |
| XDMS | XML Document Management Server |

# 4 High-level overview

Editor's Note: In Release 3, the high level overview architecture might evolve.

Editor's Note: Clarify which part of specification are mandatory and which optional (e.g. in informative annex).

Editor's Note: Clarify what are features and services supported by R2 and which are new in R3.

Editor's Note: Find the best way how to declare in R3 specs backward compatibility with R2 for IPTV specifications is FFS. When there are changes which contradict with R2 specification this should be noted explicitly.



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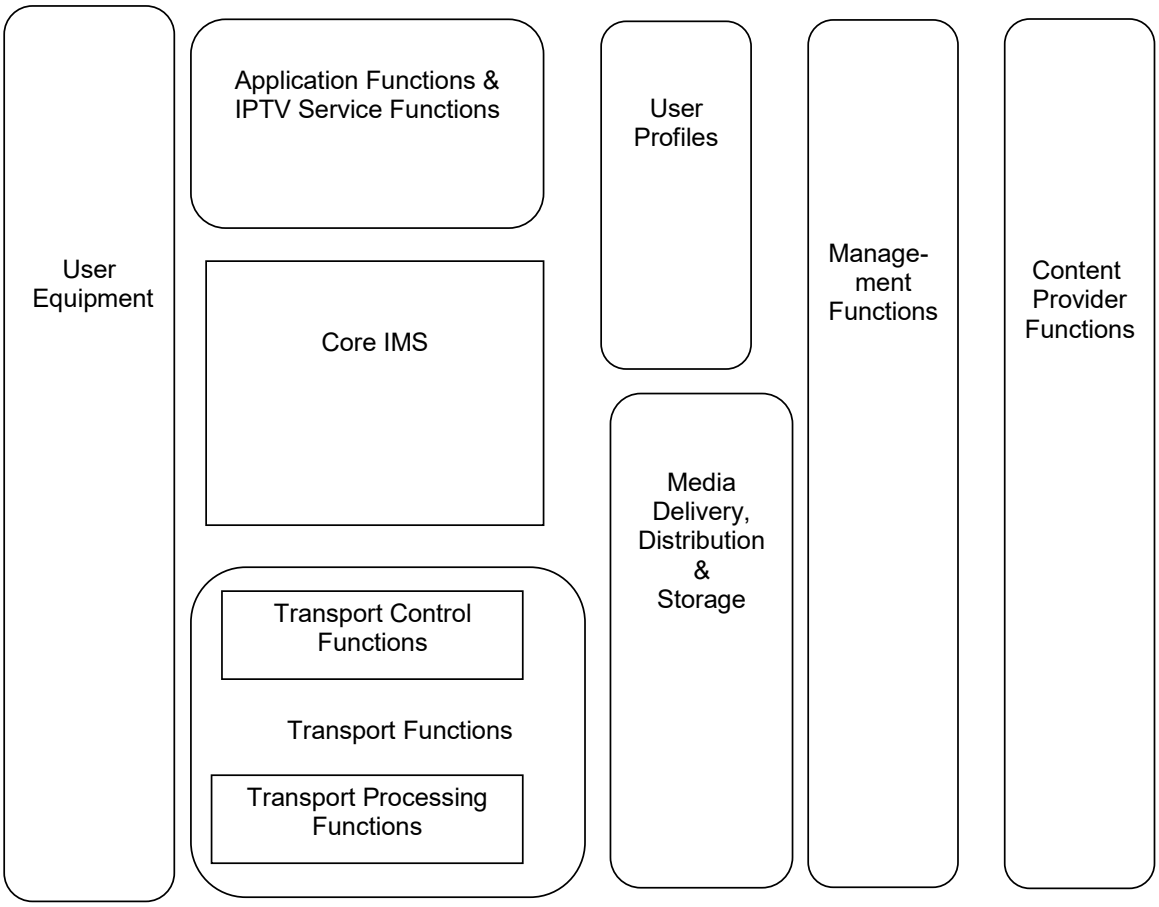


**Figure 1: High level functional architecture for IMS-based IPTV**

NOTE 1: The specification of management functions and content provider functions is considered out of scope of the present document

### User equipment:

**UE**: The IPTV enabled UE terminates the IPTV control and media signals, and displays the corresponding information to the user. The UE interaction with the user allows selection of programme, content, and service descriptions, such as content guides for broadcast and VoD services.

### Application functions & IPTV service functions:

Enables operation of or provides IPTV services. This includes IPTV Service Supporting Functions.

**IPTV Service Supporting Function:** The IPTV Service Supporting Function defined here are those common functions which could support or be used by other IPTV service or applications.

NOTE 2: Examples of IPTV service supporting functions may be Service Discovery and Selection functions.

### User Profiles:

User Profiles includes user data that are involved in providing IPTV services.



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**Core IMS:**

It provides functionality for authentication, authorization, and signalling for the setup of the service provisioning and content delivery. It routes signalling messages to the appropriate application server or triggers the applications based on settings maintained in the UPSF. For resource reservation and admission control this function interacts with the RACS.

**Transport Functions:**

**Transport Control:** contains functions from RACS and NASS. It provides policy control, resource reservation and admission control as well as IP address provisioning, network level user authentication and access network configuration as defined in TISPAN.

**Transport Processing Functions:** represents network access links and IP core. The IP core is in charge of data transmission with quality of service support.

**Media Delivery, Distribution and Storage:**

The Media Delivery, Distribution and storage function receives and stores live feeds and media streams coming into the IPTV System from Content Providers. It is mainly in charge of media processing, delivery, storing, trans-coding and relaying. This function performs all these tasks along with the control of - or feedback to the IPTV Service and Control. Content protection may also be performed here or already protected content could be delivered over these functionalities.

# 5 Overview of functional entities

## 5.1 Functional architecture for IPTV services

### 5.1.1 Functional architecture overview

Editor's Note: In Release 3, the functional architecture might evolve.

The overall functional architecture for IPTV service is shown in figure 2.



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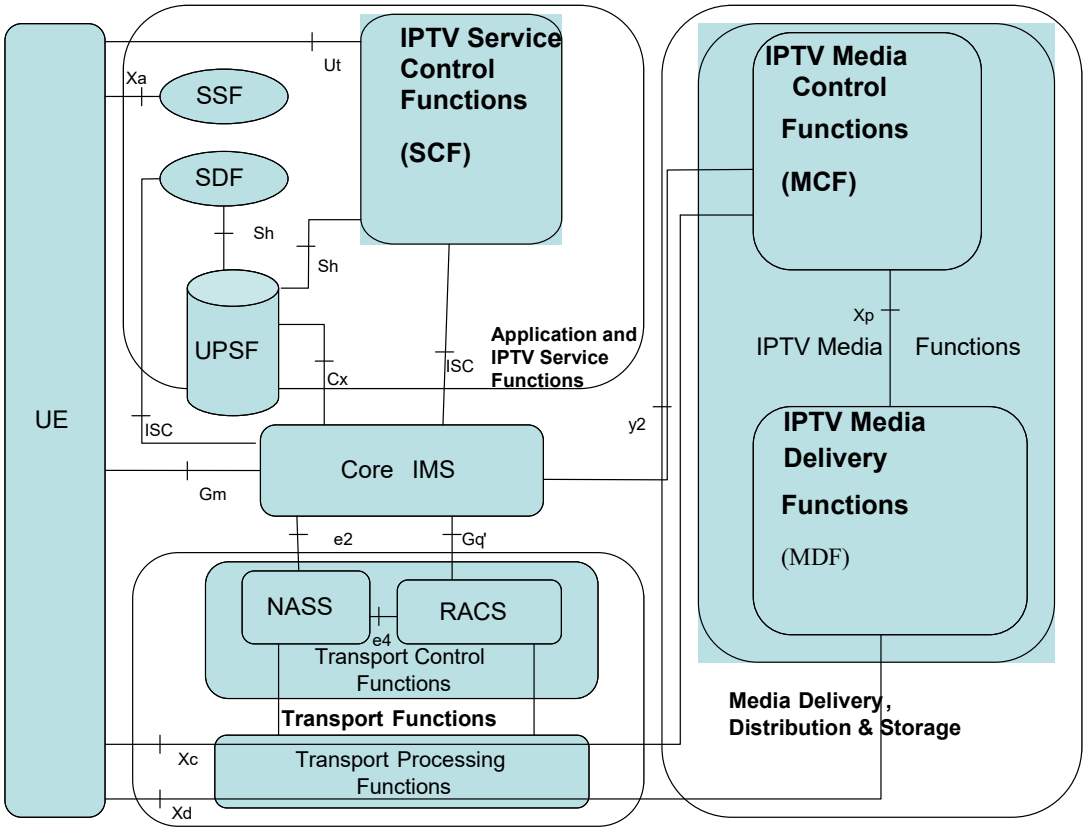


**Figure 2: Functional architecture for IPTV services**

NOTE 1: Only Xc and Xd are explicitly shown as traversing the Transport Processing Functions. For the sake of simplicity other reference points are only shown as end to end.

**In figure 2, the IPTV Service Control Functions, the IPTV Media Functions, the Service Selection Function (SSF) and the Service Discovery Function (SDF) fit in the context of TISPAN NGN Functional Architecture Release 2 [** 1].

NOTE 2: To support the regionalized delivery of content and metadata in accordance with applicable regulations, at least one of the service layer entities involved in the IPTV service should query the UE location from the NASS and enforce the regionalization.

As stated in [2], the IMS architecture shall be based on the principle that the service control for Home subscribed services for a roaming subscriber is in the Home network. This principle shall be applied also in case the IPTV solution supports roaming.

### 5.1.2 IPTV services

Editor's Note: Cover Release 2 and any new Release 3 IPTV services here.

Editor's Note: describe services in a less detailed, more generic way. Move procedural aspects to later part in document. Describe Impact of stage 1 definitions on the architecture on high level



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#### 5.1.2.1 General

IPTV services execution involves three functions: a service control function (SCF), a media control function (MCF) and a media delivery function (MDF).

An SCF may host the logic of one or more of the following services as defined in ETSI TS 181 016:

- Content on Demand (CoD),
- Broadcast (BC),
- Network Personal Video Recorder (N-PVR),
- Consumer Personal Video Recorder (C-PVR),
- User Generated Content (UGC),
- Content Recommendation (CR),
- Push CoD (PC)
- Advertising (Ad)
- Personalized Channel (PCh)
- Personalized Stream Composition (PSC)

Editor's note : this list needs alignment with the services described in stage 1.

The service request/response messages between the UE and the SCF are transferred via the Core IMS. Media Control messages are exchanged between the UE and the MCF via the Xc reference point. Media Data is exchanged between UE and MDF via the Xd reference point.

Editor's Note: The relation of Xc to the BC tasks should be clarified.

For UGC services, media may also be exchanged or streamed between users provided that the control of this media exchange or these media streams lies with the UGC function.

For CR services, the SCF exchanges service request/response messages with the UE directly over the Ut or via the IMS Core as appropriate.

### 5.1.3 Functional entities

Refer to clause 5.1.5

### 5.1.3A Generic Capabilities

Editor's Note: In this section we have the molecules called generic IPTV capabilities which provide list of basic IPTV capabilities provided by IPTV functional architecture and functional elements described in section 5.1.3 and used in procedures and provided IPTV services.

IPTV Generic IPTV Capabilities:

1. service discovery and selection
2. service control
3. service interaction
4. media control
5. media delivery



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6. content protection
7. content management and distribution
8. interactions with other NGN services

### 5.1.4 Elementary functions

Editor's Note: Cover Release 2 and any new Release 3 elementary functions here.

Editor's Note: In this clause we have the atoms called elementary functions. This clause provides a list of basic tasks provided by the IPTV functional architecture and its functional elements described in section 5.1.3 used in IPTV procedures and IPTV services.

General:

1. Network attachment
2. Registration
3. Resource Management
4. Charging information

Editor's Note: The appropriate term for generating charging information is FFS and feedback from SA5 about the correct terminology is required

IPTV elementary functions:

Service related elementary functions

5. service discovery
6. service authorization
7. service selection
8. service initiation
9. service control
10. service information handling (e.g. metadata)
11. service configuration

Session related elementary functions

12. session initiation
13. session modification
14. session termination

Multimedia delivery & control related elementary functions

15. multicast based media delivery (media streaming)
16. unicast based media delivery (media streaming)



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17. content download/upload (offline content transfer)
18. control of multicast based media streaming
19. control of unicast based media streaming)
20. control of content transfer by download/upload
21. content ingestion (receiving content)
22. content recording(capture of live content)
23. content storage
24. content adaptation (e.g. transcoding, mix, substitute, personalize)

Content management related elementary functions

25. content acquisition
26. content validation
27. content distribution

Content protection related elementary functions

28. content licencing
29. content key management
30. content encryption

User data management related elementary functions

31. User profile/data management
32. Accounting/right control

Editor's Note: The appropriate term for credit control is FFS – also interactions with online charging needs to be considered.

IPTV Common elementary functions:

33. Status/state (changes) detection/reporting
34. Common notification
35. Messaging
36. Presence Reporting
37. Inter-destination Media synchronization

#### 5.1.4.1 Content security functions

Content security elementary functions are described in clause 10.2.



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### 5.1.5 Functional Entities

Editor's Note: Cover Release 2 and any new Release 3 functional entities here.

#### 5.1.5.1 Service Discovery and Selection Functions (SDF and SSF)

The Service Discovery Function (SDF) and Service Selection Function (SSF) are functions which provide information necessary to the UE to select an IPTV service.

Tasks of the SDF:

- Generates and/or provides the service attachment information.
- Provides personalized service discovery.

The service attachment information consists of SSF addresses in the form of URIs and/or ip-addresses.

Tasks of the SSF:

- Provides the service selection information, e.g. a list of available services that the UE can then browse and select. The SSF may optionally generate this service selection information. It may also retrieve and forward the service selection information.
  - Provides personalized service selection information and/or information needed to personalize the service selection. This must be delivered via unicast mode. (See note 1 regarding multicast options.)
  - Provides non-personalized service selection data. This can be delivered via multicast or unicast mode.
- Optionally provides service selection presentation information. This presentation information may be personalized when it is delivered over unicast mode. Optionally receives selection request from UE, e.g. an N-PVR content capture request as described in clause 8.5.

NOTE 1: The way the service selection information might be personalized when it is delivered via multicast mode is out of scope for this release. However, specified below is a non exhaustive list of high-level options to achieve such personalization:

- Using the SDF: when processing a request from a particular user/UE, the SDF could redirect the user/UE to specific multicast addresses/SSFs corresponding to the category to which the user belongs. This would imply that users/UEs are classified into specific categories.
- Using the SCF: UE could fetch IPTV user profile information in the form of BC Service ID listings from the SCF. This may be encoded as XML document(s) via the Ut reference point using XCAP-like mechanism or as HTML document with possibly embedded scripts to filter this service selection data. This IPTV user profile information may then be used to locally filter the service selection data that was previously delivered via multicast mode.

NOTE 2: EPG is defined in TS 181 016 [13B].

For each IPTV service, the following data is provided:

- An identifier associated to the IPTV service: this identifier is used by service control functions and media functions to identify the requested content when processing service initiation requests. In case of a CoD service, the identifier identifies exactly one content item. In case of a BC service, the BC identifier, which is the Service Package Id related to BC profile defined in clause 7.3, identifies a set of channels among which the user can switch.
- Optionally the set of network parameters that may be required by the UE to activate a service (e.g. the extra information that may be needed by the UE to establish content delivery channels and content control channels).
- User readable data related to the IPTV service.



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#### 5.1.5.2 IPTV Service Control Functions (SCF)

Tasks of SCF:

- Service authorization during session initiation and session modification, which includes checking IPTV users' profiles in order to allow or deny access to the service.
- Credit limit and credit control (using the on-line charging systems ES 282 010 [16])

In addition, the SCF performs the following tasks depending on type of service supported

- Select the relevant IPTV media functions (see clause 5.2).
- Send relevant notifications to the MF, e.g. for content recommendation service
- For Push CoD Services, initiate media content (e.g. recorded BC program, CoD content) download to UE
- Select appropriate ad content for specific user or user group, based on user profile (e.g. user preference, shopping habits, location information, etc.) and IPTV service status (e.g. current BC program ID, commercial break in BC service or pause during CoD content playback).
- Optionally, contact an external advertising sub-system in order to make ad-selection and ad-placement decisions (see Annex E).
- Send ad insertion indication to MF.
- Instruct the UE to perform trick play commands, e.g. pause a TV channel, CoD or N-PVR stream.
- Initiate BC and/or CoD session to UE for immediate consumption.
- Generate playlist information and communicate it to the MF.
- For Content Recommendation Services, detect CRS event and generate CRS information for specific user or user group, based on user profile (e.g. user preference).
- Detect an event, based on some criteria, trigger relevant internal service logic and send a notification to the UE or other applications associated with the specific user.
- Optionally, for PVR service, initiate the recording of content, e.g. for CPVR service, initiates a notification request to UE to start recording.
- For restricted trick play, acquire restriction policy and transmit to relevant MF.

The SCF is a SIP Application Server (AS).

An IPTV SCF belonging to an IMS network managed by another provider shall not have direct access to user profile data in the UPSF via the Sh reference point; it may however have access to user profile data by other means (e.g. Rg reference point to GUP), depending on the NGN operator's implementation and capabilities.

The SCF may use the IPTV profile in order to customize the user experience. For instance, the list of subscribed BC TV Services could be used to filter the information sent to the UE. The User Equipment communicates with the IPTV Service Control Functions via the Core IMS for the purpose of session management, and may be using the Ut reference point for the purpose of service profile configuration. In the latter case, an authentication proxy may sit between the User Equipment and the SCF.

#### 5.1.5.3 IPTV Media Control and Delivery Functions (MCF and MDF)

IPTV Media Functions are in charge of controlling and delivering the media flows to the UE. They are split into Media Control Functions (MCF) and Media Delivery Functions (MDF).

Tasks of Media Control Function (MCF):

- Handling media flow control of MDF.
- May manage the media processing of MDF.



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- Monitoring the status of MDF.
- Managing interaction with the UE (e.g trick mode commands).
- Handling interaction with the IPTV service control function SCF.
- Keeping an accurate view on status and content distribution related to the different MDFs that it controls.
- Selecting an MDF, in the case an MCF controls multiple MDFs different criteria, may be applicable (as described e.g. for CoD in clause 5.2).
- Selecting MF, return the selection result to SCF and Redirect sessions to the selected MF (e.g. in case the requested content is not available on this MF or for load balancing among MFs).
- Generate charging information, e.g. for end-user charging based on the viewed content.
- Handle ad insertion control of MDF, i.e. control the fetching of the ad content and synchronization between ad content and IPTV content, including accounting for delay or drift in broadcast TV schedules.
- In case of live User Generated Content consumption (TS 181 016 [13B], clause A.13), there is a direct relationship on the media delivery and media control levels between downstreaming and upstreaming UGC sessions, which both terminate at the MCF. The MCF ensures that session descriptions of the downstreaming and upstreaming UGC sessions match. UE's subscribed to the particular Live UGC are notified when this Live UGC starts.

Editor's note: UGC-related SCF tasks are for further study, e.g. identification of UGC content and MCF/MDF selection in case of MDF specialisation.

Tasks of MDF:

- Handling media flows delivery (for delivering multimedia services to user).
- Status reporting to MCF (e.g. reporting on established IPTV media streams).
- Store of media (e.g. CoD assets) and may also store some service information stored with media for IPTV services.
- In particular, it may be used for storage for the most frequently accessed content or user specific content (e.g. recording PVR, Time-shift TV, BC service with Trick mode, user generated content) if the same tasks are not performed by UE.
- May additionally process, encode or transcode (if required) media to different required media formats (e.g. TV resolution depending on terminals capabilities or user preferences).
- May perform content protection functionalities (e.g. content encryption).
- May support content ingestion of IPTV media.

Editor's note: Whether content ingressed to MDF should be in a suitable format for delivery to UE (thus avoiding transcoding) or whether to use transcoding as a preferred option is FFS.

- MDF may act as source for multicast streams of IPTV services e.g. BC or UGC media streams.
- For UGC services, receiving content from UE through an upstreaming/upload media channel .
- May collect QoE reports (e.g. from UE using Xd).
- For Push CoD Services, handling content download (download CoD content to UE or record BC live stream and then download to UE)
- Perform ad insertion during IPTV content playback, i.e. deliver ad content to the UE during the ad insertion time, either exclusively or in parallel with the IPTV content.
- Recognize appropriate in-band /out-of-band Ad insertion indicators (eg-cue messages as defined in ITU-T J.181), when present. These Ad insertion indicators define positions within the IPTV content where



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advertisement content can be inserted /replaced. This task may be done by coordination with an external advertising sub-system.

Editor's note: A more generic term for "Ad insertion indicators" (eg: Ad insertion locations/points) needs to be considered. An alignment of the text with the generic term would be required.

- For personalized stream composition, the MDF may support alternative streams for use with an existing broadcast channel or CoD item, e.g. alternative video, audio or subtitle tracks.

NOTE: To enhance QoE evaluation quality, QoE reports may additionally be collected from other sources than the UE. However, this is beyond the scope of the present document.

To support QoE, the UE may send QoE reports via Xd concerning the quality of the IPTV Media Data received.

Each IPTV Service Control Function uses the ISC reference point to communicate with the NGN Core IMS. As stated in TS 123 506 [2], an Application Server may originate requests to a destination without involving the S-CSCF. This capability should be used in case the SCF is to communicate with the media function without involving the core-IMS.

Each corresponding IPTV Media Function communicates with the UE over Xc and Xd for Media Control and Media Delivery. For each service, the corresponding Media Control entities communicate with the UE on the Xc reference point and control the appropriate Media Data Delivery entities which send the Media Data to the UE on the Xd reference point.

#### 5.1.5.4 UPSF

The UPSF holds the IMS user profile and possibly IPTV specific profile data (see clause 7). It communicates with IPTV Service Control Functions at the Sh reference points and with the Core IMS at the Cx reference point as defined in ES 282 007 [11]. When multiple instances of a UPSF exist, the Core IMS and the IPTV Service Control Functions may use the services of a Subscription Locator Function (SLF) to fetch the address of the UPSF. The SLF communicates with IPTV Service Control Functions at the Dh reference points and with the Core IMS at the Dx reference point as defined in ES 282 007 [11]. For the sake of simplicity the SLF and associated reference points are not shown on figure 2.

NOTE: The IMS principle procedures, such as security, authentication process, are also considered to be applied to this IPTV functional architecture and the procedures, unless explicitly stated otherwise.

#### 5.1.5.5 Transport processing functions

IPTV services make use of generic transport processing functions defined in ES 282 001 [1].

## 5.2 Interactions between Service Control function and Media Functions

Editor's note: the applicability of this clause needs to be clarified.

The relationship between CoD Service Control Function (SCF) and CoD Media Function (MF), composed of Media Control Function and Media Delivery Function, is shown in figure 3.



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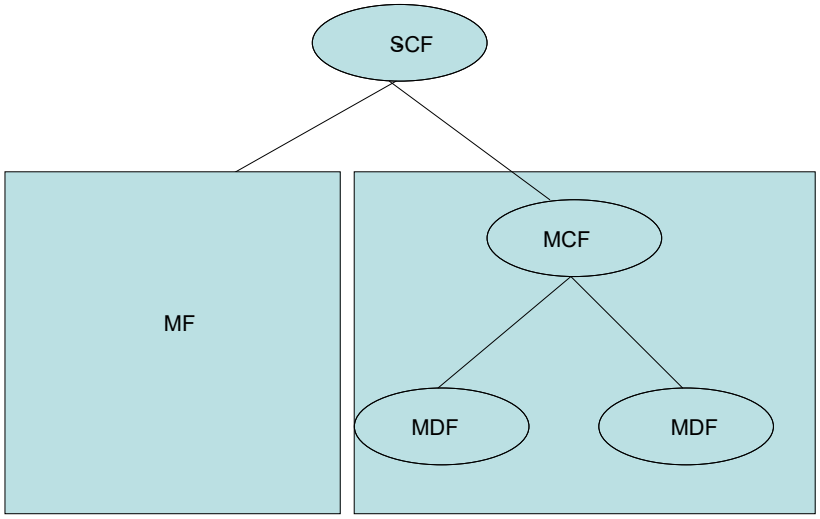


**Figure 3: Relationship between Service Control Function and Media Functions**

The specific MF for a particular session will be determined during the session initiation and resource allocation procedure. This determination may be based on the following criteria:

- Location of the UE.
- Status information of all the available media functions (e.g. online or offline, media processing capability, available resources in the different -MF holding the same contents, etc.).
- Load of the different MF holding the same contents.
- Content identity of the requested content; It is recommended that the structure of the content identifiers be designed so as to facilitate this selection, without requiring parsing the full identifier.

The selection process relies on elementary functions that can be hosted in an SCF and/or an MCF. In the latter case the MCF may act as a redirect server to redirect sessions to another MCF. And in some cases, the selection task of SCF and/or MCF may become very simple. For e.g., if a Request-URI for service/content identifier corresponds to just one MCF, then SCF and/or MCF may just transfer the session to the unique MCF.

NOTE 1: The location of the selection process in a separate entity is out of scope for this release.

NOTE 2: Admission control procedures for use of transport resources at the CoD-MF side are out of scope for this release.

The SCF shall contact the MCF during the session initiation and resource allocation phase. The SCF may contact several MCFs before its determination. TheSCF contacts the MCF via the Core IMS as shown in figure 4.



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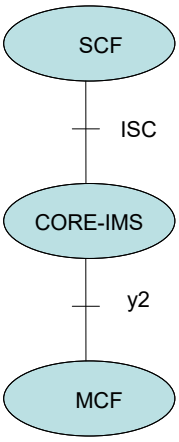


**Figure 4: Reference points between SCF and MCF**

When the MCF is contacted, it shall respond with the parameters offer for the session corresponding to the content required by the UE..

The MCF controls one or several MDFs. Tasks of the MCF are the following:

- Select an MDF.
- Control the media stream resources in the MDFs.
- Interpret information coming from the SCF and control the MDFs accordingly.
- Generate of CDRs.

Selection of the MDF by the MCF uses similar criteria to the selection of a MCF by a SCF. And in some cases, the selection task of MCF may become very simple. For e.g., if a Request-URI for service/content identifier corresponds to just one MDF, then MCF may just transfer the session to the unique MDF. After the MCF has selected a MDF for service, it may communicate with the MDF. If the MDF is not functional for some reason, the MCF may detect this exception, for example, by a local response timeout, and select another MDF with the requested content. If there is no other MDF with the requested content under the MCF's control, it should redirect the service request to another MCF or return an appropriate error message to the SCF.

## 5.3 Void

## 5.4 Inter-destination media synchronization

Inter-destination media synchronization is an optional generic capability, aimed at servicing requiring this capability, see TS 181 016 [13B], Annex A.9.6 for examples. The Media Synchronization Application Server (MSAS) and Synchronization Client (SC) are functions that provide inter-destination media synchronization. These functions are used for synchronization sensitive services for which IPTV delays and delay differences may spoil the quality of experience. The functional entities and reference point of the synchronization mechanism are shown in figure 4A.



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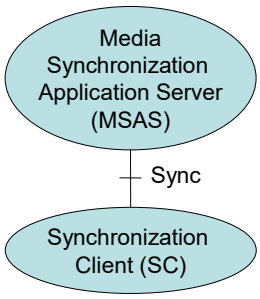


**Figure 4A: Functional entities and reference points for inter-destination media synchronization.**

### 5.4.1 Functional entities MSAS and SC

The inter-destination synchronization mechanism uses the concept of synchronization sessions. Each synchronization session involves a Media Synchronization Application Server (MSAS) and multiple Synchronization Clients (SC). A synchronization session is used for the inter-destination synchronization of a BC channel by exchanging synchronization status information and synchronization settings instructions.

- Synchronization status information: timing information on media reception at each SC.
- Synchronization settings instruction: instruction how much an SC should delay the BC channel.

Editor's note: The use of inter-destination synchronization for CoD and other IPTV services is for further study.

Tasks of the SC:

- Setting up and accepting synchronization sessions with/from the MSAS.
- Sending synchronization status information to the MSAS.
- Receiving synchronization settings instructions from the MSAS.
- Delaying a BC channel according to the received synchronization settings instruction.

Tasks of the MSAS:

- Setting up and accepting synchronization sessions with/from SCs
- Collecting synchronization status information from SCs.
- Calculating synchronization settings instructions for the SCs
- Distributing synchronization settings instructions to SCs.

NOTE: Examples of algorithms to calculate the synchronization settings instructions from collected synchronization status information may be found in [25].

### 5.4.2 Mapping onto the IPTV architecture

The synchronization architecture can be mapped onto the IPTV architecture in the following ways.

Mapping 1: SC in UE.

- The MSAS is an elementary function of the SCF.
- The SC is an elementary function of the UE.
- The Sync reference point is tunnelled over the Gm and ISC reference points.
- Each synchronization session is associated with a BC session.

Mapping 2: SC in Transport



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- The MSAS is an elementary function of the SCF or a stand-alone Application Server.
- The SC is an elementary function of the Transport Functions.

NOTE: Mapping 1 is aimed at small-scale deployments of services that require media synchronization and only a limited number of UEs uses media synchronization. It reuses existing IPTV sessions. Mapping 2 is aimed at large-scale deployment of media synchronization.

# 6 Reference points

Editor's Note: New Reference points may be needed in Release 3, depending on section 5.

## 6.1 UE - SSF (Xa)

This reference point between UE and SSF is used by the UE to make appropriate service selections.

## 6.2 UE - IPTV Service Control Functions (Ut)

This reference point between UE and IPTV Service Control Functions is used by the UE for the purpose of service profile configuration.

Use of the Ut reference point conforms to ES 282 007 [11].

## 6.3 UE - Core IMS (Gm)

Use of the Gm reference point conforms to ES 282 007 [11].

## 6.4 UE - Media Control Functions (Xc)

This Xc reference point (for media control) is a logical end-to-end reference point between the UE and the IPTV Media Control Function that is used to exchange media control messages for controlling the IPTV Media flow.

NOTE: transport related reference points are used to carry media control messages over underlaying transport segment (defined in ES 282 001 [1]) and as shown below in figure 5 depending on the location of the MCF. The Dj reference point between the UE and the access network, the Di reference point between the access network and the core network, and possibly the Ds or Iz reference point between the core network and the Media Control Function if the MCF is located after the Core Network.

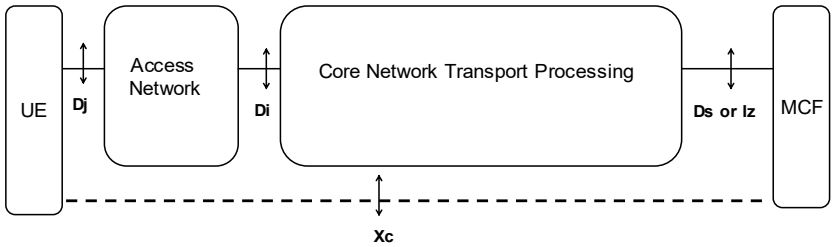


**Figure 5: Decomposition of the Xc reference point when the MCF is after the core network**

## 6.5 UE - Media Delivery Functions (Xd)

This Xd reference point (for media delivery) is a logical end-to-end reference point between the UE and the IPTV Media Delivery Function that is used to deliver media data.



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**NOTE:transport related reference points are used to carry media delivery data over underlaying transport segment (defined in ES 282 001 [**

]) and as shown below in figure 6 depending on the location of the MDF. The Dj reference point between the UE and the access network, the Di reference point between the access network and the core network, and possibly the Ds or Iz reference point between the core network and the Media Delivery Function if the MDF is located after the Core Network.

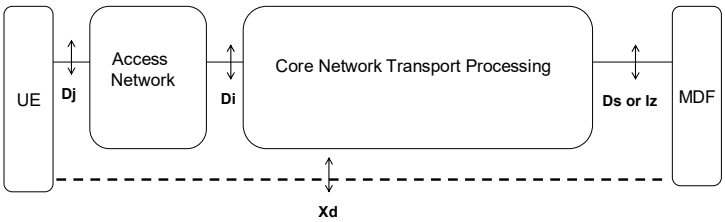


**Figure 6: Decomposition of the Xd reference point**

If the IPTV system architecture supports QoS and/or QoE [7] and [14], this reference point may carry QoS and/or QoE reports from the UE to the MDF. These reports relate to the quality of the IPTV Media Data that the UE receives.

## 6.6 IPTV Service Control Functions (SCF) - UPSF (Sh)

Use of the Sh reference point conforms to ES 282 007 [11].

## 6.7 Core IMS - UPSF (Cx)

Use of the Cx reference point conforms to ES 282 007 [11].

## 6.8 Core IMS - IPTV Service Control Functions (ISC)

Use of the ISC reference point conforms to ES 282 007 [11].

## 6.9 Core IMS - IPTV Media Functions (y2)

This reference point between S-CSCF and IPTV Media Control Function (MCF) carries IPTV Service Control Signalling originating from the IPTV Service Control Function (SCF) to control the MCF.

In case the CSCF and the Media Control Function are in different administrative domains, signalling flows go through an IBCF.

NOTE: As stated in TS 123 506 [2], an Application Server may originate requests to a destination without involving the S-CSCF. This capability should be used in case the SCF is to communicate with the media function without involving the core-IMS, thus omitting y2.

## 6.10 Core IMS - SDF (ISC)

Use of the ISC reference point conforms to ES 282 007 [11].

## 6.11 SDF - UPSF (Sh)

Use of the Sh reference point conforms to ES 282 007 [11].

## 6.12 Void

Void.



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## 6.13 Application Functions - NASS (e2)

Use of the e2 reference point conforms to ES 282 007 [11] and ES 282 004 [3].

NOTE: Application Function entities associated to IPTV services such as core IMS and SCF may query the UE location from the CLF in order to fulfil their tasks.

## 6.14 Core IMS - RACS (Gq')

Use of the Gq' reference point conforms to ES 282 007 [11] and ES 282 003 [8].

## 6.15 NASS - RACS (e4)

Use of the e4 reference point conforms to ES 282 003 [8] and ES 282 004 [3].

## 6.16 IPTV Service Control Functions - SLF (Dh)

Use of the Dh reference point conforms to ES 282 007 [11].

## 6.17 Core IMS - SLF (Dx)

Use of the Dx reference point conforms to ES 282 007 [11].

## 6.18 IPTV Media Control Function - IPTV Media Delivery Function (Xp)

This Xp reference point between the Media Control Function (MCF) and Media Delivery Function is used to control media delivery sessions to support media delivery session setup when content is distributed across one and more media delivery functions.

## 6.19 MSAS-SC reference point (Sync)

This optional reference point is between Media Synchronization Application Server (MSAS) and Synchronization Client (SC). It is used to set up synchronization sessions and to exchange synchronization status information and synchronization settings instructions. The Sync reference point is a logical reference point in Mapping 1 from clause 5.4.2, where it is tunneled tunnelled over the Gm and ISC reference points.

# 7 User data

Editor's Note: Evolution of User data specification may be needed in Release 3, depending on new IPTV services in this Release.

## 7.1 Classification of information

Four categories of user data are involved in providing IPTV services:

- IMS-profile: This category includes all information required to establish IMS sessions and access IPTV services hosted in Application Servers, as described in TR 182 005 [17].
- Communication Services profile: This category encompasses all information associated to communication services (e.g. PSTN/ISDN simulation services, presence services, messaging services…) as defined in relevant ETSI TISPAN standards (e.g. TS 183 004 [9]). This type of information is required in support of combinational services (e.g. Caller Id on TV Screen).



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- IPTV user profile: This category encompasses all information required to operate an IPTV service. This includes all the user settings regarding:
  - Global settings (Language preference, etc.).
  - Broadcast settings.
  - List of subscribed BC service packages. A BC service package is a set of elementary BC TV services, along with a description. These BC services have the same authorization and charging policy. A BC IPTV service is for instance a multicast channel, interactive channel, mosaic that a user may subscribe to.

NOTE: The Broadcast settings only provide a reference to service package and/or associated services that a given IPTV user has subscribed to and is not meant to be a complete description of the service package and/or service. The complete service package and/or service description is available in an associated IPTV Service Profile definition (e.g. described with metadata) . If the list of elementary IPTV services associated with a given service package are not explicitly listed in the IPTV user profile, then it implies that the IPTV user has implicitly subscribed to all of the IPTV services within that service package.

- IPTV User profile information may be used for providing a listing of recommended content to the user based on the user's profile settings
- Content on demand settings (Parental control level, etc.).
- PVR settings (PVR preferences network/local, PVR user restrictions, PVR storage limit).
- UE Settings which includes information related to the capabilities of the UE(s) that an IPTV user is associated with. An IPTV user may be associated with one or more UE(s) and every UE is uniquely identified with a unique UE Identifier (UE ID). The UE capabilities associated with an IPTV user profile may be used for customization of IPTV service selection data that is provided by the SSF to the IPTV user (based on capabilities of the UE that the IPTV user is currently associated with). For instance, an IPTV user on a SD-only device would not be provided with information related to HD services.
- The UE settings is not intended to cover all information related to the UE and currently holds only the UE capabilities attribute since this information may be used by the SSF for personalized service selection. Note that detailed information about the UE may be located elsewhere and can be referenced by the IPTV user profile using the UE ID parameter.
- Further details are provided in clause 7.3.
- IPTV service action data: this category encompasses information related to the actions the user may have taken while accessing services such as BC or CoD (e.g. ordering a CoD - Choosing to pause while viewing a live event ). Those data are required to enable IPTV session portability for the user.
- They include:
  - The list of CoDs that the user has ordered and associated status, CodOffset which is offset in the content where the user has paused and CodOffsetExpiryTime which is expiration time associated with the CodOffset value.
  - The list of BC TV services (or programmes) that the user has paused (and is hence likely to resume later) including the bookmark value associated with the paused BC TV service or Programme and BookMarkExpiryTime which is expiration time associated with the bookmark value.
  - The list of N-PVR contents that the user has asked to be recorded . This would include the following parameters:
    - NPVRContentId: it refers to a content identifier used by the UE to activate an N-PVR session related to the NPVR content.

NOTE: In the case when a specific programme has been requested to be recorded, this ID would be the same as ProgrammeID, and the RecordStartDate and RecordEndDate attributes would be optional.

    - BCServiceId: the identifier of the BC service that is to be recorded.
    - (Optionally)] RecordStartDate: the start date (and time) of the recording.



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- (Optionally) RecordEndDate: the end date (and time) of the recording.
- (Optionally) RecordDescription : a description of the recording made by the user when he/she requested to record the live content.
- RecordStatus: the status of such a recording (requested - scheduled - available - failed).
- RecordOffset : the offset in the NPVR content where the user might have paused while actually watching it.
- RecordOffsetExpiryTime: expiration time associated with the RecordOffset.
- RecordExpiryTime : the expiration time associated with the recording value.

- A Boolean flag, user action recordable, may be associated with IPTV user profile information to indicate if the user wishes to have the service persist such data or not. Further details are provided in clause 7.3.1.6
- The relationships between the IMS profile and the dedicated IPTV user data categories are as follows:
  - IPTV user profile: This profile is associated with an IMS Public user Identity (IMPU). This would enable for instance enforcement of parental control on a per-user basis independent of the device they are using.
  - IPTV service action data: This profile is associated with an IMS Public user Identity (IMPU). This would enable for instance "follow me TV/video" kind of scenarios wherein users can resume the viewing of content on any device that they are authorized to use .

## 7.2 Location and access to user data

Editor's Note: Distribution, synchronization and handling of user data across multiple FEs as well as multiple FEs accessing that data may need further clarification/investigation. This may require involvement of WG8

### 7.2.1 Data management functions

IMS-profile information is managed by the UPSF. Communication Services profile information may be managed by dedicated database functions, the Application Server functions hosting the communication services, or by the UPSF as transparent data (repository function) associated to these Application Server functions. In the first and second case the Application Server function or the stand-alone server may exhibit the behaviour of an XDMS.

IPTV user profile information should be located in the following locations:

- Application Server functions hosting the IPTV applications.
- In a stand-alone server associated with one or more Application Server functions.
- In the UPSF as transparent data associated to these Application Server functions.

The first and second options are recommended for data to be accessed by 3rd party application server functions. In the first and second case the Application Server function or the stand-alone server may exhibit the behaviour of an XDMS.

IPTV service action data needs to be persistent across IPTV sessions, and should be located in the network. They may be located in one of the following locations

- The Application Server functions hosting the IPTV applications.
- A stand-alone server associated with one or more Application Server functions.
- In the UPSF as transparent data associated to these Application Server functions.

In the first and second case the Application Server function or the stand-alone server may exhibit the behaviour of an XDMS.



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### 7.2.2 Access from other application servers

User data stored in the UPSF can be accessed by Application Servers at the Sh reference point.

Direct access to user data stored in Application Servers is outside the scope of the present document. However, part of these data may be indirectly exposed through Web Services and/or SIP Event packages.

### 7.2.3 Access from User Equipment (UE)

A subset of IPTV user-profile information may be accessed from the User Equipment at the Ut reference point.

### 7.2.4 Access from the SSF

For the purpose of personalized service selection, the SSF may need to access user data.

In the case when such user data is stored in the UPSF, it can be accessed by the SSF at the Sh reference point when the SSF is in the same domain.

On the contrary, when such user data is stored in the AS or in a stand alone server associated with one or more application servers or if the SSF in not in the same domain as the UPSF, the user data can be accessed by the SSF using an reference point that is out of scope for this release.

The SSF may also request notification of IPTV user data updates.

## 7.3 IPTV user profile structure

### 7.3.1 IPTV user profile structure

An IPTV user profile comprises:

- zero, one or more instances of the UE object class comprising UE capabilities attribute and associated UE ID;
- at least one instance of a Broadcast (BC) or a Content on Demand (CoD) object class (see figure 7);
- zero or one instance of the Global settings object class;
- zero or one instance of the Network Personal Video Recorder (N-PVR) object class;
- zero, one or multiple instances of Personalized Channel profile (PCh Profile) object class.
- zero or one instance of the Content Recommendation settings (CR ) object class

A Broadcast profile comprises one or more BC Service package descriptions.

A PCh profile comprises one or more PCh itemlist descriptions, which contain the mapping of each PCh content item to the world clockthe individual PCh IDs as well as the expiry time of each PCh list.

Each BC service package comprises zero or more BC TV Services descriptions.

Each PCh list comprises one or more PCh items descriptions

Each BC TV service includes a quality definition level (e.g. standard or high definition or other defined quality level). Delivered quality level depends on this quality definition level as well as UE capabilities, available codecs and/or bandwidth limitations.

NOTE: When there is no service description for a given BC service package, it would imply that the IPTV user has access to all of the BC services within that given BC service package.

The complete service package and/or service description is available in an associated IPTV Service Profile definition (e.g. described with metadata). The ServicePackageId attribute associated with the service package and/or the ServiceId attribute associated with the service refers to appropriate descriptions in an associated IPTV Service Profile definition



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(e.g. described with metadata) and hence, can be used to fetch detailed information about the particular service package and associated services.

A CoD profile includes a parental control level (ParentalControlLevel) attribute.

A BC profile includes a parental control level (ParentalControlLevel) attribute.

An N-PVR profile contains N-PVR rules for the user.

A Global Setting profile includes zero or one Parental Control description, which contains attributes related to parental control.

The CR Settings includes a CR notification attributes.

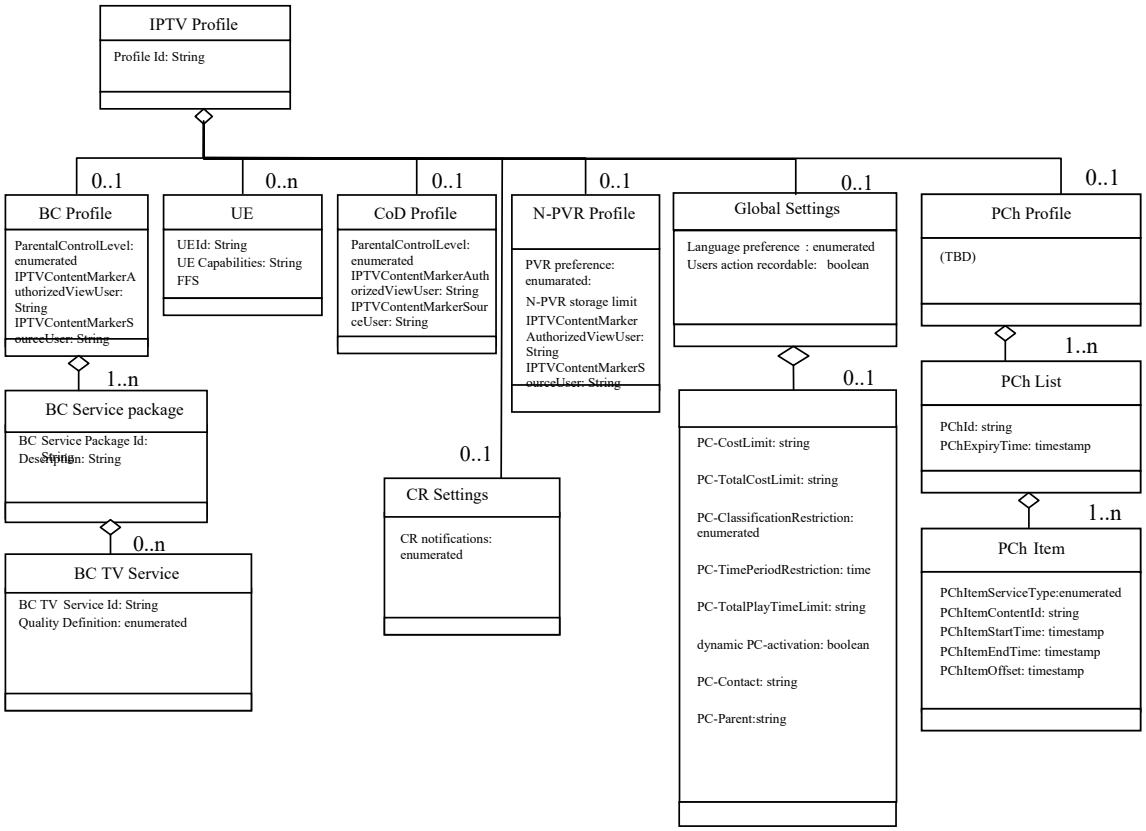


**Figure 7: IPTV user profile data model**

This data model assumes that each IPTV user is allocated at least an IMS Public User Identity and an IPTV user profile is associated with this IMS Public User Identity.

Multiple IPTV users may share the same IMS subscription.

The IPTV user identity (i.e. the IMS Public User Identity) selected when making an outgoing request is asserted by the UE using means outside the scope of the present document (e.g. using a local pin code).



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#### 7.3.1.1 BC service package

A service package is a group of one or more BC service.

#### 7.3.1.2 BC service

A service relates to a particular TV channel and associated quality definition (e.g. SD or HD).

#### 7.3.1.3 UE

Contains the UE's Id and its capabilities.

#### 7.3.1.4 Global settings: language preference

This attribute defines which default language the user would like to use. For instance, this could be the default language for the GUI that is displayed on the UE, and/or the default language used for subtitles.

#### 7.3.1.5 Global settings: user action recordable

The "user actions recordable" parameter indicates whether user actions can be recorded by the network as part of the IPTV service action data.

#### 7.3.1.5A Global settings: PC-CostLimit

This parameter defines the cost limit of an individual content when toll content (e.g. PPV content) is involved. It has a string value.

#### 7.3.1.5B Global settings: PC-TotalCostLimit

This parameter defines the cost limit on all IPTV content over a period of time. It has a string value.

This parameter may be defined on the basis of day, week, month or year.

There can be several occurrences of this parameter.

#### 7.3.1.5C Global settings: PC-ClassificationRestriction

This parameter defines the classifications of the content (e.g. news, action movies, parental rating …) which are not allowed, in case of Parental Control. It has an enumerated value.

#### 7.3.1.5D Global settings: PC-TimePeriodRestriction

This parameter defines time period of the day, in case of Parental Control, during which all IPTV services are restricted. It has a time segment value, which includes a start time and a time length.

There can be several occurrences of this parameter.

#### 7.3.1.5E Global settings: PC-TotalPlayTimeLimit

This parameter defines the total play time which can be consumed for IPTV services, in case of Parental Control. It has a string value.

This parameter may be defined on the basis of day or week.

#### 7.3.1.5F Global settings: PC-AdminUser

The "PC-AdminUser " parameter defines a list of administrative users (identified by a SIP-URI) that have access to the user's profile and can modify it.



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*Editor's note: the impact of this parameter on the rights of the user to modify his/her own IPTV profile has to be considered*

#### 7.3.1.5G Global settings: dynamic PC-activation

The " dynamic PC-activation " parameter indicates whether dynamic parental control is activated or not. If activated, any session initiation request that does not suit the parental-control rules well, will trigger a request to the contact defined in the "PC-Contact" parameter.

#### 7.3.1.5H Global settings: PC-Contact

The "PC-Contact" parameter indicates a list of users (SIP URI or mobile phone number) to be contacted at session initiation request if dynamic PC-activation is on.

Note: parental control related parameters in Global Settings object class can be optionally and dynamically configured according to user strategy.

*Editor's note: further filters about Parental Control can be included.*

#### 7.3.1.6 N-PVR storage-limit

This attribute defines a limit allocated per user for N-PVR contents.

It can be expressed in time or volume.

There can be several occurrences of this parameter.

#### 7.3.1.6A N-PVR: IPTVContentMarkerAuthorizedViewUser

The "IPTVContentMarkerAuthorizedViewUser" parameter indicates a list of users authorized to view N-PVR IPTV Content Markers of this user. The data model of IPTV Content Markers is defined in clause 7.5.

#### 7.3.1.6B N-PVR: IPTVContentMarkerSourceUser

The "IPTVContentMarkerSourceUser" parameter indicates a list of other users from which N-PVR IPTV Content Markers can be accessed. The data model of IPTV Content Markers is defined in clause 7.5.

NOTE: The authorization to access a user's IPTV Content Markers does not imply access rights to the content. Separate acquisition of these rights might be necessary.

#### 7.3.1.7 BC: ParentalControlLevel

This parameter defines the Parental Control Level of the BC services. It has an enumerated value.

*Editor's note: whether ParentalContentLevel parameters within the COD profile and the BC profile can be moved to the ParentalControl global settings profile needs to be considered.*

#### 7.3.1.7A BC: IPTVContentMarkerAuthorizedViewUser

The "IPTVContentMarkerAuthorizedViewUser" parameter indicates a list of users authorized to view BC IPTV Content Markers of this user. The data model of IPTV Content Markers is defined in clause 7.5.

#### 7.3.1.7B BC: IPTVContentMarkerSourceUser

The "IPTVContentMarkerSourceUser" parameter indicates a list of other users from which BC IPTV Content Markers can be accessed. The data model of IPTV Content Markers is defined in clause 7.5.

NOTE: The authorization to access a user's IPTV Content Markers does not imply access rights to the content. Separate acquisition of these rights might be necessary.



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#### 7.3.1.8 CoD: IPTVContentMarkerAuthorizedViewUser

The "IPTVContentMarkerAuthorizedViewUser" parameter indicates a list of users authorized to view CoD IPTV Content Markers of this user. The data model of IPTV Content Markers is defined in clause 7.5.

#### 7.3.1.9 CoD: IPTVContentMarkerSourceUser

The "IPTVContentMarkerSourceUser" parameter indicates a list of other users from which CoD IPTV Content Markers can be accessed. The data model of IPTV Content Markers is defined in clause 7.5.

NOTE: The authorization to access a user's IPTV Content Markers does not imply access rights to the content. Separate acquisition of these rights might be necessary.

#### 7.3.1.10 PCh: PChId

This attribute contains the unique identifier of the PCh list. It has a string value.

#### 7.3.1.11 PCh: PChExpiryTime

This attribute defines the expiry time of the PCh list. It has a timestamp value.

#### 7.3.1.12 PCh: PChItemServiceType

This attribute defines the service type of the item within a PCh list. It has an enumerated value and refers to BC, CoD or N-PVR.

#### 7.3.1.13 PCh: PChItemContentId

This attribute defines the referenced content id of the item within a PCh list:

- In case of BC, it shall consist of the "BCServiceId" as well as the "ProgrammeId" (see clause 7.4.1)
- In case of CoD, it shall be set to the "CoDId" (see clause 7.4.1)
- In case of N-PVR, it shall be set to the "NPVRContentId" (see clause 7.4.1)

#### 7.3.1.14 PCh: PChItemStartTime

This attribute indicates the start time of playing a content item within a PCh list. It has a timestamp value.

#### 7.3.1.15 PCh: PChItemEndTime

This attribute indicates the end time of playing a content item within a PCh list. It has a timestamp value.

#### 7.3.1.16 PCh: PChItemOffset

This optional attribute indicates the offset from beginning of the content item in case the item is CoD or N-PVR., from which the item is ready to play. It has a timestamp value. If this attribute is not present, the item shall be played from the beginning.

NOTE: The availability of PCh information should be guaranteed by mechanisms aligned with user profile and content metadata validity rules.

#### 7.3.1.17 CR Settings: CR notifications

Activate, deactivate content recommendation notifications, or other actions for further study.



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### 7.3.2 Usage of IPTV user profile

The IPTV user profile may be used to customize the user IPTV experience.

For instance:

- The CoD profile parental control level should be used to filter a CoD catalog.
- The UE capabilities associated with an IPTV user profile UE data may be used for customization of IPTV service selection data that is provided by the SSF to the IPTV user (based on capabilities of the UE that the IPTV user is currently associated with).

Thanks to the IPTV user profile standardization, any equipment can render the same IPTV environment to the user. The IPTV user profile may also be used to allow or deny access to IPTV services.

### 7.3.3 Life cycle

UE List: The information about the UE(s) that an IPTV user is currently associated with may be purged when the IPTV user deregisters and/or logs off. This is to avoid persisting UE related information when the IPTV user logs off that particular UE.

## 7.4 IPTV service action data

### 7.4.1 Data model

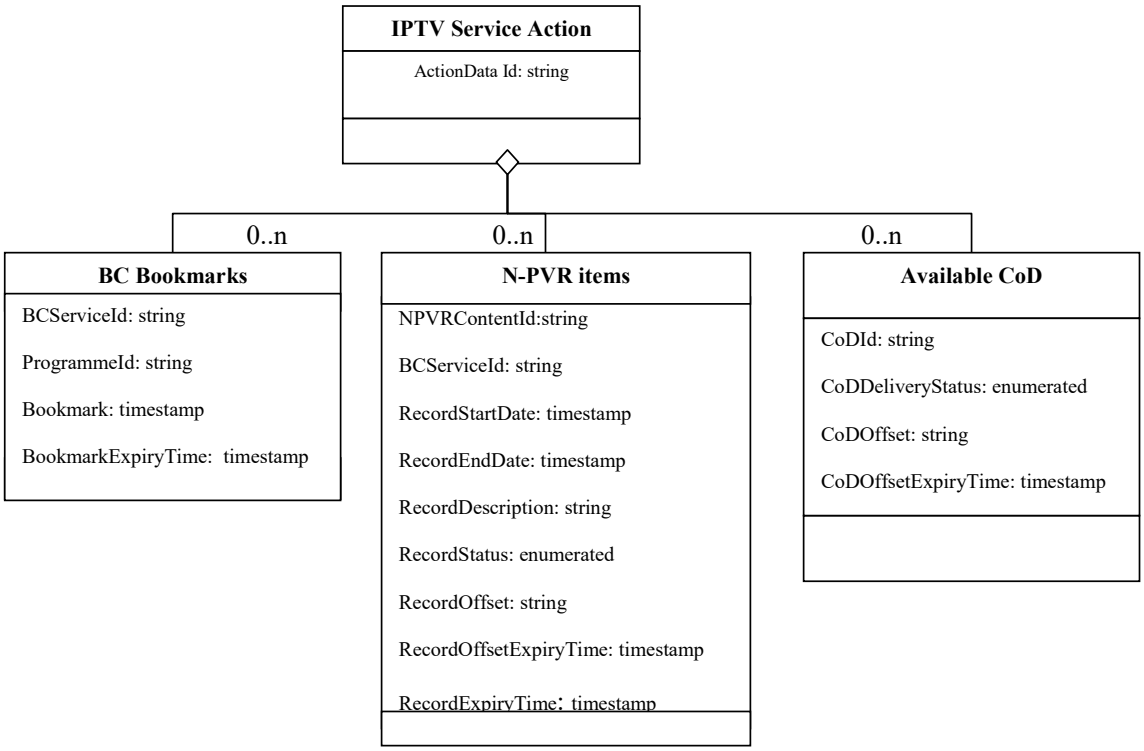


**Figure 8: IPTV Service action data - data model**

This data model assumes that each IPTV user is allocated at least an IMS Public User Identity and an IPTV Service Action data profile is associated with this IMS Public User Identity.

NOTE 1: The "ProgrammeId" attribute is unique, as it refers to one and only one entry in the EPG.



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NOTE 2: Although the "Bookmark" attribute could be used as an indirect way to identify the programme, it is seen as more convenient and immediate to use the ProgrammeId for that purpose.

### 7.4.2 Life cycle

- CoD list: Items may be removed when they are no longer accessible (e.g. the offer they were attached to has expired.) or when the entitled number of visualizations has been reached. Alternatively, items are purged when the expiration time associated with the CoDOffset (identified using CoDOffserExpiryTime) expires.
- BC bookmarks are kept in the profile while the BC TV service or Programme they refer to is available in the media server. Alternatively, entries may also be purged when the expiration time associated with BookMark value (identified using BookmarkExpiryTime) expires.
- N-PVR items are kept in the profile while the content they refer to is available in the Network PVR server(s). Alternatively, entries may also be purged when the expiration time associated with Recording value (identified using RecordExpiryTime) expires. Failed recordings may be purged on a regular configurable basis.

## 7.5 IPTV information storing/sharing services

### 7.5.1 General

This clause defines data models to be used by IPTV information sharing or targeting services.

Editor's Note: Commonalities of data models between different IPTV information sharing services should be exploited.

NOTE: Accessibility, as well as the legal use of data related to sharing or targeted services should be considered.

### 7.5.2 IPTV Content Marker

#### 7.5.2.1 General

This clause defines the data model of IPTV Content Markers for BC/CoD/N-PVR services. The intention of IPTV Content Markers is twofold:

1) To store configurable pointers to content and be able to quickly access that content
2) Enable users to exchange and share IPTV Content Markers.

NOTE: Exchanging IPTV Content Markers between users does not imply a transfer of access rights. Separate acquisition of these rights might be necessary.

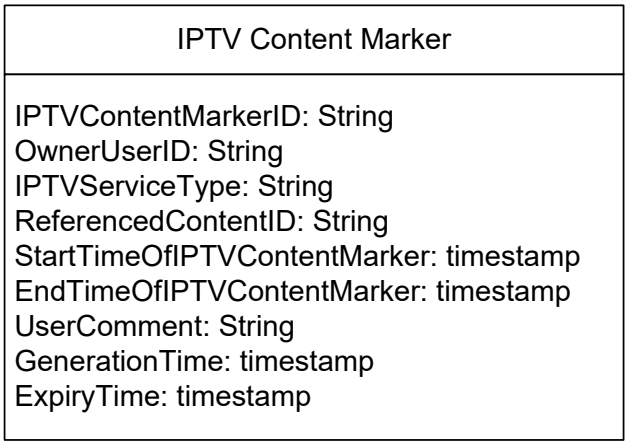


**Figure 8A: IPTV Content Marker - data model**



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Figure 8A depicts the data model assumes that each IPTV user is allocated at least an IMS Public User Identity and individual IPTV Bookmark data items are associated with this IMS Public User Identity.

Each of the entries within an IPTV Bookmark item may be rendered to the end-user.

Editor's Note: Whether IPTV Bookmark data is a part of Service Action Data or not is FFS

#### 7.5.2.2 IPTVContentMarkerID

Unique identifier to distinguish between several of a user's IPTV Content Markers. It shall always be present.

#### 7.5.2.3 OwnerUserID

This attribute shall identify the user owning the IPTV Content Marker by means of the IMPU. It shall always be present.

#### 7.5.2.4 IPTVServiceType

This attribute identifies the type of IPTV service this IPTV Content Marker refers to: BC, CoD, N-PVR.

#### 7.5.2.5 ReferencedContentID

This attribute shall identify the content this particular IPTV Content Marker refers to

- In case of BC, it shall consist of the "BCServiceId" as well as the "ProgrammeId" (see clause 7.4.1)
- In case of CoD, it shall be set to the "CoDId" (see clause 7.4.1)
- In case of N-PVR, it shall be set to the "NPVRContentId" (see clause 7.4.1)

#### 7.5.2.6 StartTimeOfIPTVContentMarker

This optional timestamp may be used to identify a starting point for playback of referred-to content. If it is not present playback should start at the beginning of the content.

NOTE: StartTimeOfIPTVContentMarker and EndTimeOfIPTVContentMarker are intended as guidance for playback logic to point to particularly interesting scenes within the content they are associated to.

#### 7.5.2.7 EndTimeOfIPTVContentMarker

This optional timestamp may be used to identify an ending point for playback of referred-to content. If it is not present playback should end at the end of the content.

NOTE: StartTimeOfIPTVContentMarker and EndTimeOfIPTVContentMarker are intended as guidance for playback logic to point to particularly interesting scenes within the content they are associated to.

#### 7.5.2.8 UserComment

The user may comment an IPTV Content Marker/the content referred to by the IPTV Content Marker item.

#### 7.5.2.9 GenerationTime

This optional timestamp may store the point in time when the IPTV Content Marker item was created.

#### 7.5.2.10 ExpiryTime

This optional timestamp indicates when the associated IPTV Content Marker item expires.



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## 7.5.3 IPTV Service Access History

### 7.5.3.1 Data model

This clause defines the data model for IPTV service access history, which can be used for:

- User preference extraction needed by service personalization and targeting (e.g. targeted Ad, CRS, personalized EPG etc.);
- Sharing consumption history among authorized users.

Editor's Note: How the user preference is extracted from the IPTV service access history is out of scope of present document.

| IPTV Service Access History |
|---|
| UserID: String<br>AccessHistoryID: String<br>ServiceType: Enumerated<br>ReferencedContentID: String<br>Rating : enumerated<br>AccessStartTime: Timestamp |

**Figure 8B: IPTV service access history data model**

Figure 8B depicts the data model assumed that each IPTV user is allocated at least an IMS Public User Identity (i.e. IMPU) and one or multiple IPTV service access history items are associated with this identifier.

The entries of IPTV service access history may be rendered to the user through authorization rules or be processed by the service provider subject to appropriate privacy and regularity mechanisms.

### 7.5.3.2 UserID

This attribute identifies who is the IPTV service access history item is associated. It shall always be present and has a string value.

### 7.5.3.3 AccessHistoryID

This attribute is used to distinguish between several IPTV service access history items of a user.It shall always be present and has a string value.

### 7.5.3.4 ServiceType

This attribute identifies the service type of a user's service access history, which refers to BC, CoD, N-PVR Ad or UGC. It shall always be present and has a enumerated value.

### 7.5.3.5 ReferencedContentID

This attribute identifies the associated content accessed by the user

- In case of BC, it shall consist of the “BCServiceId” as well as the “ProgrammeId“ (see clause 7.4.1);
- In case of CoD, it shall be set to the “CoDId” (see clause 7.4.1);
- In case of N-PVR, it shall be set to the “NPVRContentId” (see clause 7.4.1);
- In case of Ad, it shall contain the ad content id (see 8.14.1);



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- In case of UGC, it shall contain the UGC content id (see 8.9.2)

#### 7.5.3.6 Rating

This optional attribute indicates the user rating for the referened content. It has a numerated value (e.g. one-star, two-stars…).

#### 7.5.3.7 AccessStartTime

This attribute is used to identify the time when the access to the content is started. It shall always be present and has a timestamp value.

#### 7.5.3.8 AccessEndTime

This attribute is used to identify the time when the access to the content is ended. It shall always be present and has a timestamp value.

#### 7.5.3.9 HistoryExpiryTime

This optional attribute identifies the expiry time of an IPTV service access history item. It has a timestamp value.

## 7.6 IPTV Content Recommendation profile

Editor's note : This clause should describe Content Recommendation data model to store informations that could not be covered by IPTV Service Access history data model (e.g. like Preferred Genres, …)

# 8 Procedures

Editor's Note: Contributions are invited in this clause to clarify on the streaming case and upload/download case for better understanding on how the generic procedures could be referred, as well as avoid inconsistency with Release 2.

Editor's Note: Whether dedicated procedures for e.g. content recommendation and advertising are required or whether the services can be described using notification procedure is FFS.

Editor's Note: Depending on new IPTV services in this Release, additional procedures need to be defined.

## 8.1 IPTV addressing mechanisms

### 8.1.1 IPTV end-users identification and addressing mechanisms

End-user identification and addressing shall be done according to what is defined in document TS 182 006 [2].

### 8.1.2 Addressing of nodes

As specified by TS 182 006 [2], those network nodes with reference points supporting the SIP protocol shall be identifiable using a valid SIP URI.

## 8.2 UE start-up procedure

Figure 9 depicts the typical steps that occur at power up of the UE. Some of the steps are not new in them selves, but exist already in NGN.



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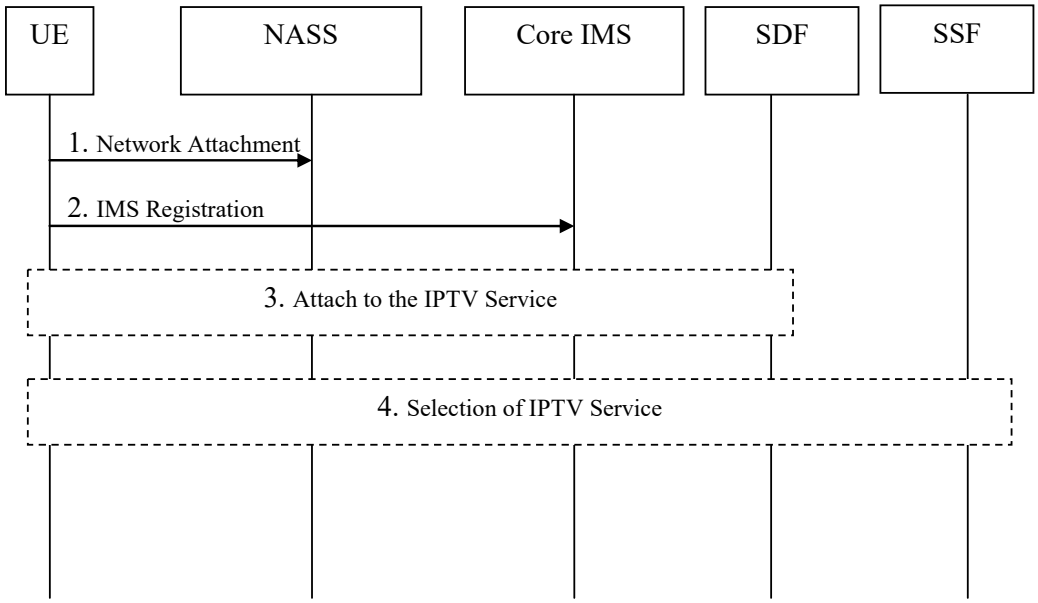


**Figure 9: UE start-up procedure**

1) Network Attachment
In this step the UE attaches to the network. The procedures for network attachment are defined in ES 282 004 [3]. This step includes IP configuration, P-CSCF address discovery, etc.

2) IMS Registration
In this step, the UE performs regular IMS Registration as defined in TS 182 006 [2].

3) Service Attachment
In this step, the UE retrieves the configuration information (server addresses and other relevant information) needed to retrieve the appropriate information to access the services that the user is authorized to. The user preferences and the capabilities of the UE can be taken into account to enable personalized service discovery. The UE could retrieve the service discovery information through the Push mode and Pull mode.
Push mode: When the UE attaches to the IMS network, the SDF actively sends the service attachment information to the UE.
Pull mode: After the UE attaches to the IMS network, the UE actively requests the service attachment information from the SDF.

NOTE 1: The SDF discovery can be performed in several ways: through NASS attachment, by manual provisioning, using IFC e.g. third-party registration, etc.

4) Service Selection
In this step, the UE retrieves data related to specific services and makes appropriate service selection.

NOTE 2: In case the UE needs to directly contact a network functional element, (e.g. a Service Control Function - SCF, or SSF), it should perform GBA authentication, for key management purposes. This procedure will secure further communication taking place between the UE and the IPTV Service Control Function. The GBA bootstrapping procedure is defined in GAA - TS 133 220 [4] and is referenced in the TISPAN NGN Security architecture - TS 187 003 [5]. This step is not affecting the functional behaviour of any of the entities involved in this start-up phase and thus, it is not displayed in this flow.

The detailed sequence of steps 3-4 is described in the figures below:



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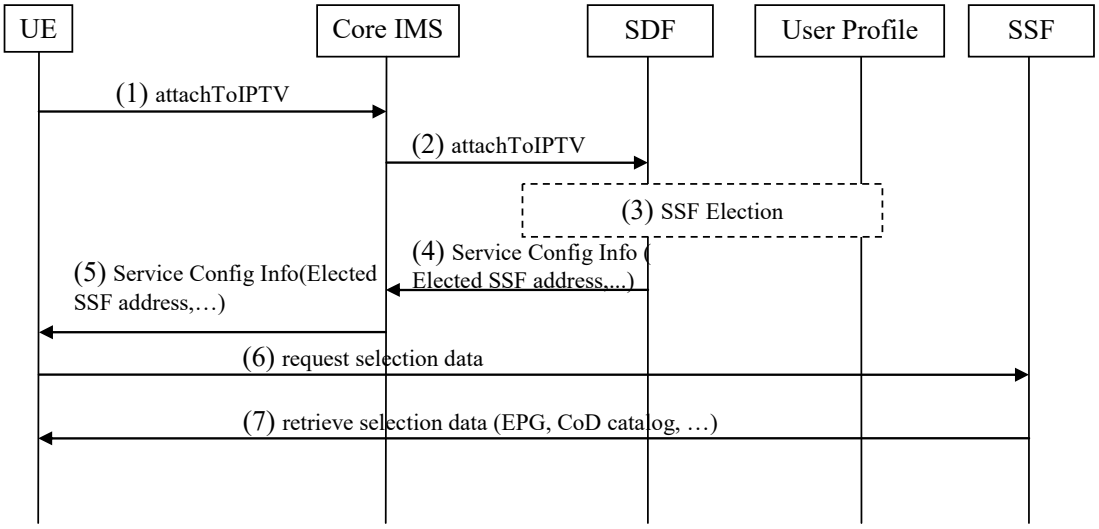


**Figure 10: IPTV service attachment and selection in pull mode**

1) The UE makes a service attachment request.

2) The core IMS relays the request to the appropriate entity (here, SDF).

3) The SDF determines the proper SSF (or SSFs) according to the UE's capabilities, the user's profile and also the location of the UE (Personalized Service Discovery). The user profile may be retrieved from the UPSF or any other entity where it is stored.

4) Configuration information that includes the SSF address(es) is (are) routed back to the UE.

5) Core IMS relays the configuration information related to IPTV services back to UE.

6) The UE requests the SSF to get the selection data.

7) The SSF delivers the requested data to the UE.

For the purpose of service configuration update, steps 4 and 5 described above can be repeated at any time after completion of the IPTV service attachment and selection procedure.

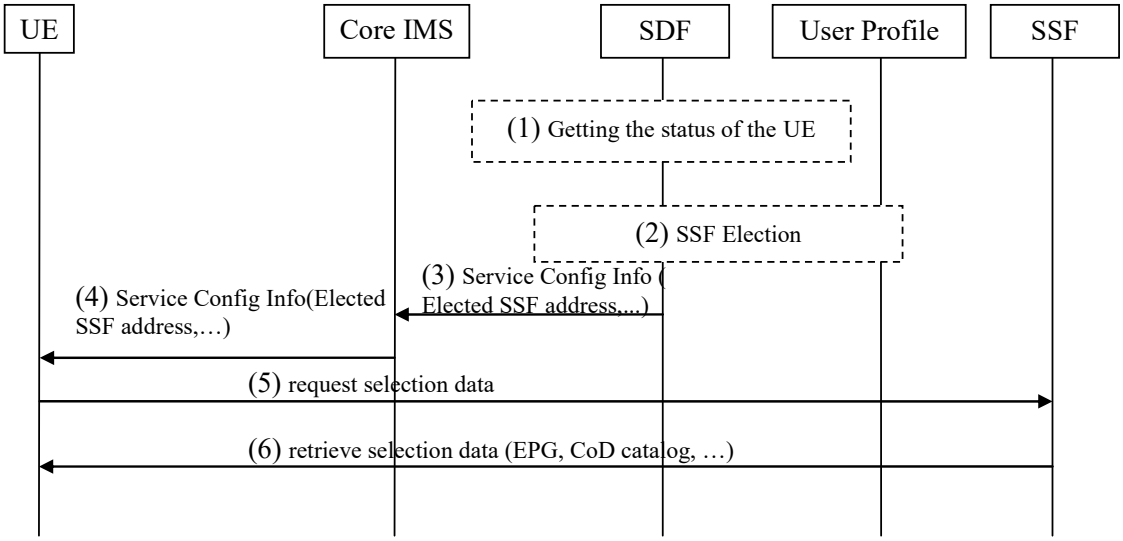


**Figure 11: IPTV service attachment and selection in push mode**



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1) The SDF gets the status of the UE, e.g. the S-CSCF sends a third-party REGISTER request to the SDF after the IMS Registration or by other method, then the SDF gets the status of the UE.

2) The SDF determines the proper SSF (or SSFs) according to the UE's capabilities, the user's profile and also the location of the UE (Personalized Service Discovery). The user profile may be retrieved from the UPSF or any other entity where it is stored.

3) Configuration information that includes the SSF address(es) is (are) routed back to the UE.

4) Core IMS relays the configuration information related to IPTV services back to UE.

5) The UE requests the SSF to get the selection data.

6) The SSF delivers the requested data to the UE.

# 8.3 Broadcast session

The procedures described here are for streaming cases distinguished from upload/download cases (described in 8.19).

Before the User Equipment can join a multicast channel, a session initiation procedure shall take place as described in clause 8.3.1. One session initiation is associated to one or more service packages. SCF does not participate in channel change control in order to avoid zapping delays.

The UE retrieves necessary network parameters to handle the BC TV Service either before the session initiation procedure (from the SSF) or as part of the session initiation procedure (from the SCF).

The SSF and/or the SCF acquire network parameters from management entities.

NOTE: Alternative methods could exist, but they out of scope for this release.

The session may be modified using the procedure described in clause 8.3.2 in the following cases:

- The BC TV Service is modified.
- Currently allocated resources are not sufficient and the User Equipment wishes to join a multicast channel with different QoS requirements (e.g. zapping from a SD to HD channel). The session modification procedure may take place before or after the request to change channel, in order to avoid increasing zapping delays. In the later case, the session modification procedure is initiated by the UE and the new channel is delivered using currently allocated resources until this procedure and any additional resource reservations that may be required are completed.

The session can be terminated by the User Equipment using the procedures described in clause 8.3.3 or by the network.

Interactions between the IMS and the RACS take place at different steps of the session initiation and modification and release. Additional resource control procedures not triggered by the IMS may also take place and are not described in the following clauses.

## 8.3.1 Signalling flows for broadcast session initiation

### 8.3.1.1 Overview of the signalling flows for session initiation

Figure 12 provides an overview of the information flows for UE-initiated BC session initialization.



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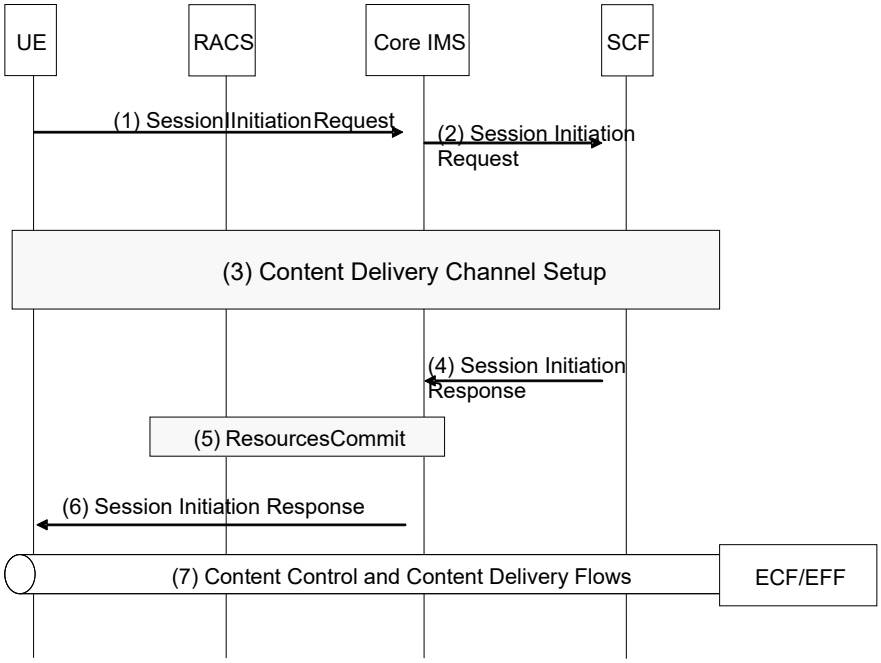


**Figure 12: UE-initiated BC session initialization**

1) The UE initiates a dialogue to the BC service which refers to the service package(s).

2) The session initiation request is routed by the Core IMS entities up to the SCF in charge of the requested BC service.

3) Signalling procedures for the establishment of one or more content delivery channels network parameters necessary to handle the BC service take place between the UE and the SCF (see clause 8.3.1.2).

NOTE: In a particular protocol realization, the messages supporting step 3 may be embedded in the messages supporting session initiation.

4) The SCF confirms the dialogue establishment.

5) The P-CSCF within the Core IMS interacts with the RACS to commit all resources and to activate the service package(s) in transport network element at edge of network for enabling multicast joining.

6) The P-CSCF forwards the dialogue confirmation to the UE.

7) The UE starts joining multicast channels and receiving multicast flows.

Figure 12A provides an overview of the information flows for SCF-initiated BC session initialization.



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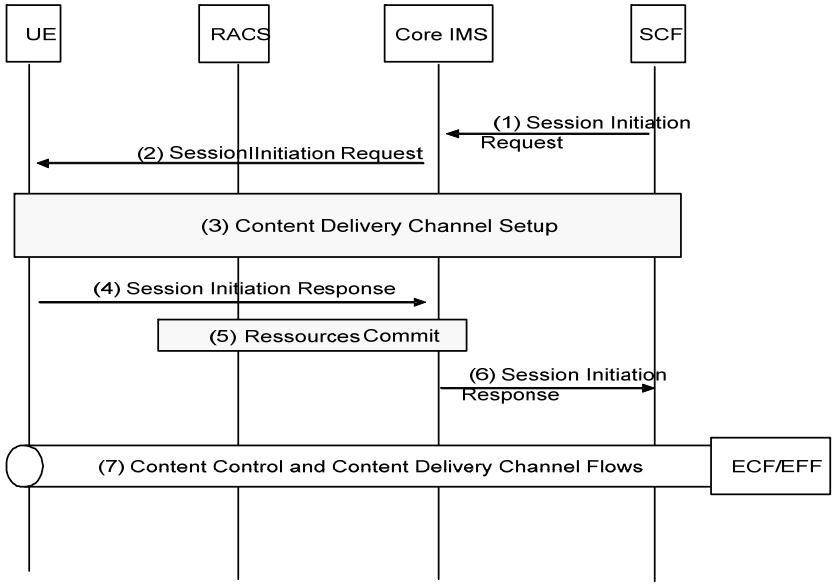


**Figure 12A: SCF-initiated BC session initialization**

1) The SCF sends a session initiation request to the UE via the core IMS.

2) The Core IMS forwards the session initiation request to the UE.

3) If the UE accepts the request, signalling procedures for the establishment of one or more content delivery channels network parameters necessary to handle the BC service take place between the UE and the SCF (see clause 8.3.1.2).

NOTE: In a particular protocol realization, the messages supporting step 3 may be embedded in the messages supporting session initiation.

4) The UE confirms the establishment of the dialogue with the SCF.

5) The P-CSCF within the Core IMS interacts with the RACS to commit all resources and to activate the service package(s) in transport network element at edge of network for enabling multicast joining.

6) The core IMS forwards this confirmation to the SCF.

7) The UE starts joining multicast channels and receiving multicast flows.

NOTE: SCF can initiate BC notification to UE (The procedure is described in clause 8.11.1), when UE receive the notification, it can initiate the BC session as figure 12.

### 8.3.1.2 Signalling flows for the establishment of the delivery channel

Figure 13 shows information flows applicable when SCF initiates the establishment of content delivery channel.



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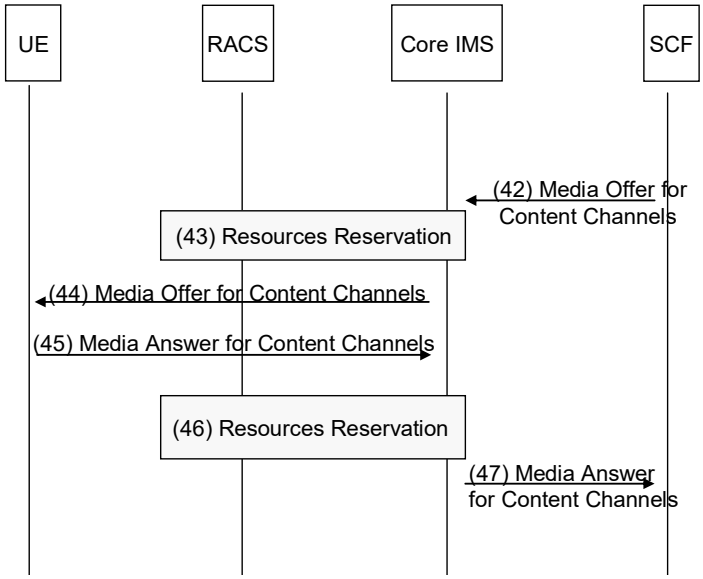


**Figure 13: Establishment of the delivery channel**

(42) The SCF initiates the establishment of one or more content delivery channels with the UE, by sending a media offer through the Core IMS.

(43) The P-CSCF within the Core IMS interacts with the RACS according to the description given in the media offer.

(44) The P-CSCF within the Core IMS forwards the media offer to the UE.

(45) The UE provides a media answer to the Core IMS.

(46) The P-CSCF within the Core IMS interacts with the RACS to update the configuration according to the media answer.

(47) The media answer is propagated to the SCF.

Figure 14 provides an overview of the information flows for UE-initiated establishment of content delivery channel necessary to handle the BC service.

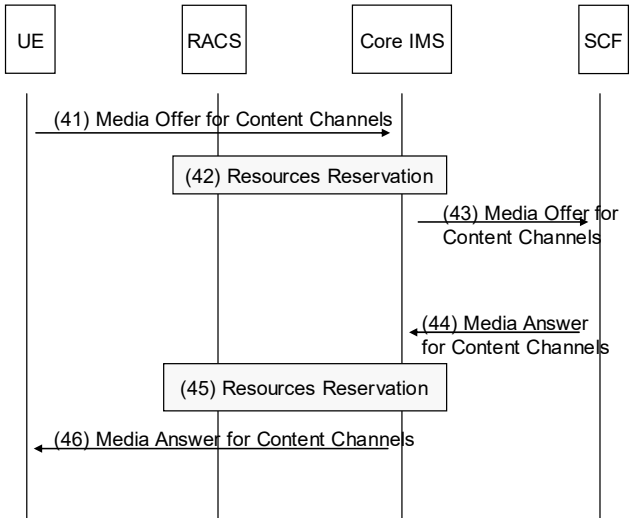


**Figure 14: Establishment of the delivery channel**



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(41) The UE initiates the establishment of one or more content delivery channels with the SCF, by sending a media offer through the Core IMS.

(42) The P-CSCF within the Core IMS interacts with the RACS to reserve transport resources according to the media offer.

(43) The media offer is forwarded to the SCF.

(44) The SCF sends a media answer through the Core IMS.

(45) Within the Core IMS, the P-CSCF interacts with the RACS to update the previous reservation (optional).

(46) The media answer is propagated to the UE.

### 8.3.2 Signalling flows for BC session modification

The BC session modification procedure is used to modify network parameters necessary to handle the BC service in an existing session.

The BC session modification procedure is initiated by the UE or the SCF.

Figure 15 provides an overview of the information flows for UE-initiated BC session modification.

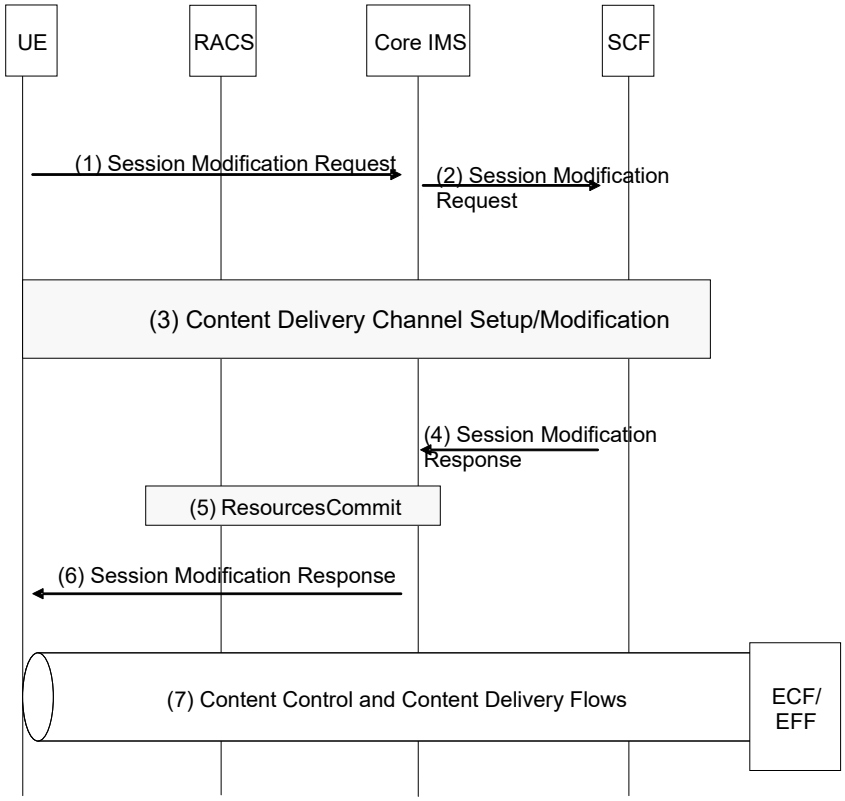


**Figure 15: UE-initiated BC session modification**

1) The UE initiates a session modification procedure in order to start a modification of network parameters necessary to handle the BC service.

2) The session modification request is forwarded to the SCF through the Core IMS.

3) Procedures for the negotiation of the network parameters necessary to handle the BC service take place between the UE and the SCF (see clause 8.3.1.2).



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NOTE: In a particular protocol realization, the messages supporting step 3 may be embedded in the messages supporting session modification.

4) The SCF acknowledges the session modification.

5) The P-CSCF within the Core IMS interacts with the RACS to commit all resources previously reserved.

6) The P-CSCF forwards the confirmation to the UE.

7) The UE starts joining multicast channels and receiving multicast flows.

Figure 16 provides an overview of the information flows for SCF-initiated session modification.

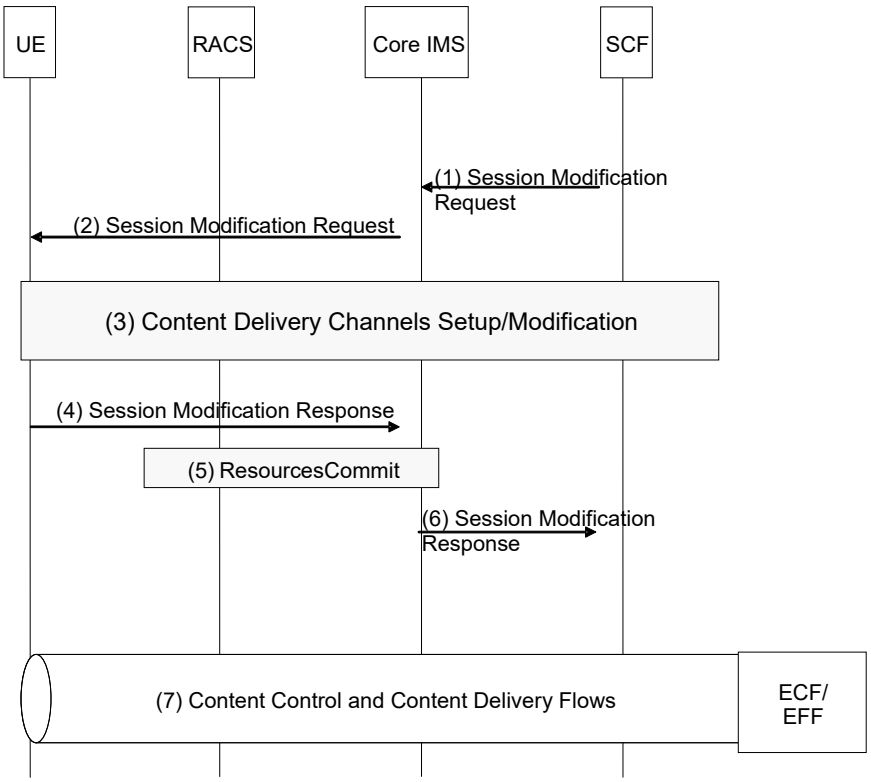


**Figure 16: SCF-initiated BC session modification**

1) The SCF initiates a session modification procedure in order to start a negotiation for network parameters necessary to handle the BC service.

2) The session modification request is forwarded to the UE by the Core IMS.

3) Procedures for the negotiation of the network parameters necessary to handle the BC service take place between the UE and the MF (see clause 8.3.1.2).

NOTE: In a particular protocol realization, the messages supporting step 3 may be embedded in the messages supporting session modification.

4) The UE confirms the modification of the session.

5) The P-CSCF within the Core IMS interacts with the RACS to commit all resources previously reserved.

6) The Core IMS forwards this modification to the SCF.

7) The UE starts joining multicast channels and receiving multicast flows.



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### 8.3.3 Signalling flows for broadcast session release

Figure 17 provides an overview of the information flows for UE-initiated session release.

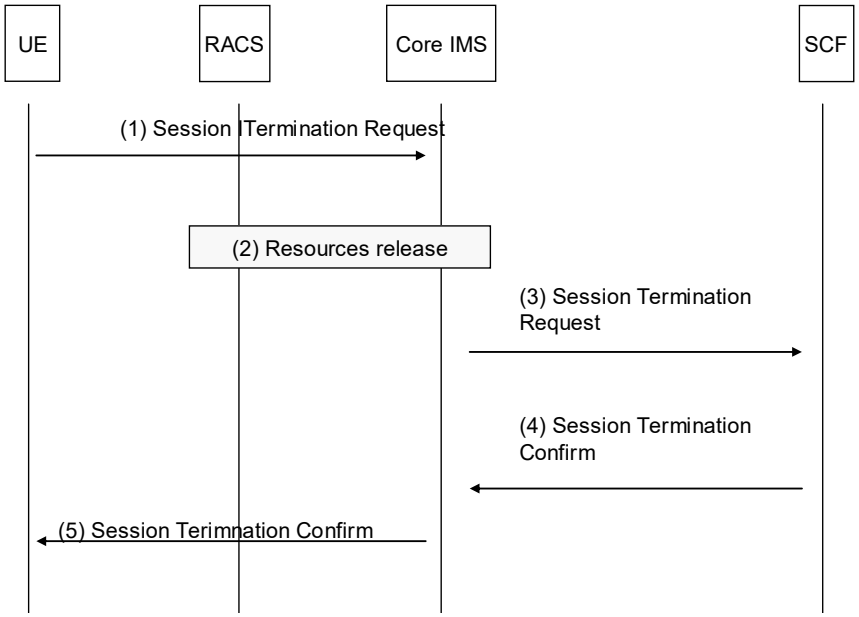


**Figure 17: UE-initiated broadcast session release**

1) The UE initiates a session termination.

2) The P-CSCF interacts with the RACS to release all transport resources that had been reserved for this session and to deactivate the service package in transport network element to prevent invalid multicast joining.

3) The Session Termination Request is routed by the Core IMS entities up to the SCF.

4) The SCF returns a Session Termination Confirm to the Core IMS.

5) The P-CSCF forwards the Session Termination Confirm to the UE.

Figure 18 provides an overview of the information flows for SCF-initiated session release.



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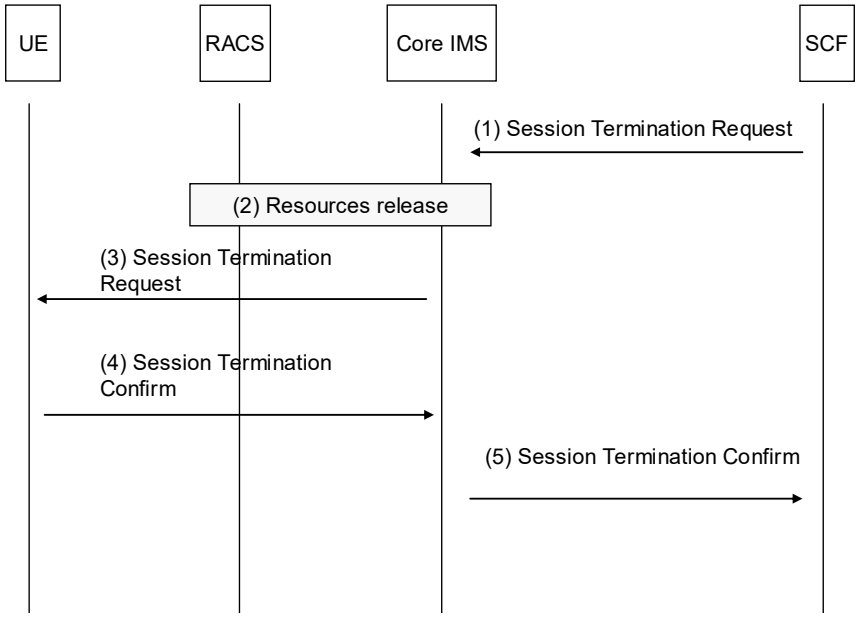


**Figure 18: SCF-initiated broadcast session release**

1) The SCF initiates a session termination.

2) The P-CSCF interacts with the RACS to release all transport resources that had been reserved for this session and to deactivate the service package in transport network element to prevent invalid multicast joining.

3) The Session Termination Request is routed by the Core IMS entities up to the UE.

4) The UE returns a Session Termination Confirm to the Core IMS.

5) The Core IMS forwards the Session Termination Confirm to the SCF.

### 8.3.4 Signalling flow for Broadcast TV channel switching

Figure 19 provides an example of a signalling flow for channel switching. It shows how the SCF can be informed about what channel is currently being watched.

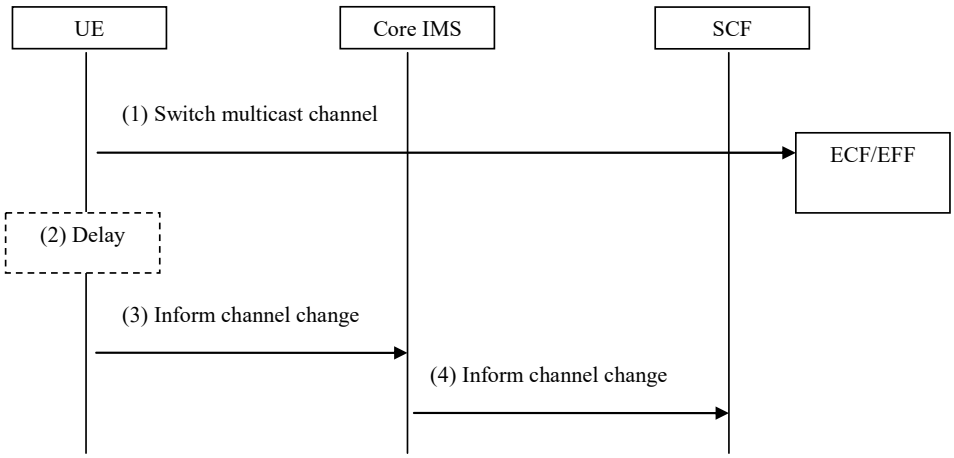


**Figure 19: Broadcast TV channel switching**



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1) The UE leaves a multicast channel and joins another multicast channel.

2) A delay may be applied. If the user switches channel again during this delay time, the flow is restarted at step 1.

3) The UE sends information about which channel is being watched.

4) Core IMS routes the information to the SCF.

### 8.3.5 Signalling flows for transition from Broadcast TV to Broadcast TV with trick play

Figure 20 provides the signalling flow for trick play of a Broadcast TV channel. In order to apply trick modes to a Broadcast TV session, this must be established as indicated in clause 8.3.1.

The same session is used in the trick play session modification, in order not to change the bandwidth requirements on the network. At successful conclusion of these procedures the UE seamlessly transitions from viewing Broadcast TV to Broadcast TV with trick play.

NOTE: As an alternative to the session modification, it is possible to initiate a separate session for trick modes handling, in addition to the Broadcast TV one, while keeping control of the bandwidth requirements between the two of them. This method is, however, out of the scope of the present document.



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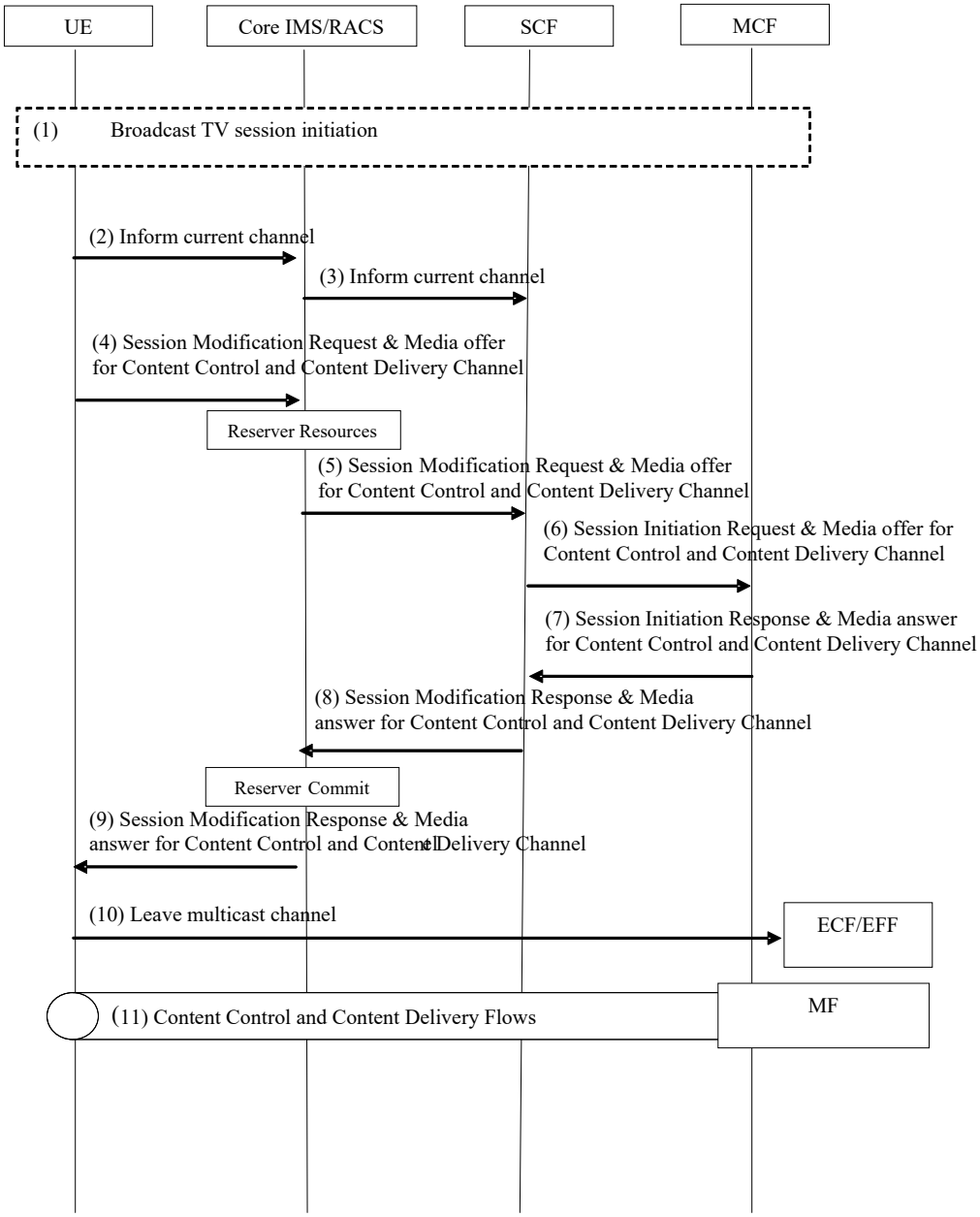


**Figure 20: Signalling flow for initiating trick play of broadcast TV channel**

1) Broadcast TV session initiation.

NOTE 1: The procedures are the same as clause 8.3.2, Overview of the signalling flows for session initiation. RACS and channel establishment have been removed for purpose of simplification.

2) The UE sends information on the current channel being watched, in order for the SCF to know what channel should be recorded.

3) Core IMS routes the information to the SCF.



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4) When the UE initiates trick play mode of a Broadcast TV the UE sends a session modify request which includes a media offer for a content control channel and content delivery channel with the MF. If trick play service is not available for the UE, the session modification is not sent.

NOTE 2: The Broadcast TV with trick play session modification is performed on the same session as the Broadcast TV session initiation. The existing reservation (for broadcast) needs to be modified to add a unicast flow that reuses the resources dedicated to the user. In the figure, RACS has been combined with Core IMS for the purpose of simplification.

NOTE 3: Steps 2 and 3 are optional in a generic Broadcast TV session, but are required if trick play is activated. The implementation of both steps as separate messages or combined with step 4 is an implementation issue.

5) After reserving resources in RACS Core IMS forwards the session modification request to the SCF.

6) The SCF forwards the session modification request as a new session initiation to the MF along with the channel indication. The MF will determine if the programme currently broadcasted has trick play support. . Prior to replying the MF uses real time to calculate the media offset for the broadcast TV channel when replying with the offered media. If trick play service is not available for the UE the session modification is rejected and the old Broadcast TV session initiation (along with the previous reserved committed resources) is maintained.

7) The MF sends the session modification response to the SCF.

8) The SCF forwards the session modification response to the Core IMS.

9) After committing resources in RACS Core IMS forwards the session modification response to the UE.

10) The UE leaves the multicast channel.

11) The UE starts playing content and receiving unicast flow.

NOTE 4: Alternatives to the above call-flow are for further study.

### 8.3.6 Signalling flows for transition from Broadcast TV with trick play to Broadcast TV

The UE returns from Broadcast TV trick play to linear Broadcast TV, for example when the UE switches channels from a paused channel to another live Broadcast TV channels, or when the UE fast-forwarding in a unicast stream and catches up with the live Broadcast TV channel.

The trigger to transition from Broadcast TV with Trick Play to Broadcast TV may be initiated by the UE, SCF or MCF.

NOTE: The event to trigger the transition is outside of the present document.

The UE or SCF may request a Broadcast TV session modification as described in clause 8.3.2, titled Overview of the signalling flows for session modification. The difference is that the Broadcast TV session modification is performed on the same session, in order to release unicast resources, and the SCF is responsible for releasing the resources in the MCF with a session termination request/response.

The MCF may request a session termination towards SCF which in turn performs Broadcast TV session modification towards the UE.

### 8.3.7 Signalling flows for Broadcast TV with trick play session release

When the UE terminates the Broadcast TV with trick play the UE shall follow the same flows as clause 8.4.3.

### 8.3.8 Signalling flows for Pay Per View service

Figure 20A depicts signalling flows for PPV service, this procedure applies for IPTV users subscribing to a PPV program scheduled on a channel to which the user is not subscribed to.



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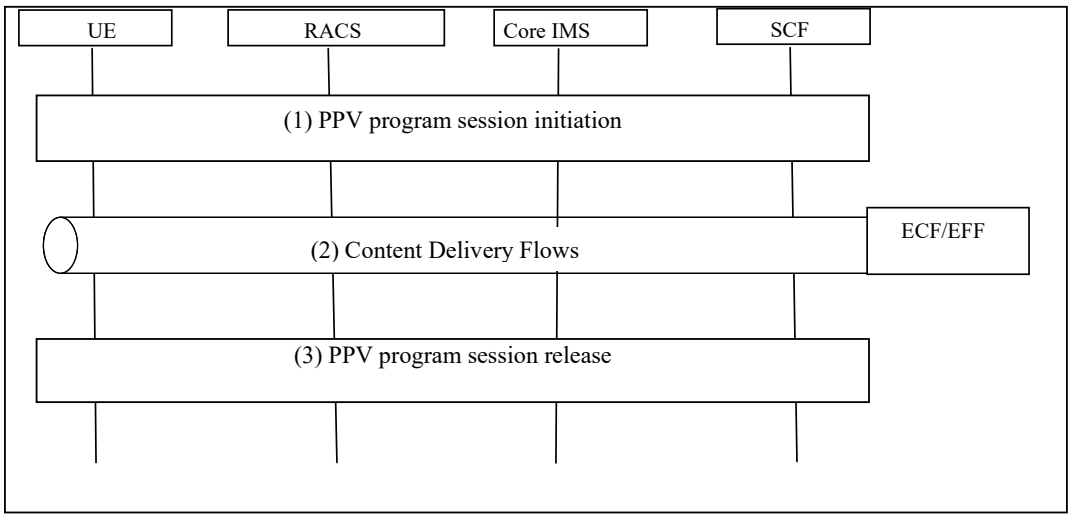


**Figure 20A: Signalling flows for Pay Per View session**

Prior to the PPV program session initiation, users should have subscribed a PPV program. The subscription information which may be saved as user profile include the user's indentity, BC service ID and BC program ID of the PPV program.

1) UE initiates the PPV program session as the BC session initiation procedures specified in clause 8.3.1, The PPV specific steps here are as follows:

   i. The PPV program session initiation request includes the BC service ID and the BC program ID of the PPV program.

   ii. When SCF receives the request, the SCF identifies the program according to the BC service ID and BC program ID, and verifies based on the IPTV user profile, that the program has been PPV subscribed. Upon successful verification, the SCF verifies that the program is ready to start, i.e. the current time is greater than/equal to program start time. Then accepts the request. If not, it refuses the request.

NOTE 1: The SCF authorizes the BC Session Initiation for that BC Service ID based on the fact that BC Program ID has been PPV subscribed. In the answer to the session initiation, the SCF includes information related to that authorized PPV program to enable the Core IMS to provision RACS with necessary parameters.

Editor's Note: It if FFS how to include the PPV Profile in the IPTV User Profile and the relation with the BC Profile.

NOTE 2: The initiation of PPV program session may be triggered by the user's action or the notification from SCF (e.g. SCF detects the PPV program is ready to start, and sends a notification to UE as specified in clause 8.11.1).

2) The UE starts joining multicast channels and receiving multicast flows.

3) UE or SCF initiates the PPV program session release procedure as BC session release procedures specified in clause 8.3.3. As part of the PPV program session release, RACS is updated by removing the BC Service.

NOTE 3: Session release for PPV service can be initiated either by SCF or UE. SCF initiates session release when detects the PPV program is over.

NOTE 4: an alternative solution using release 2 mechanisms can also be used. The SCF indicates the BC service ID that identifies the PPV program either at session initiation (clause 8.3.1) if the PPV programm is already authorised or by initiating a session modification (clause 8.3.2). If the BC session is on-going when the authorisation duration has elapsed, the SCF modify the session to remove the appropriate BC service ID from the authorised BC service list.



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# 8.4 CoD session

The procedures described here are for streaming cases distinguished from upload/download cases (described in 8.18).

## 8.4.1 Signalling Flows for CoD session initiation

Editor's Note: Document network initiated CoD sessions

Before the User Equipment can view the content, a session initiation procedure shall take place as described in clause 8.4.1.

The UE retrieves necessary network parameters to handle the CoD service before the session initiation procedure (from the SSF), or as part of the session initiation procedure, or after the session initiation procedure (from the MF).

The session can be terminated by the User Equipment using the procedures described in clause 8.4.3 or by the network.

Interactions between the IMS and the RACS take place at different steps of the session initiation/modification and release.

In certain cases such as in conventional content server deployments, it may be preferable that a content control channel and content delivery channel(s) be established separately.

### 8.4.1.1 Overall signalling flows

Figure 21 provides an overview of the information flows for UE-initiated CoD session initialization.

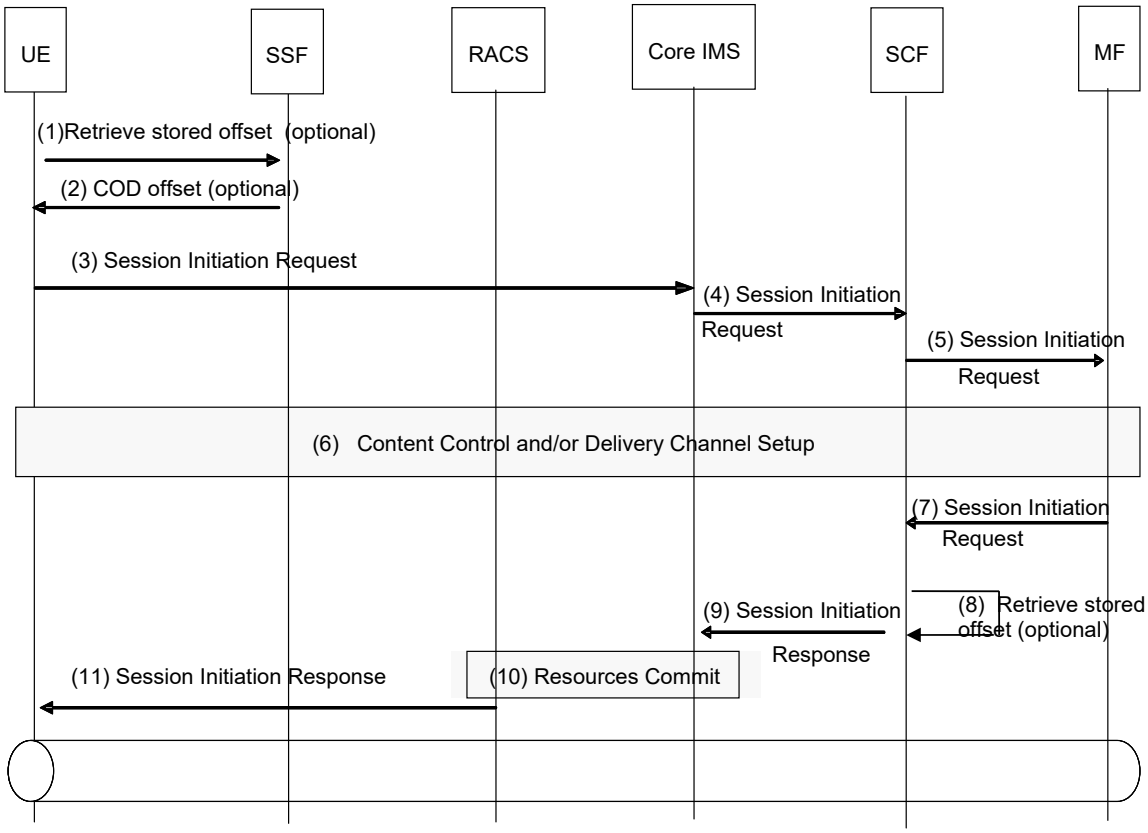


**Figure 21**

1) (Optionally) UE may retrieve COD offset from service action data

2) (Optionally) SSF may return COD offset for specified content



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3) The UE initiates a dialogue to the CoD service.

4) The session initiation request is routed by the Core IMS entities up to the SCF in charge of the requested CoD service.

5) The SCF performs service authorization as described in clause 5.1. If the UE is allowed to access the content, the SCF forwards the session initiation request to the selected MF.

6) Signalling procedures for establishment of a content control channel and optionally (Note 2) content delivery channels take place between the UE and the MF (see clause 8.4.1.2).

NOTE 1: In a particular protocol realization, the messages supporting step 4 may be embedded in the messages supporting session initiation.

NOTE 2: The establishment of the content delivery channel in the session initiation is only optional when network has provided information for only content control channel setup. In this case, the content delivery channel is established during session modification.

7) The MF confirms the establishment of the dialogue with the UE.

8) (Optionally) If the session initiation does not include a COD offset, the SCF may try to retrieve a stored offset for this CoD service in service action data. In this case, the SCF includes this offset in the session initiation answer.

9) The SCF forwards this confirmation to the Core IMS.

10) The P-CSCF within the Core IMS interacts with the RACS to commit all resources previously reserved. This includes opening pinholes for exchanging content control messages and/or content delivery.

11) The P-CSCF forwards the dialogue confirmation to the UE.

Figure 21A provides an overview of the information flows for SCF-initiated CoD session initialization



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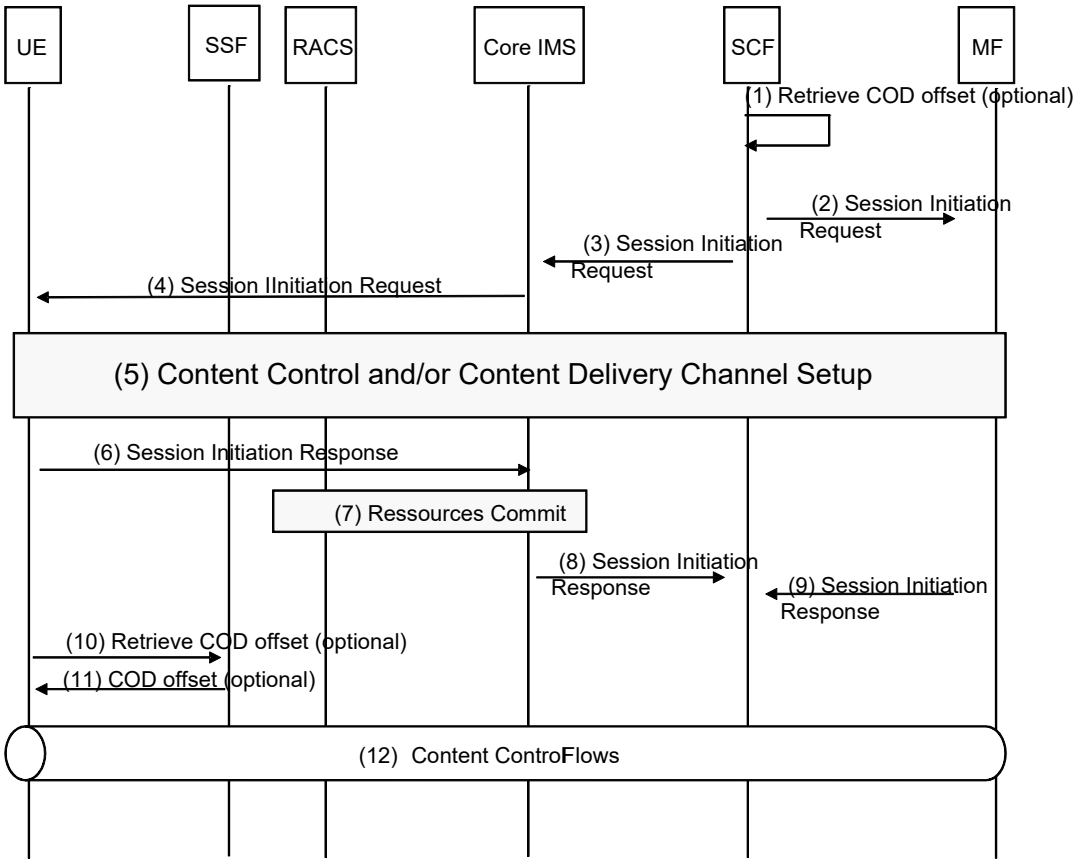


**Figure 21A**

1) (Optionally) The SCF may retrieves the COD offset if present in service action data

2) The SCF sends a session initiation request including the COD offset to the MF

3) The SCF sends a session initiation request to the UE via the core IMS .

4) The Core IMS forwards the session initiation request to the UE.

5) If the UE accepts the request, signalling procedures for establishment of a content control channel and optionally (Note 2) content delivery channels take place between the UE and the MF via the SCF (see clause 8.4.1.2).

NOTE 1: In a particular protocol realization, the messages supporting step 4 may be embedded in the messages supporting session initiation.

NOTE 2: The establishment of the content delivery channel in the session initiation is only optional when network has provided information for only content control channel setup. In this case, the content delivery channel is established during session modification.

6) The UE confirms the establishment of the dialogue with the SCF.

7) The P-CSCF within the Core IMS interacts with the RACS to commit all resources previously reserved. This includes opening pinholes for exchanging content control messages and/or content delivery.

8) The core IMS forwards this confirmation to the SCF.

9) The MF confirms the establishment of the dialogue with the SCF.

10) (Optionally) UE may retrieve COD offset from service action data

11) (Optionally) SSF may return COD offset for specified content



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After this point, UE may use the content control channel to request content to be streamed and the actual content will be then delivered/streamed over the content delivery channels.

The content control channel will also be used to carry UE requests for controlling the streams, e.g. "pause", "fast forward", etc.

### 8.4.1.2 Media Channel Negotiation

The following clauses go into details related to step 4 in the session initiation in clause 8.4.1.1.

#### 8.4.1.2.1 Signalling flows for the establishment of the content control and content delivery channels from MF

Figure 22 shows information flows applicable when network parameters necessary to handle the CoD service are provided by the MF as part of the session initiation procedure. This set of information flows assume that the UE does not receive a description of the network parameters required from the SSF before initiating the session.

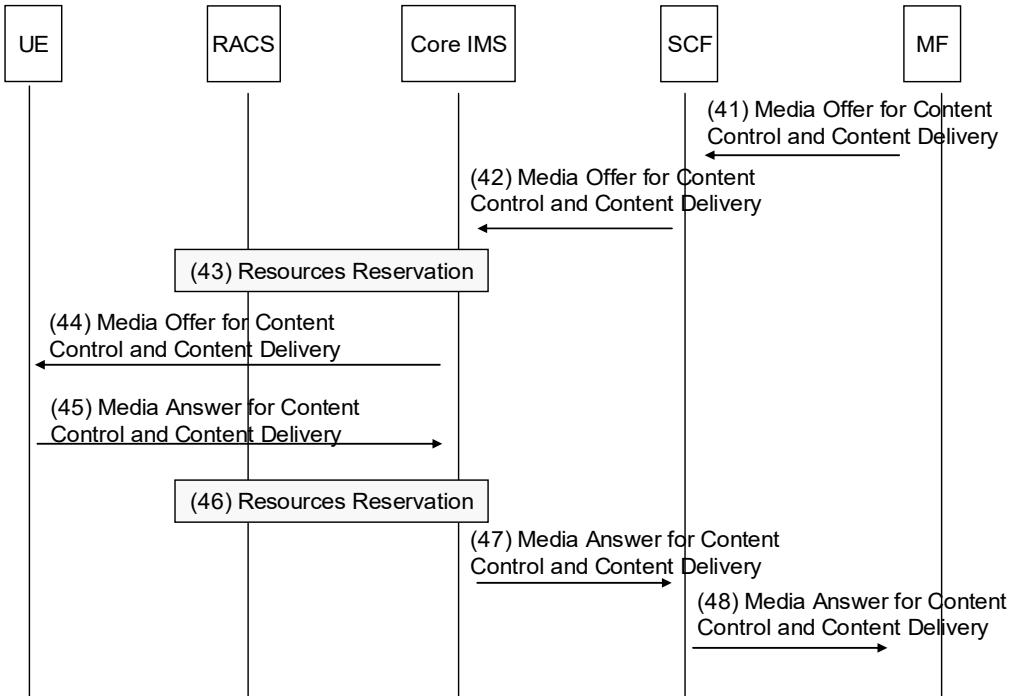


**Figure 22**

(41) The MF initiates negotiation of a content control channel and one or more content delivery channels with the UE, by sending a media offer to the SCF.

(42) The media offer is forwarded to the Core IMS.

(43) The P-CSCF within the Core IMS interacts with the RACS to reserve transport resources for the content control channel and one ore more content delivery channels.

(44) The P-CSCF within the Core IMS forwards the media offer to the UE.

(45) The UE provides a media answer to the Core IMS.

(46) The P-CSCF within the Core IMS interacts with the RACS to update the reservation (optional).

(47) The media answer for the content control channel and one or more content delivery channels is propagated to the SCF.

(48) The SCF forwards the media answer to the MF.



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#### 8.4.1.2.2 Signalling flows for the establishment of the content control and content delivery channels from UE

Figure 23 provides an overview of the information flows for UE-initiated negotiation of the network parameters necessary to handle the CoD service. This set of information flows assume that the UE receives a description of the network parameters required from the SSF before initiating the session.

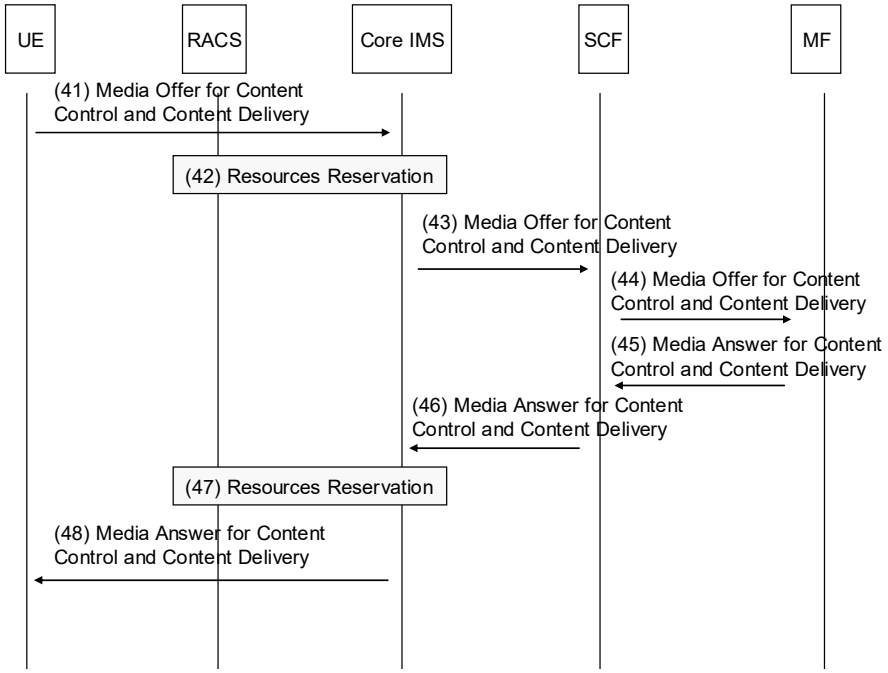


**Figure 23**

(41) The UE initiates negotiation of a content control channel and one or more content delivery channels with the MF, by sending a media offer to the Core IMS.

(42) The P-CSCF within the Core IMS interacts with the RACS to reserve transport resources for the content control channel and one or more content delivery channels.

(43) The media offer is forwarded to the SCF.

(44) The SCF forwards the media offer to the MF.

(45) The MF provides a media answer to the SCF.

(46) The SCF forward the media answer to the Core IMS.

(47) Within the Core IMS, the P-CSCF interacts with the RACS to update the previous reservation (optional).

(48) The media answer for the content control channel and one or more content delivery channels is propagated to the UE.

#### 8.4.1.2.3 Signalling flows for the establishment of the content control channel from UE

Figure 24 provides an overview of the information flows for UE-initiated establishment of the content control channel.



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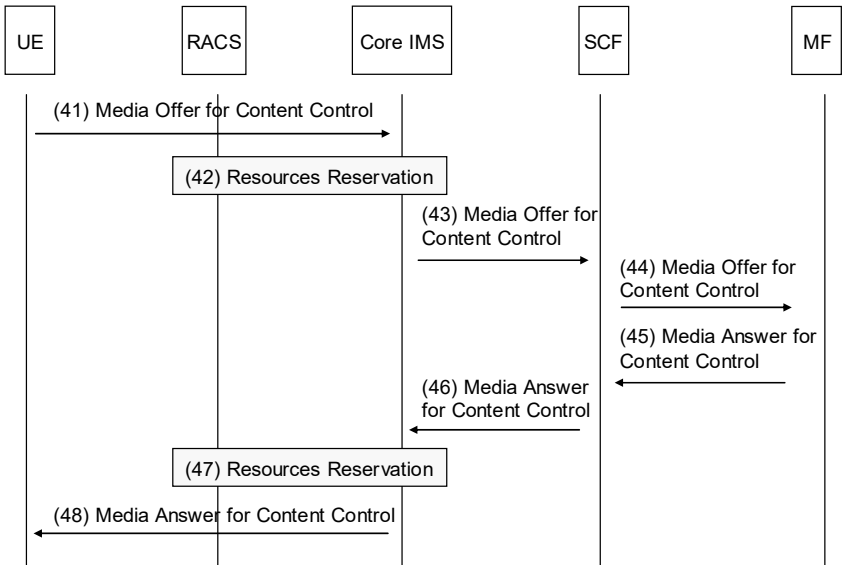


**Figure 24**

(41) The UE initiates negotiation of a content control channel with the MF, by sending a media offer to the Core IMS.

(42) The P-CSCF within the Core IMS interacts with the RACS to reserve transport resources for the content control channel.

(43) The media offer is forwarded to the SCF.

(44) The SCF forwards the media offer to the MF.

(45) The MF provides a media answer to the SCF.

(46) The SCF forward the media answer to the Core IMS.

(47) Within the Core IMS, the P-CSCF interacts with the RACS to update the previous reservation (optional).

(48) The media answer for the content control channel is propagated to the UE.

### 8.4.2 Signalling Flows for CoD session modification

The CoD session modification procedure is used to add, remove or modify one or more content delivery channels in an existing session.

The CoD session modification procedure is initiated by the UE or the MF.

The session modification procedure shall take place immediately after the session initiation procedure (e.g. using network parameters retrieved from content control messages) when no content delivery channels were set during this previous phase.

In case of a session modification, the content delivery channel setup/modification procedure is always triggered by the entity initiating the session modification.

Figure 25 provides an overview of the information flows for UE-initiated CoD session modification.



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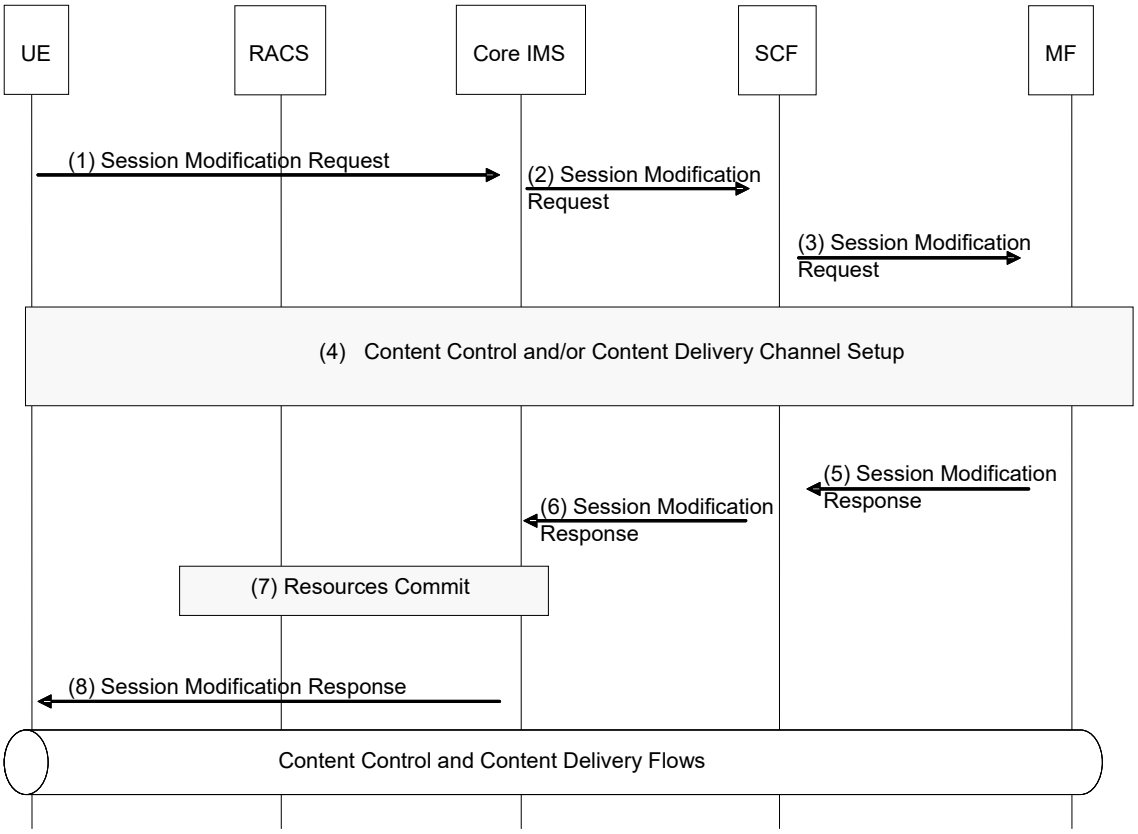


**Figure 25**

1) The UE initiates a session modification procedure in order to start a negotiation for one or more content delivery channel(s).

2) The session modification request is forwarded to the SCF through the Core IMS.

3) The SCF performs service authorization as described in clause 5.1. If the UE is allowed to modify the content, the SCF forwards the session modification request to the MF.

4) Procedures for establishment of a content delivery channels take place between the UE and the MF (see clause 8.4.2.1).

NOTE: The messages supporting step 4 are embedded in the messages supporting session modification.

5) The MF confirms the modification of the session.

6) The SCF forwards this modification to the Core IMS.

7) The P-CSCF within the Core IMS interacts with the RACS to commit all resources previously reserved. This includes opening pinholes for content delivery.

8) The P-CSCF forwards the confirmation to the UE.

After this point, UE may request content to be delivered over the content control channel and the actual content will be then delivered over the content delivery channels.

The content control channel will also be used to carry UE requests for controlling the streams over the content delivery channels, e.g. "pause", "fast forward", etc.

Figure 26 provides an overview of the information flows for MF-initiated CoD session modification.



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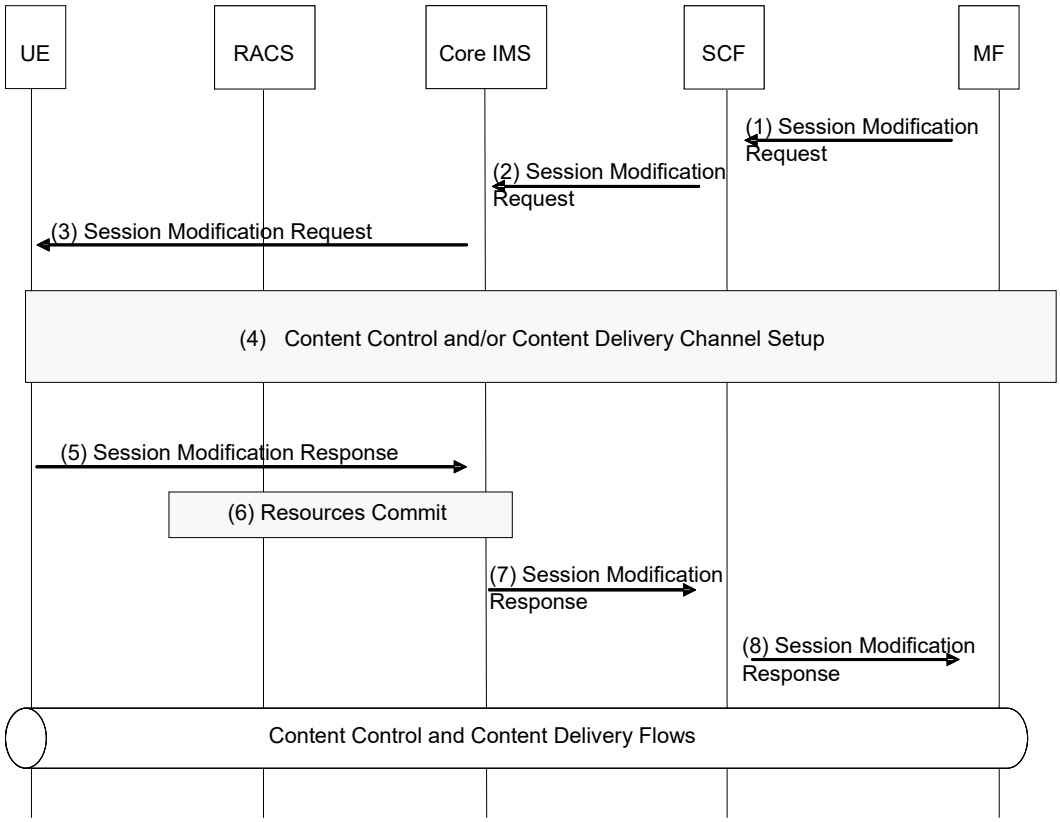


**Figure 26**

1) The MF initiates a session modification procedure in order to start a negotiation for one or more content delivery channel(s).

2) The SCF performs service authorization as described in clause 5.1. The SCF forwards the session modification request to the MF.

3) The session modification request is forwarded to the UE by the Core IMS.

4) Procedures for establishment of a content delivery channels take place between the UE and the MF (see clause 8.4.2.2).

NOTE: The messages supporting step 4 are embedded in the messages supporting session modification.

5) The UE confirms the modification of the session.

6) The P-CSCF within the Core IMS interacts with the RACS to commit all resources previously reserved. This includes opening pinholes for content delivery.

7) The Core IMS forwards this modification to the SCF.

8) The SCF forwards the confirmation to the MF.

After this point, UE may send a request over the content control channel to stream content and the actual content will be then delivered over the content delivery channels.

The content control channel will also be used to carry UE requests for controlling the content streams e.g. "pause", "fast forward", etc.



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#### 8.4.2.1 Signalling flows for the establishment/modification of the content delivery channel from UE

Figure 27 provides an overview of the information flows for UE-initiated establishment or modification of the content delivery channel.

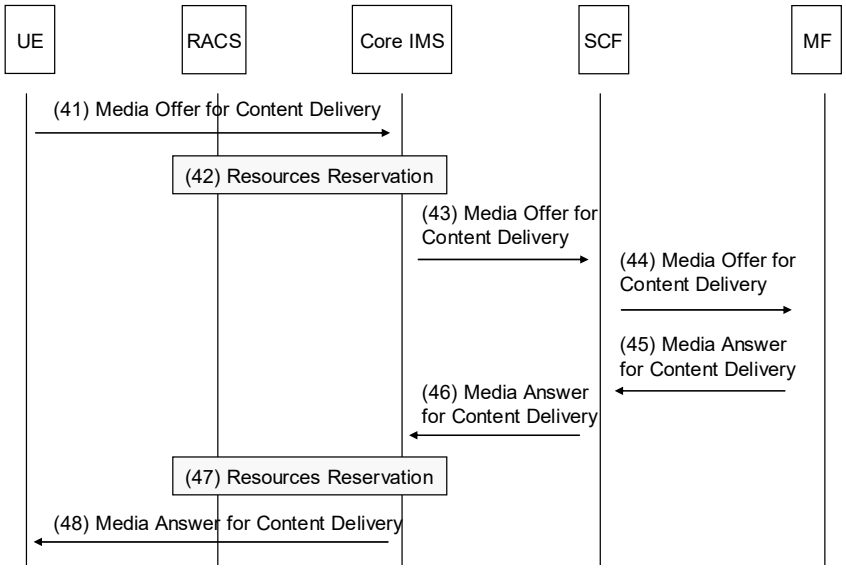


**Figure 27**

(41) The UE initiates negotiation of one or more content delivery channel with the MF, by sending a media offer to the Core IMS.

(42) The P-CSCF within the Core IMS interacts with the RACS to reserve transport resources for the content delivery channels.

(43) The media offer is forwarded to the SCF.

(44) The SCF forwards the media offer to the MF.

(45) The MF provides a media answer to the SCF.

(46) The SCF forward the media answer to the Core IMS.

(47) Within the Core IMS, the P-CSCF interacts with the RACS to update the previous reservation (optional).

(48) The media answer for the content delivery channels is propagated to the UE.

#### 8.4.2.2 Signalling flows for the modification of the content delivery channels from MF

Figure 28 provides an overview of the information flows for MF-initiated modification of the content delivery channel.



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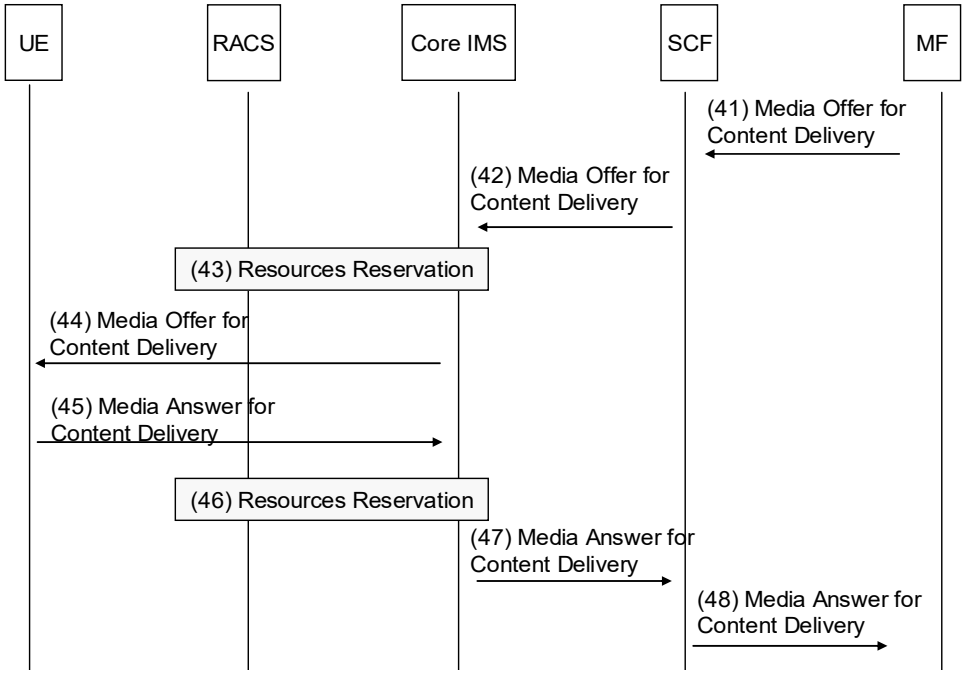


**Figure 28**

(41) The MF initiates negotiation of one or more content delivery channels with the UE, by sending a media offer to the SCF.

(42) The media offer is forwarded to the Core IMS.

(43) The P-CSCF within the Core IMS interacts with the RACS to reserve transport resources for the content delivery channels.

(44) The P-CSCF within the Core IMS forwards the media offer to the UE.

(45) The UE provides a media answer to the Core IMS.

(46) The P-CSCF within the Core IMS interacts with the RACS to update the reservation (optional).

(47) The media answer for the content delivery channels is propagated to the SCF.

(48) The SCF forwards the media answer to the MF.

### 8.4.3 Signalling Flows for CoD session release

Figure 29 provides an overview of the information flows for UE-initiated session release.



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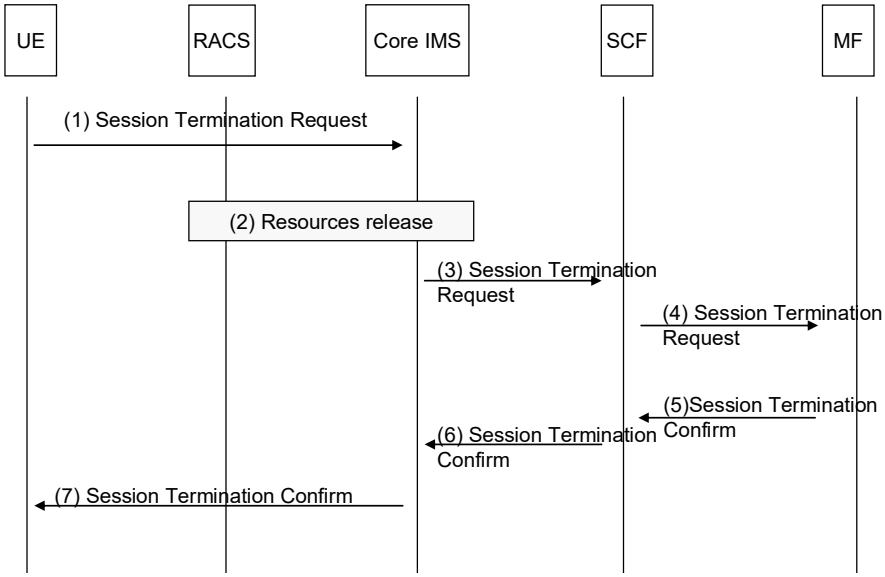


**Figure 29**

1) The UE initiate a session termination.

2) The P-CSCF interacts with the RACS to release all transport resources that had been reserved for this session.

3) The Session Termination Request is routed by the Core IMS entities up to the SCF.

4) The SCF forwards the Session Termination Request to the appropriate Media Function.

5) The Media Function (i.e. the MCF) release all resources associated with the session and returns a Session Termination Confirm.

6) The SCF forwards the Session Termination Confirm to the Core IMS.

7) The P-CSCF forwards the Session Termination Confirm to the UE.

Figure 30 provides an overview of the information flows for SCF-initiated session release.



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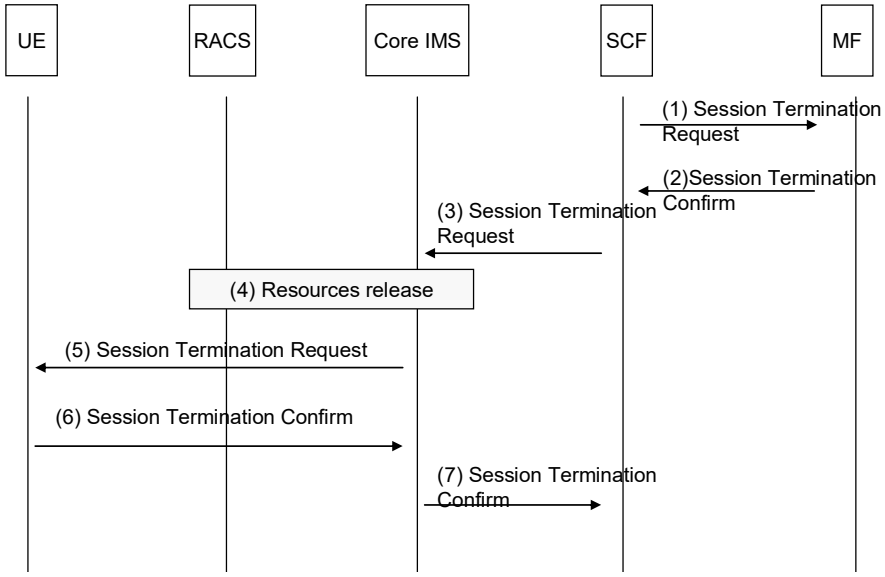


**Figure 30**

1) The SCF initiates a session termination towards the MF.

2) The Media Function (i.e. the MCF) releases all resources associated with the session and returns a Session Termination Confirm.

3) The SCF initiates a session termination towards the UE.

4) The P-CSCF interacts with the RACS to release all transport resources that had been reserved for this session.

5) The Session Termination Request is routed by the Core IMS entities up to the UE.

6) The UE returns a Session Termination Confirm to the Core IMS.

7) The Core IMS forwards the Session Termination Confirm to the SCF.

Figure 31 provides an overview of the information flows for MF-initiated session release.

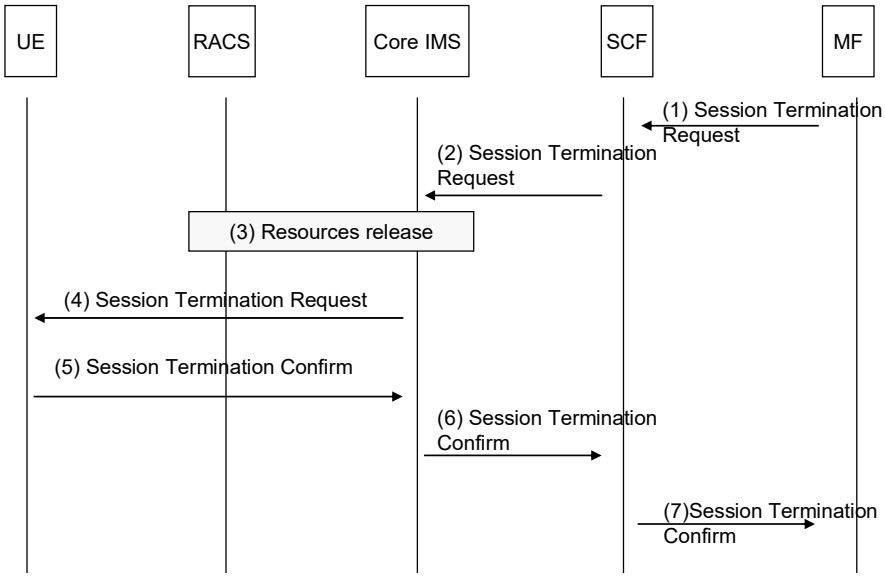


**Figure 31**



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1) The MF initiates a session termination towards the SCF.

2) The SCF forwards the session termination request to the Core IMS.

3) The P-CSCF interacts with the RACS to release all transport resources that had been reserved for this session.

4) The Session Termination Request is routed by the Core IMS entities up to the UE.

5) The UE returns a Session Termination Confirm to the Core IMS.

6) The Core IMS forwards the Session Termination Confirm to the SCF.

7) The SCF forwards the Session Termination Confirm to the MF that releases all resources associated with the session.

### 8.4.4 Signalling Flows for CoD session transfer

Editor's note : This chapter provides a basic proposal that requires alignment with ongoing work in 3GPP for inter-UE transfer and multimedia session continuity. Contributions are required to align the proposed mechanism below by proper referencing to the generic mechanism(s) provided by 3GPP in order to provide a unique solution for transferring sessions under the control of IMS.

The CoD session transfer is used to transfer an on-going CoD session from one terminal called transferor UE to another one called transferee UE.

The transferor UE and the transferee UE can be served by different or the same SCF.

The session transfer could be handled directly between both terminals or can be managed by the transferee SCF. In the latter case, the transferor SCF will initiate a CoD session with the transferee UE at session transfer request from the transferor UE.

It is considered that prior to the Session Transfer, the originating UE has necessary information to contact the transferee UE.

Figure 31A provides an overview of the information flows for direct CoD session transfer between the transferor UE (UE1) and the transferee UE (UE2). For clarity purpose, core-IMS is not indicated in the figure but all messages go through it.



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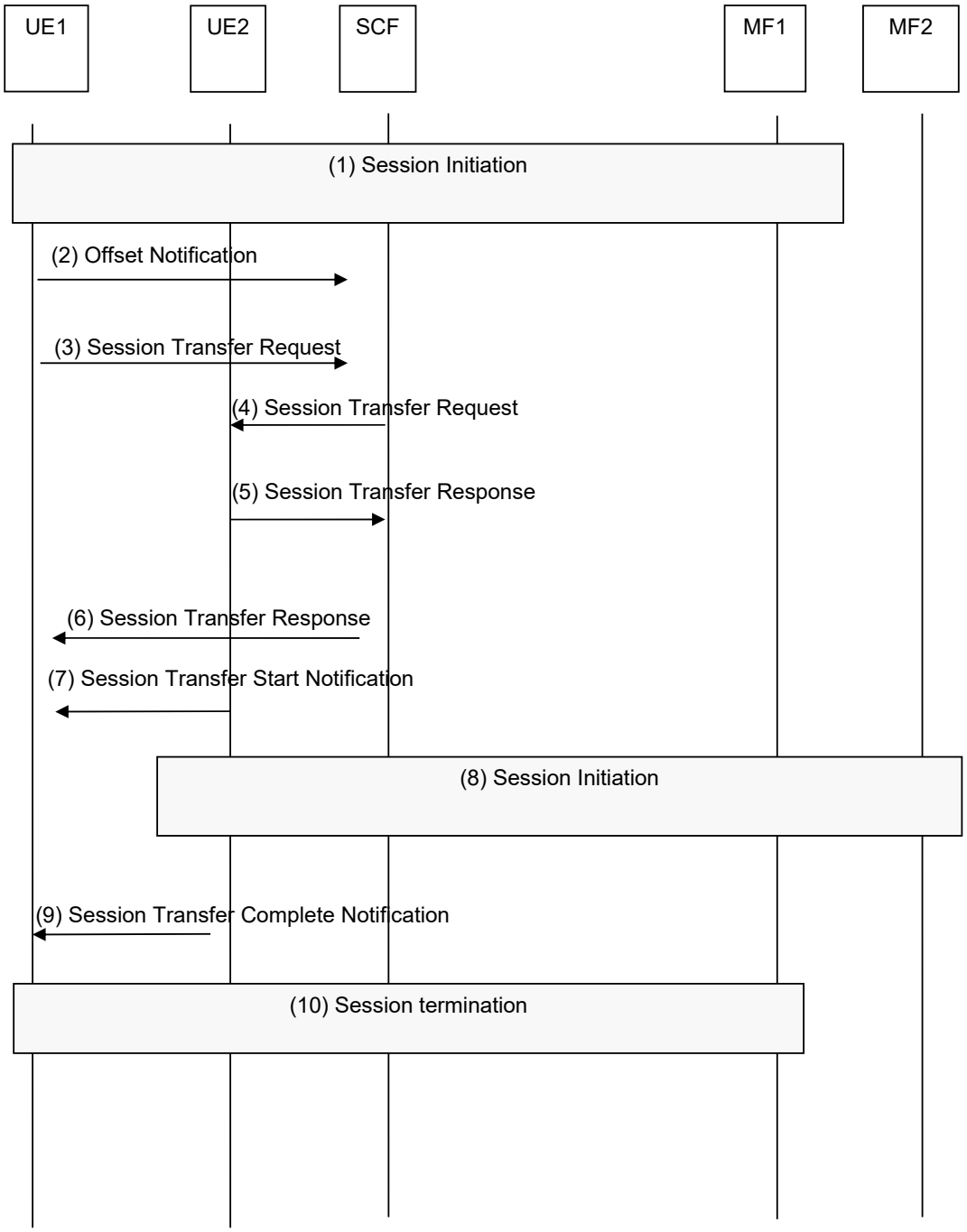


**Figure 31A**

1) The UE1 has initiated a dialogue to the CoD service as defined in clause 8.4.1. A session is on going with the MF1.

2) The user decides to transfer the session to the UE2. The UE1 sends an Offset Notification to the SCF via the core-IMS.

3) The UE1 sends a Session Transfer Request to the SCF via the core-IMS, containing user ID and if necessary the UE2 ID (e.g. if the user ID corresponds to multiple UEs), the content-id of the content to be transferred. The SCF performs service authorisation and checks that the user is authorised to transfer the session to the UE2.



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NOTE 1: In a particular protocol realization, the messages supporting step 2 may be embedded in the messages supporting session transfer request to the SCF.

4) The Session Transfer Request, including the offset, is forwarded from the SCF to the UE2 via the Core-IMS.

5) The UE2 receives an invitation to initiate a CoD session for the content indicated by the content-id. It acknowledges the Request by sending a Session Transfer Response to the SCF via the Core-IMS..

6) The SCF forwards the Session Transfer Response to the UE1 via the Core-IMS

7) The UE2 informs the UE1 that it initiates the CoD session initiation by sending a Session Transfer Start Notification to the UE1 via the core-IMS.

NOTE 2: This message can optionally go through the SCF.

8) CoD session initiation between the UE2 and MF2 via core-IMS is done as defined in clause 8.4.1.

9) The UE2 informs the UE1 that CoD session initiation is complete by sending a Session Transfer Complete Notification to the UE1.

NOTE 3: This message can optionally go through the SCF.

10) The UE1 terminates the CoD session with the MF1 as defined in clause 8.4.3

Figure 31B provides an overview of the information flows for CoD session transfer between the transferror UE (UE1) and the transferee UE (UE2) managed by the transferor SCF . For clarity purpose, core-IMS is not indicated in the figure but all messages go through it.



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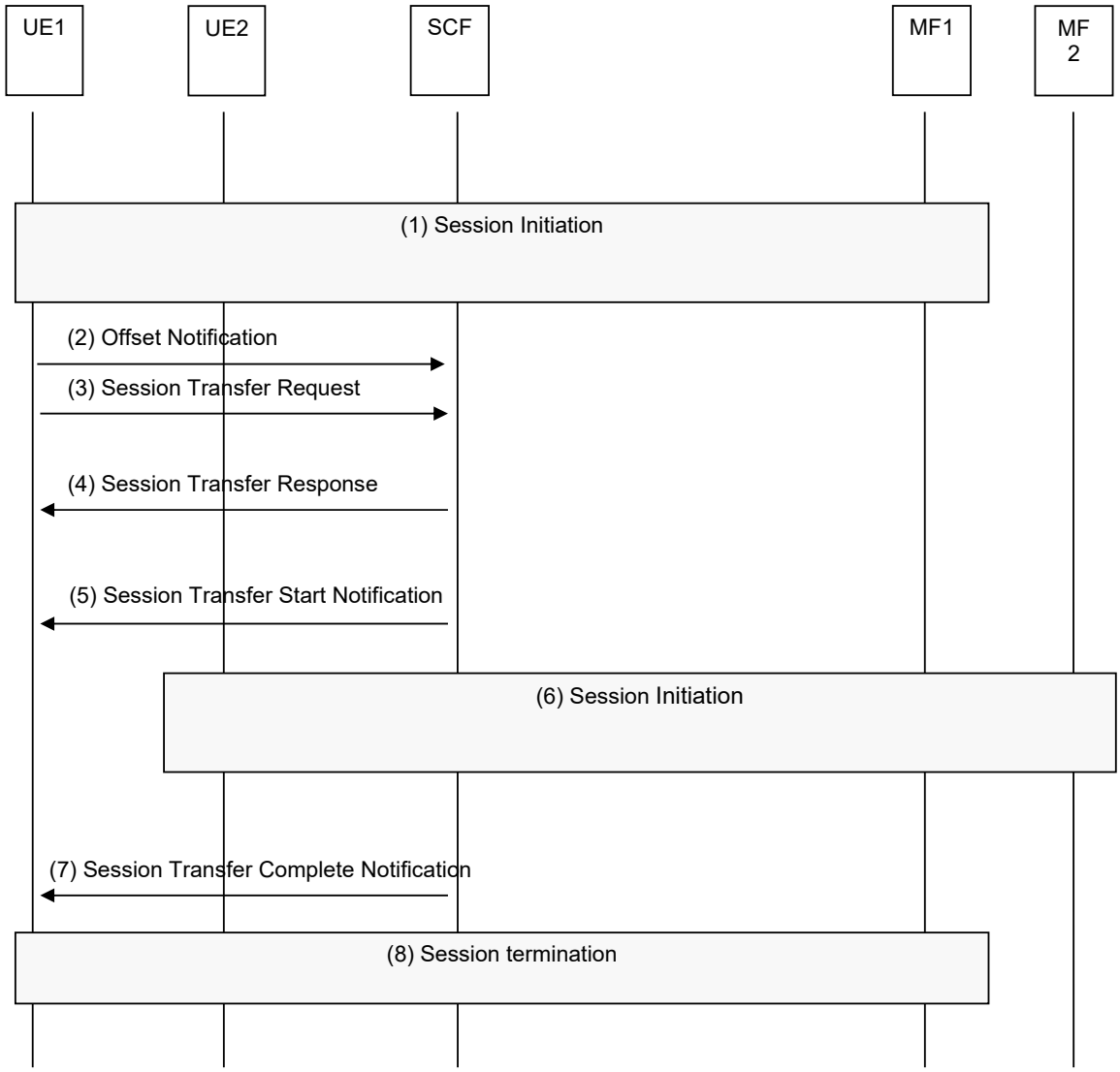


**Figure 31B**

1) The UE1 has initiated a dialogue to the CoD service as defined in clause 8.4.1. A session is on going with the MF1.

2) The user decides to transfer the session to the UE2. The UE1 sends an Offset Notification to the SCF via the core-IMS.

3) The UE1 sends a Session Transfer Request to the SCF via the Core-IMS, containing user ID and if necessary the UE2 ID (e.g. if the user ID corresponds to multiple UEs), the content-id of the content to be transferred. The SCF performs service authorisation and checks that the user is authorised to transfer the session to the UE2.

NOTE 4: In a particular protocol realization, the messages supporting step 2 may be embedded in the messages supporting session transfer request to the SCF.

4) The SCF replies by a Session Transfer Response to the UE1.

5) The SCF informs the UE1 that it initiates the CoD session initiation by sending a Session Transfer Start Notification to the UE1 via the core-IMS.

6) SCF-initiated CoD session initiation between the UE2 and MF2 is done by the SCF as defined in clause 8.4.1.



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7) The SCF informs the UE1 that CoD session initiation is complete by sending a Session Transfer Complete Notification to the UE1.

8) The SCF terminates the CoD session between the UE1 and the MF1 as defined in clause 8.4.3

## 8.4.5 Signalling flows for CoD service action data update

CoD service action data may be updated by UE as described in clause 8.4.5.1 and generically may be updated by MF as described in clause 8.4.5.2.

### 8.4.5.1 CoD service action data updated by UE

The UE use the procedure described in figure 31C to save a current CoD SAD.

Editor's Note: If there are other attributes in CoD service action data should be updated by UE is FFS.

This procedure may occur at any time. The most common use case is the stop CoD viewing request.

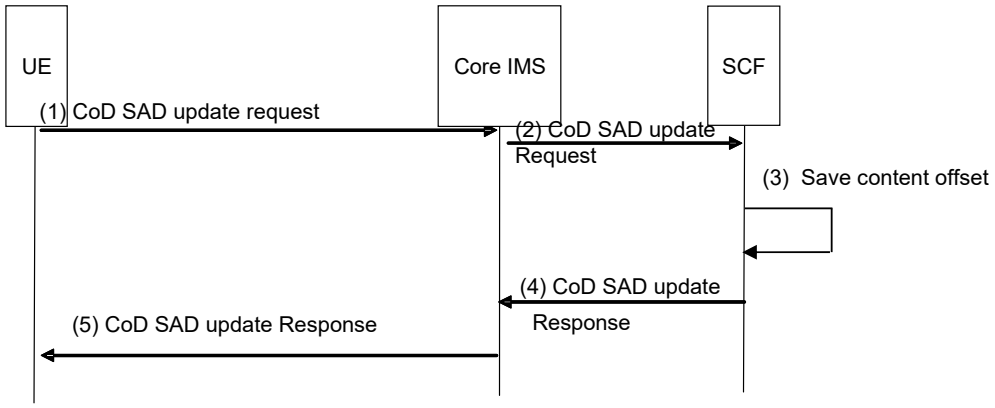


**Figure 31C**

1) The UE sends a CoD SAD update request to save the current position of the content.

2) The IMS core forwards this request to the SCF

3) The SCF store this offset as service action data for this user

4) The SCF confirms the CoD SAD update

5) The IMS core forwards the response to the UE.

### 8.4.5.2 CoD service action data updated by MF

The procedure described in figure 31D is used to save a CoD service action data by MF.

This CoD SAD may need to be updated for example when a user pauses a streaming, terminates the session or if the MF detects that the UE becomes unexpectedly offline.

Editor's Note: How to detect that the UE has lost connectivity is out of the scope of this document. For example loss of rstp heartbeat or rtcp packages may be used.



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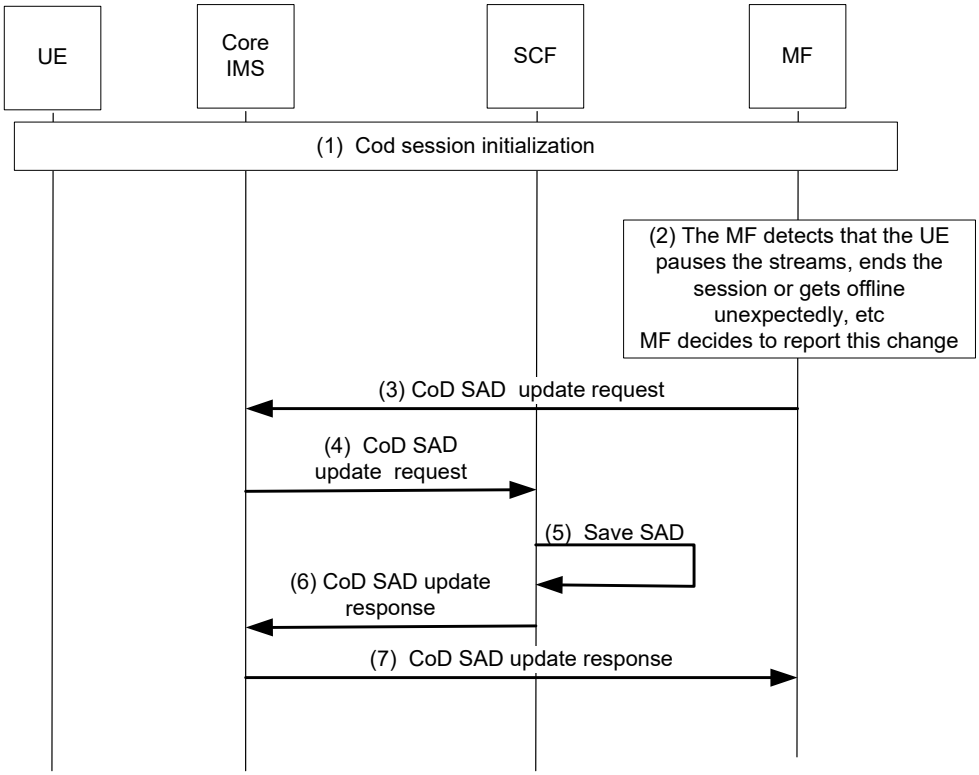


**Figure 31D**

1) CoD session initialization is performed as described in clause 8.4.1

2) MF detects a pause, end of session or that the UE becomes offline unexpectedly. The MF may decides to send changes of SAD to SCF.

3) MF sends a CoD SAD update request to save the current CoD SAD. This request may also include a indicator to inform the SCF that the UE went offline abnormally or not.

4) The IMS core forwards this request to the SCF.

5) The SCF updates the CoD SAD .

6) The SCF confirms the CoD SAD update.

7) The IMS core forwards the response to the MF.

### 8.4.6 Signalling flows for generating playlist by SCF and sending playlist information from SCF to MF during CoD session initiation

Figure 31E provides an overview of the information flows for playlist generation by SCF and sending playlist information from SCF to MF when UE initiated CoD session.



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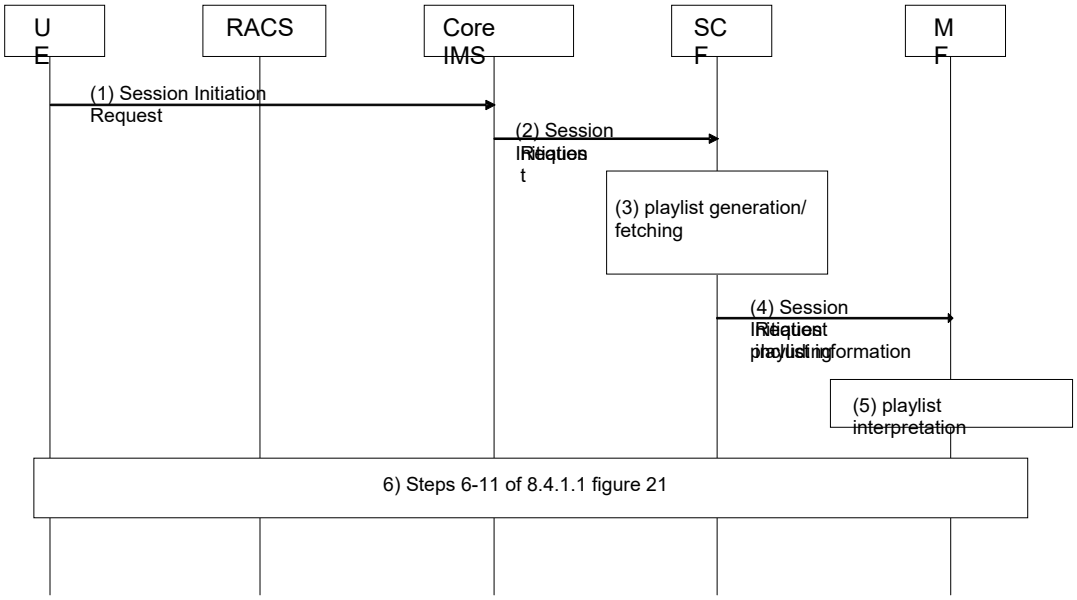


**Figure 31E: Playlist communication during CoD session initiation**

1) The UE initiates a dialogue to the CoD service as defined in clause 8.4.1.1, figure 21, step 3.

2) The session initiation request is routed by the Core IMS entities up to the SCF in charge of the requested CoD service as defined in clause 8.4.1.1, figure 21, step 4.

3) The SCF performs service authorization as described in clause 5.1. If the UE is allowed to access the service, the SCF generates playlist information or fetches a pre-configured playlist from a repository, based on the content ID carried in the session initiation request. Other information (e.g. the User ID etc) may also be used to generate the playlist. The playlist contains the list of content ID to be played and optionally content duration and restricted trick-play indication for each content.

Editor's Note: The data model for playlist is FFS.

4) The SCF selects an appropriate MF and forwards the session initiation request including playlist information to the selected MF, e.g. sends a SIP INVITE message.

Editor's Note: Whether a playlist can refer to content distributed over multiple MF entities is FFS.

5) The MF interprets playlist information and prepares for content delivery.

6) Content Control and or Content Delivery Channel Setup procedures and finalization of the CoD Session initiation procedure follow clause 8.4.1.1, steps 6-11.

NOTE: During this signalling, the UE might learn that a playlist was generated and act accordingly. Depending on the service type, the UE might already have learned the playlist in advance of service invocation.

### 8.4.7 Signalling flows for generating playlist by SCF and sending playlist information from SCF to MF during an existing CoD session

Figure 31F provides an overview of the information flows for playlist generation by SCF and sending playlist information from SCF to MF during an existing CoD session. This playlist may be a new playlist or an update.



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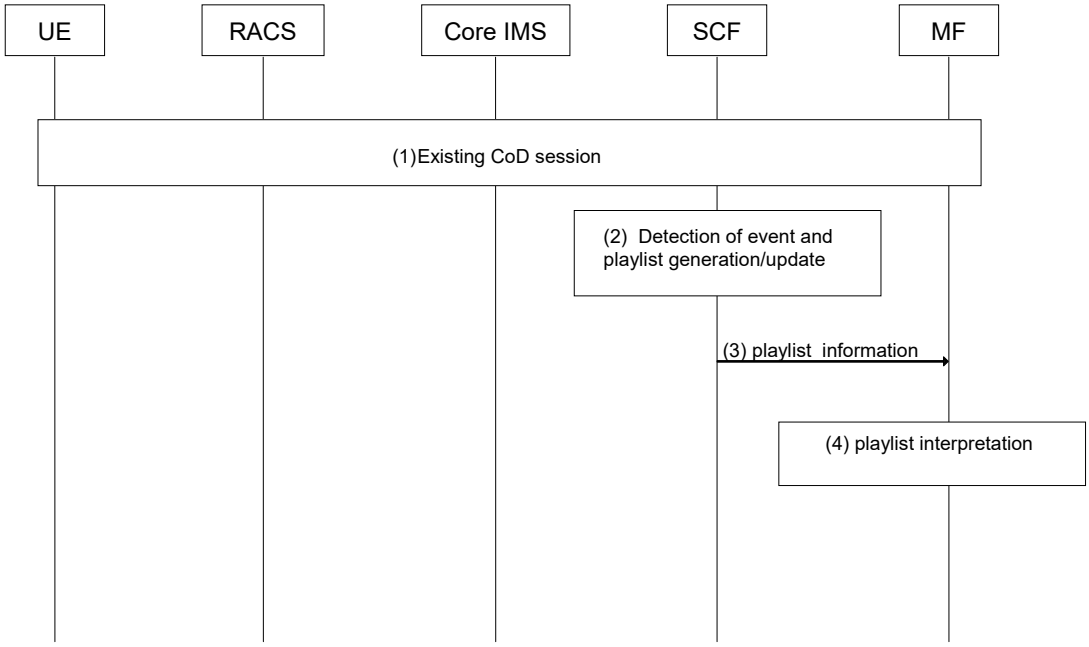


**Figure 31F: Playlist communication during an existing CoD session**

1) A CoD session has been successfully established as described in Clause 8.4.1.1

2) Due to detecting an event, the SCF may choose to generate or update playlist information for the ongoing CoD session. The playlist contains the list of content ID to be played and optionally content duration and restricted trick-play indication for each content.

3) The SCF passes the playlist information to the MF.

4) The MF interprets the playlist information and acts accordingly. This may have immediate impact on the ongoing media channel.

NOTE: A new or updated playlist might make a modification of the session necessary.

### 8.4.8 Content switch procedure within a CoD playlist

Figure 31G provides an overview of the information flows for content switch within a CoD playlist.



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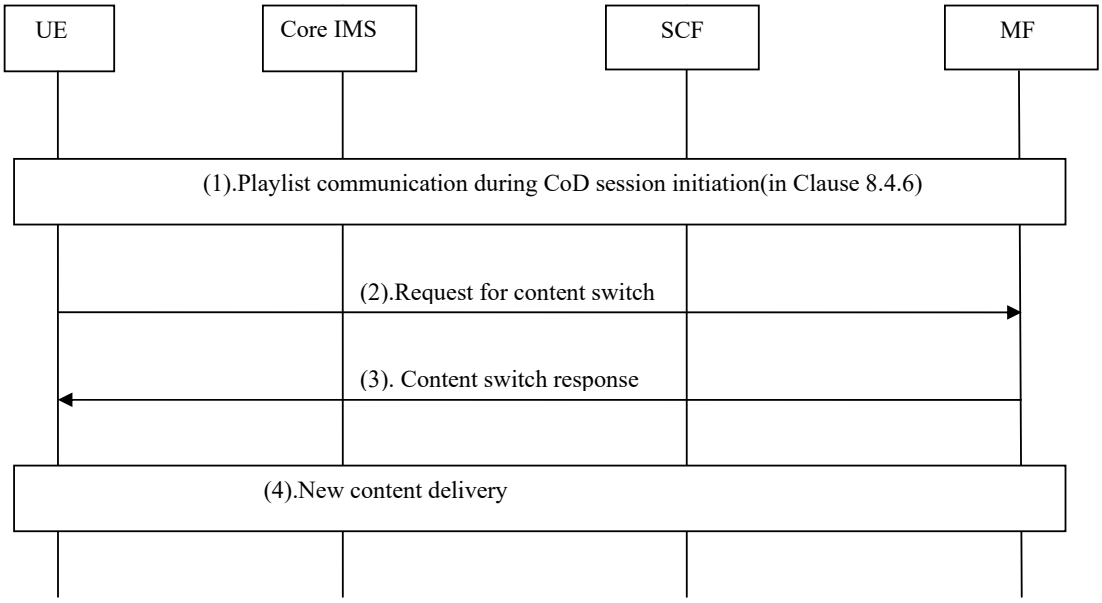


**Figure 31G Content switch within a CoD playlist**

1) The UE initiates a dialogue to the CoD service as defined in clause 8.4.6. In addition,the playlist which is generated by the SCF as defined in clause 8.4.6 may be forwarded to the UE by the MF for user to choose the subsequent content.

2) The UE sends the content switch request related to the selected content within the playlist. The similar mechanism defined in 3GPP TS 26 234 clause 5.5.4.2 may be used here.

3) The MF checks that the selected content is referred in the playlist, and confirms the request.

4) The MF starts to deliver the new content, reusing the established media channel in case of the numbers of channels and QoS requirements are the same as the previous channel.

NOTE: Session modifications may be needed if QoS requirements of the new content is not the same as the previous one.

# 8.5 PVR service procedures

Editor's Note: Should the PVR service be extended to record unicast sessions also?

## 8.5.0A Signalling Flows for PVR Using Impulsive Request

Figure 32 depicts the typical steps that occur when the UE makes an impulsive request for a PVR service.



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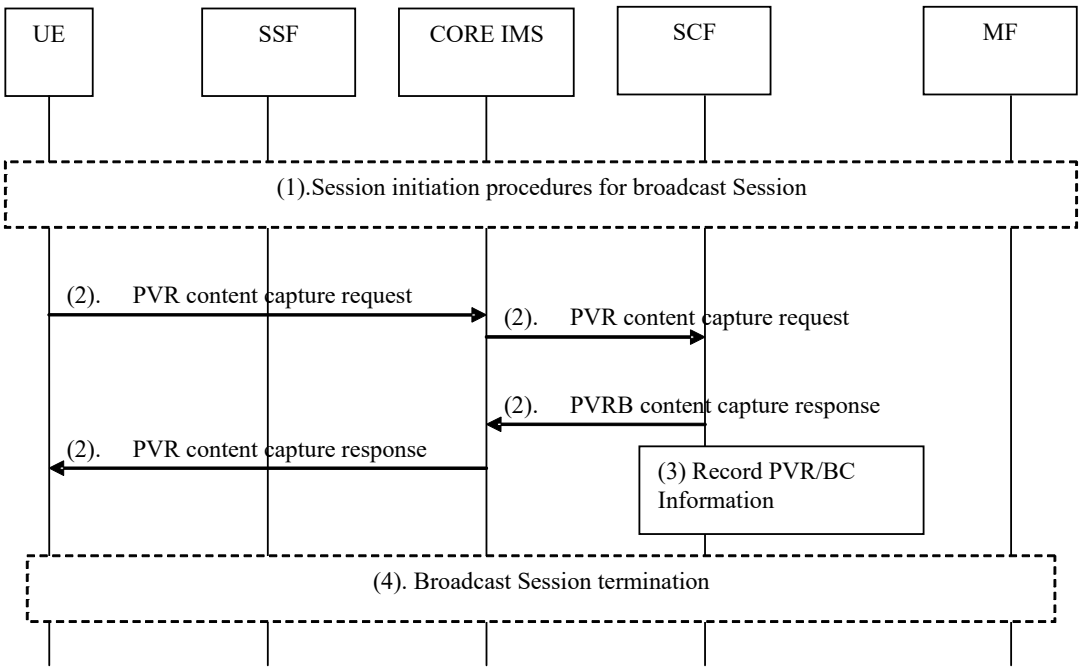


**Figure 32: PVR capture using impulsive request**

Specifics of interaction with RACS have been removed for purpose of simplification. It will follow the same procedures as outlined in the BroadcastTV and COD flows in clauses 8.3 and 8.4.

1) UE initiates Broadcast TV session following procedures specified in clause 8.3.1.

2) The user (on UE) makes a request to the SCF through the core IMS to capture the currently watched live content. During this step, the UE gives appropriate parameters to the SCF to identify the content to be recorded (e.g. BC service id and or current BC ProgrammeID, time channel delimitation code, beginning date, end date, duration, etc.). The UE also indicates the type of recording (N-PVR or C-PVR) and the target UE. The target UE identifies either the UE that is asked to record the content in case of C-PVR or the UE where the content will be downloaded, if required, in case of N-PVR.

Editor's note: Based on the PVR subscription when the target UE is the same that the UE sending the request, the SCF may override the PVR mode (nPVR or cPVR) based on the service provider's specific logic criteria in SCF.

In case of N-PVR, The SCF may check the N-PVR max-duration parameter to decide whether to allow the user to capture the selected live content. Instead of specifying a time limit, the UE may specify the current ProgrammeID indicating that the current Broadcast programme needs to be captured. The SCF answers with an N-PVR content capture response indicating to the user if capture of the content is allowed or not.

In case of C-PVR or N-PVR with download, the SCF will check whether the target UE is authorized to record or receive the selected live content, and in the case of one UE-A scheduling C-PVR Service Capture Request for another UE-B, SCF further checks that UE-B has C-PVR terminal capabilities and UE-A is authorized by UE-B to make C-PVR Capture Requests on behalf of UE-B.

Editor's Note: Mechanisms for SCF notifying to the UE (the content to be stored) of the storage space for the actual recording may be needed.

3) The SCF records the PVR/BC bookmark information as part of the IPTV service action data. In case of N-PVR, The SCF then follows relevant procedures to initiate the recording of the content by the MF, details of which are not explicitly shown in figure. In case of C-PVR, the SCF follows procedures in clause 8.5.2.2 to initiate the recording of the content by the specified client device.



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4) The UE initiates Broadcast session termination procedures as defined in 8.3.3. Depending on the usage model, the UE initiates the Broadcast session termination procedure immediately after issuing the PVR capture request or it may do it at later point. The former would be the typically be the case of "Park and Pickup TV".

## 8.5.0B Signalling flows for the PVR off-line capture request

Figure 33 depicts the typical steps that occur when the UE makes an offline request for a PVR service.

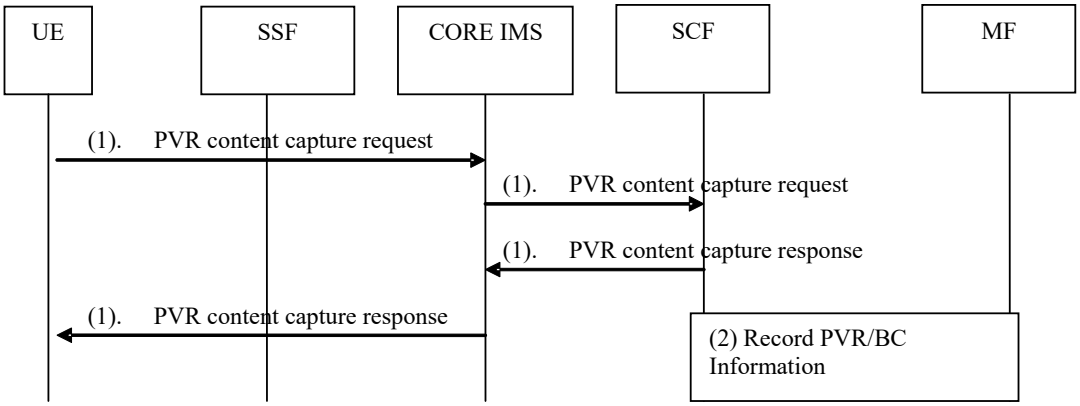


**Figure 33: PVR Capture procedures using offline request**

1) The user (on UE) makes a request to the SCF through the core-IMS to capture a particular live content. During this step, the UE gives appropriate parameters to the SCF to identify the content to be recorded (e.g. BC service id, BC programmeID time channel delimitation code, beginning_date, end_date, duration, etc.). The UE also indicates the type of recording (N-PVR or C-PVR) and the target UE. The target UE identifies either the UE that is asked to record the content in case of C-PVR or the UE where the content will be downloaded, if required, in case of N-PVR.

Editor's note: Based on the PVR subscription when the target UE is the same that the UE sending the request, the SCF may override the PVR mode (nPVR or cPVR)based on the service provider's specific logic criteria in SCF.

The SCF may check the N-PVR max-duration parameter to decide whether to allow the user to capture the selected live content.

NOTE: The content capture request may go to the SSF instead of the SCF. This implies that the SSF needs to communicate with the SCF. A reference point for direct communication between the SSF and SCF is out of scope for this release.

In case of C-PVR or N-PVR with download, the SCF will check whether the target UE is authorized to record or receive the selected live content, and in the case of one UE-A scheduling C-PVR Service Capture Request for another UE-B, SCF further checks that UE-B has C-PVR terminal capabilities and UE-A is authorized by UE-B to make C-PVR Capture Requests on behalf of UE-B.

Editor's Note: Mechanisms for SCF notifying to the UE (the content to be stored) of the storage space for the actual recording may be needed.

2) In case of NPVR, the SCF follows relevant procedures to initiate the recording of the content by the MF. In case of C-PVR, the SCF follows procedures in clause 8.5.2.2 to initiate the recording of the content by the specified client device.

## 8.5.1 Network PVR service procedures

Network PVR (N-PVR) service is used by the UE to ask for a capture of live content by the network and to access it later on.



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The NPVR service procedures comprise two major steps:

Step 1: Request for N-PVR Service Capture Request

The UE sends an N-PVR content capture request to the SCF. This request can be:

**an impulsive request :** in this case, a BC service is already activated. The UE asks the SCF to record the live content currently being watched. This may be a request to record current Broadcast Programme or a sequence of programmes from a given position in time (BC bookmark) .This is as discussed in clause 8.5.1.1.1.

**an off-line request :** the UE asks the SCF to record a particular live content unrelated to any active BC session. may be a request to record current Broadcast Programme or a sequence of programmes This is as discussed in clause 8.5.1.1.2.

Step 2: Request for N-PVR service

Once recorded, the user can make a request for previously recorded N-PVR request. The N-PVR content can be resumed on the same UE or different UE belonging to user from start or from the point at which the content recording was requested. The N-PVR content may have also been downloaded to the UE making local watching of the content possible.

NOTE: The case when an N-PVR service capture is done as an impulsive request and is requested later from the same or another UE from the point at which the content recording was requested can be viewed as a case of "*Park and Pickup TV*" as described in clause 3.1. In this case, the currently active Broadcast TV programme or channel that was scheduled for an impulsive N-PVR capture request can be requested at a later point on the same or different UE from the previously paused/parked point.

### 8.5.1.1 Signalling Flows for Network-PVR Service Capture Request

This can be handled as an off-line request or as an impulsive request.

#### 8.5.1.1.1 Signalling Flows for Network-PVR Using Impulsive Request

Refer to clause 8.5.0A.

#### 8.5.1.1.2 Signalling flows for the Network-PVR off-line capture request

Refer to clause 8.5.0B.

### 8.5.1.2 Signalling flows for Network-PVR content session

Figure 34 depicts the typical steps that occur when the UE makes a request to retrieve/resume previously recorded N-PVR content.

NOTE: If the N-PVR content has been previously downloaded to the UE, it can watch it locally without using the following procedures.



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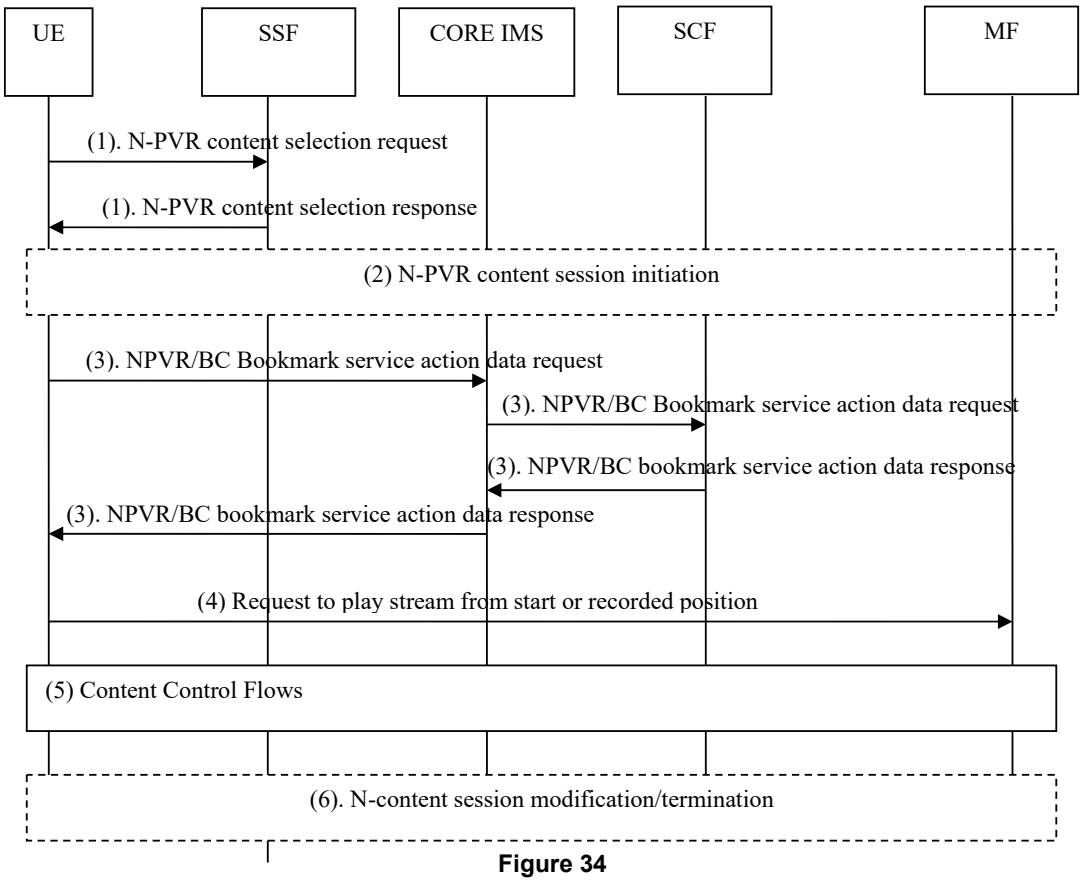


**Figure 34**

1) The SSF presents the UE with listing of available N-PVR Broadcast TV content captured via impulsive or offline capture requests, from which the user can select. In addition the "BC bookmark" information could be presented by the SSF else the UE can make a separate request to retrieve it from the SCF as specified in step (3).

2) The UE initiates an N-PVR session. The N-PVR session is equivalent to the CoD session. Therefore procedures defined in clause 8.4.1 apply.

3) The UE may request to the SCF through the core-IMS BC bookmark information pertaining to the Broadcast TV programme(s) that was previously requested to be recorded.

NOTE 1: Instead of having the UE retrieve the BC bookmark information as in Step (1) or (3), it may be possible for SCF to directly send the BC bookmark information from IPTV service action data to the MCF. Details of the procedures are out of scope for this release.

NOTE 2: This is a logical step. For efficiency purposes it may be combined with step (2).

4) The UE makes a request to play the content from specified bookmarked location.

5) This includes procedures for trick play control of the resumed BroadcastTV stream.

6) When the UE wishes to modify to terminate the resumed BC programme, it follows session termination procedures as specified in clauses 8.4.2 and 8.4.3.

## 8.5.2 Client PVR service procedures

Client PVR (C-PVR) service is used by the UE to ask for a capture of live content locally or by the remote client device and to access the recorded content later on.



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NOTE: In case of local capture requests that do not need network IPTV management or authorization, the recording can be handled locally on the client without SCF involvement. The procedures for local recording on client without SCF involvement is outside scope of specification.

The C-PVR service procedures comprise three major steps:

Step 1: Initiate C-PVR Service Capture Request.

The UE sends a C-PVR content capture request to the SCF. This request can be an impulsive request or an off-line request. Impulsive request and off-line request are the same with the definitions in clause 8.5. This step is used for SCF to perform C-PVR service authorization, or where one UE schedules the C-PVR task for a future time or for another UE.

NOTE: If further mechanisms are required to protect the digital rights of the content, the system could use DRM to prohibit unauthorized access to the content.

Step 2: Request for initialization of the C-PVR recording session.

When the event for the C-PVR recording have been reached (e.g. beginning time of a TV program), the SCF initiates a request to UE to trigger the initialization of the C-PVR recording session and record the content.

NOTE: in case the UE makes an impulsive request for a C-PVR service, the existing BC session may be reused, thus the step 2 is optional.

Editor's note: The offline capture request without SCF trigger is FFS.

Step 3: Access the recorded content.

Once recorded, The C-PVR content can be resumed on the UE which stored the content from the point at which the content recording was requested.

NOTE: Since the content is stored on the UE, it will not be required to have any further interaction between the UE and any other network entities to either access or play recorded content in this step.

#### 8.5.2.1 Signalling Flows for Client-PVR Service Capture Request

##### 8.5.2.1.1 Signalling Flows for Client-PVR Using Impulsive Request

Refer to clause 8.5.0A.

##### 8.5.2.1.2 Signalling flows for the Client-PVR off-line capture request

Refer to clause 8.5.0B.

#### 8.5.2.2 Signalling flows for Client-PVR recording session

Figure 34A depicts the typical steps when the SCF makes a request to initiate the recording of the content. For the scenario when the UE makes an impulsive request for a C-PVR service, the existing BC session may be reused if one exists instead of the following procedures.



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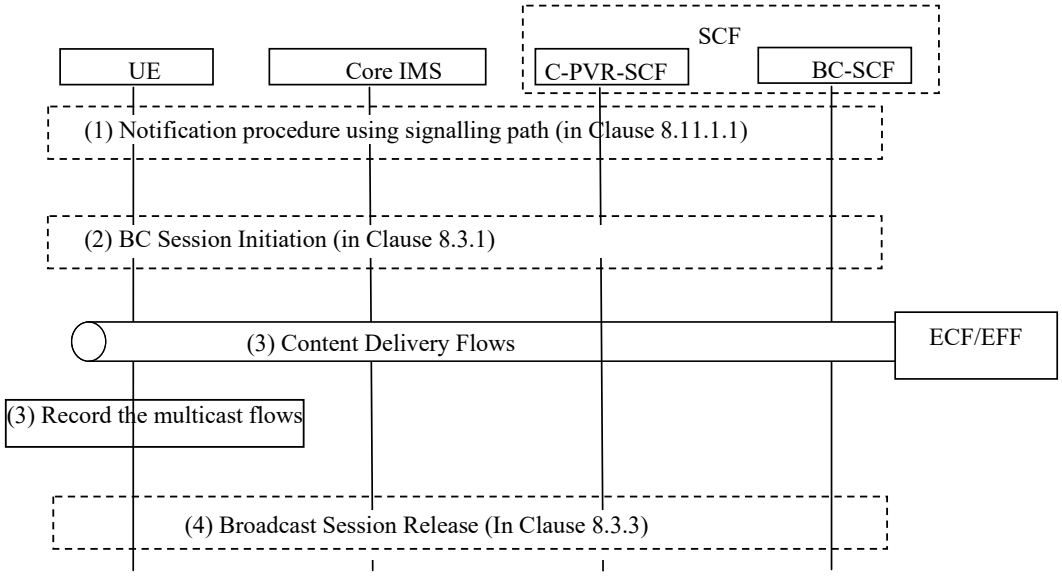


**Figure 34A Signalling flows for Client-PVR recording session**

1) The SCF detects the event that triggers the C-PVR service, e.g. when the BC program is ready to be recorded. The SCF initiates a notification request to the UE designated by the C-PVR content capture request to record the content, and the notification request carries parameters to identify the content to be recorded (e.g. BC service id and or current BC Programme ID, time channel delimitation code, beginning date, end date, duration, etc.) and indicates that the content should be recorded.

NOTE: The notification request procedures are the same as sending notification using signalling path specified in clause 8.11.1.1.

2) UE initiates BC session initiation procedures as specified in clause 8.3.1, and after the content delivery channel setup, the UE joins multicast channels and receives multicast flows.

3) The UE records the multicast flows.

4) When the end time of the recording is reached, the UE or SCF initiates BC session release procedures as specified in clause 8.3.3.

## 8.6 Time Shift service procedures

The Time Shift service is used by the UE to view a programme that has already occurred or started. It is necessary for the IPTV operator to store a programme in order for this service to be available. Note that unlike nPVR it is not necessary for a UE to indicate that a programme shall be recorded but it is not always the case that a programme is Time Shift enabled. The time to live for Time Shifted enabled programmes have a different expiration time compared to nPVR (example 1 week compared to possible 6 months for nPVR). For a programme that has not finished it is possible that the UE catches up with the broadcasted programme sent in real time.

The user selects timeshift content from the information provided by the SSF; just as any other CoD content. Consequently initiation and termination of time-shift sessions are exactly the same as for CoD, as described in clauses 8.4.1 and 8.4.3 respectively.

Modification of the session is also the same as for the CoD service, as described in clause 8.4.2, except for the special case when the timeshift session catches up with real time, at which time the session may be modified to switch over to multicast. In this case the same flows as for trickplay TV will be used.



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## 8.7 Preview procedures

Editor's Note: The preview procedures for BC and COD services can be described in this clause.

### 8.7.1 Preview procedures for BC service

### 8.7.2 Preview procedures for COD service

The CoD content preview procedures may take place before the users decide to obtain some particular CoD content.

The preview content may have its own content identifier to enable the content selection (e.g. from the content guide), in which case the preview procedures can refer to procedures specified in clause 8.4.

The preview content may also share the content identifier with the regular CoD content, while variation of the regular CoD content (e.g. segment collection, lower bit-rate transcoding etc.) is delivered to the UE based on criteria such as content metadata or policy of service provider.

#### 8.7.2.1 CoD preview procedures for sharing identifier

Editor's Note: simplification and alignment with existing CoD procedures is needed.

In this case, the preview content shares the content identifier with (related) regular CoD content, while other indicators should be present during session initiation procedure. The MF is informed by preview indications to deliver content for preview (e.g. segment collections, lower bit-rate stream).

The figure 34B depicts the steps for session initiation when CoD content preview is requested with sharing identifier with regular CoD content.



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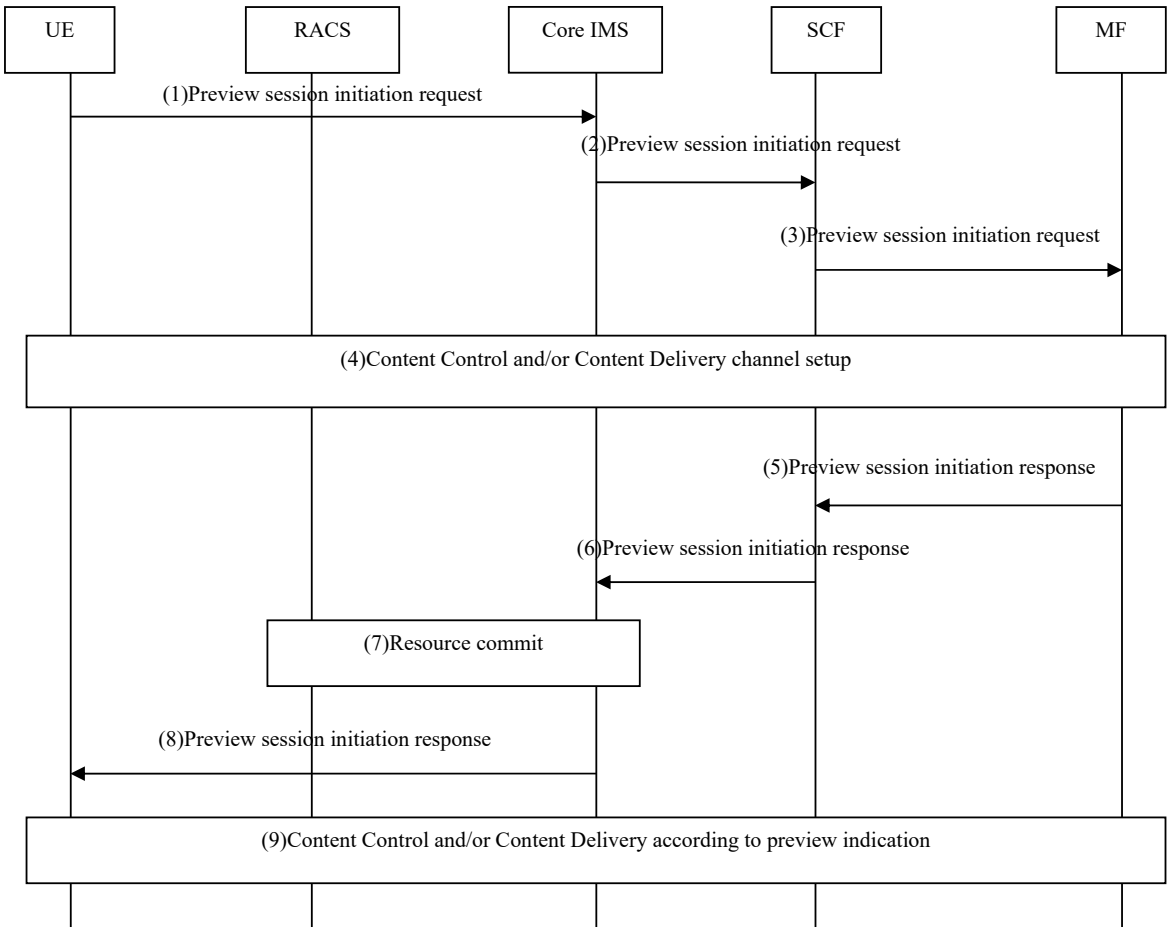


**Figure 34B signalling flow for preview session initiation for CoD content**

1) The UE initiates a request for the CoD content preview. The request includes the regular CoD content identifier, with specific indicator for content preview.

2) The preview session initiation request is routed by the Core IMS entities up to the SCF in charge of the requested CoD preview service.

3) The SCF identifies the session initiation is for content preview and performs service authorization. If the UE is allowed to preview the content, the SCF forwards the session initiation request to the selected MF, including preview indication for the CoD content.

NOTE 1: In step 3 the preview indication shall be subject to some type of criteria, e.g. content metadata.

4) Signalling procedures for establishment of a content control channel and optionally content delivery channels for the content preview take place between the UE and the MF as described in clause 8.4.1.2.

5) The MF confirms the establishment of the dialogue with the UE.

6) The SCF forwards this confirmation to the Core IMS.

7) The P-CSCF within the Core IMS interacts with the RACS to commit all resources previously reserved. This includes opening pinholes for exchanging content control messages and/or content delivery.

8) The P-CSCF forwards the dialogue confirmation to the UE.



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9) After the Content control and/or delivery channel is established MF delivers preview content to UE regarding the preview indication obtained in step 3.

## 8.8 Parental control procedures

Editor's Note: The parental control procedures can be described in this clause.

## 8.9 UGC procedures

Editor's Note: The procedures for UGC service can be described in this clause.

### 8.9.1 Overview

There are two types of UGC procedures :

- **creation of the User Generated Content:** this type of procedure allows a user to declare and upload/upstream his/her own content to the network ,
- **watching of User Generated Content that has already been created**: this type of procedure allows a user to select and watch User Generated Content that has already been created.

NOTE: The clause 8.9.3 UGC watching procedure may start before the clause 8.9.2 UGC creation procedure has been completed (see e.g. TS 181 016 [13B] clause A.9.1.2 "Use case: Home movie sharing, streaming").

### 8.9.2 UGC creation procedure

The UGC creation procedure comprises four major steps:

Step 1: Declaration of User Generated Content.

- The UE sends a User Generated Content creation request to the SCF and receives a content ID for the UGC from the SCF. The content ID is independent of the address where the UGC can be retrieved by other UEs.

Step 2: Publication of User Generated Content information by the UE

- The UE sends a request to the SCF that contains a description of the User Generated Content (name, type, restriction, textual description, , special group users etc …). This request may be combined with the User Generated Content Declaration request in step 1.

Step 3: Creation of User Generated Content

- The UE initiates a session with the SCF and MF in order to create the User Generated Content (i.e. upload/upstream (unicast) the content to the MF). The MF provides the SCF with the location at which the UGC becomes available.

Step 4: Publication of User Generated Content information by the SCF

- The SCF establishes the relationship between UGC content ID, UGC description ,and optionally the MF, and publishes this UGC descriptioninformation.

NOTE: In general, the UGC procedures should allow for all forms of SCF-MF interaction as described in clause 5.2

Step 1 is always the first step. Step 2 may happen at any time during the UGC creation and can be repeated during the lifetime of the content.Editor's note: Mechanisms for validation of publication of UGC content description may need to be considered. How to keep the published UGC content description accurate or whether it is needed is FFS.

Editor's note: Mechanisms for validation of publication of UGC content description may need to be considered. How to keep the published UGC content description accurate or whether it is needed is FFS.

Figure 34B depicts the typical steps that occur when the UE creates UGC.



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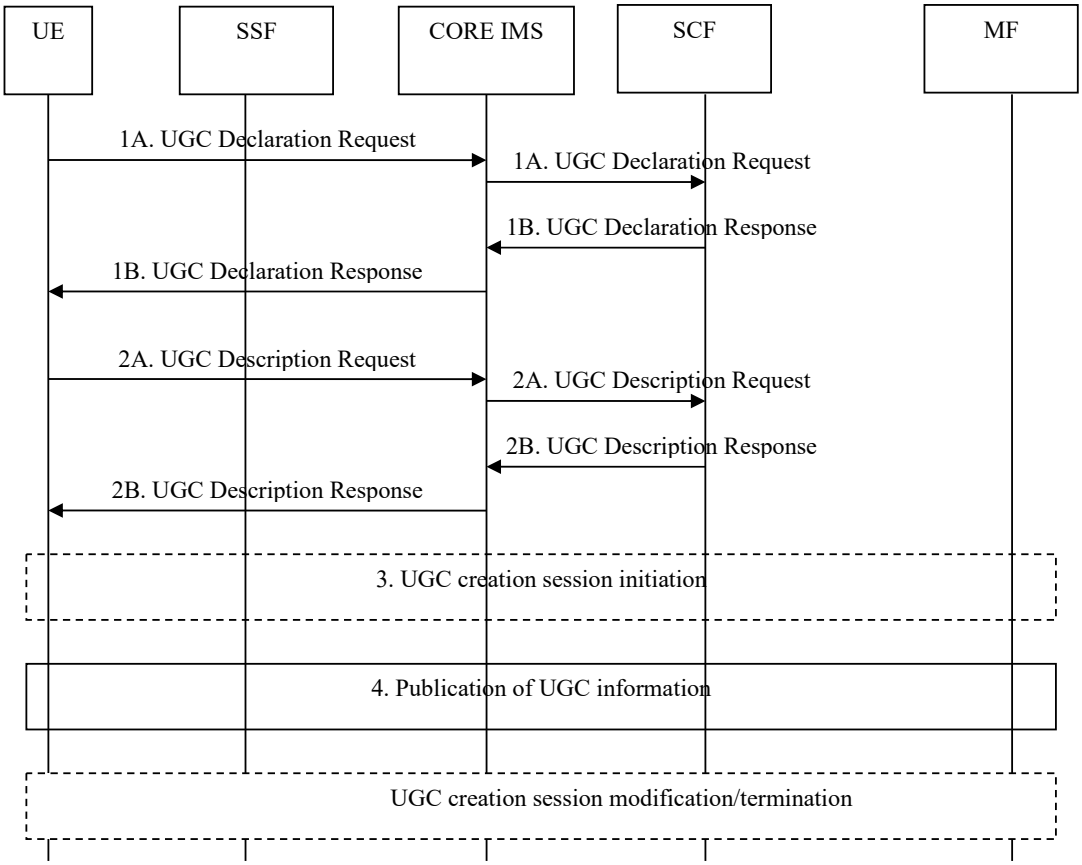


**Figure 34B: UGC creation**

1A) The UE sends a UGC Declaration Request through the Core IMS to the SCF

1B) The SCF records the UGC information and sends a UGC Declaration Response including a UGC content ID through to core IMS to the UE..

2A) The UE sends a UGC Description Request through the Core IMS to the SCF. The request contains a description of the User Generated Content (name, type, restriction, textual description, , special group users etc …).

2B) The SCF records the UGC description, establishes the relationship between UGC ID and UGC description and sends a UGC Description Response through to core IMS to the UE.

NOTE: Steps 2A/B can be done either after steps 1A/1B or combined with steps 1A/1B.

3) The UE initiates a UGC creation session, including a content upload/upstream channel to the MF. This procedure is similar to the one defined in 8.4.1.1 figure 21 for CoD initiation procedure (steps 3-6 and 9-11). The content control channel may not be required. The session initiation response from the MF to the SCF includes the location on which the UGC becomes available.

4) The SCF establishes the relationship between UGC ID, UGC description and optionally UGC location (address), and publishes this UGC information.

The UE can modify or terminate the established UGC creation session later on .

NOTE: Whether publication of UGC information can be performed between UE and the SSF is FFS.



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NOTE: In a particular protocol realization, the messages supporting steps 1 and 2 may be embedded in the messages supporting UGC session initiation.

Editor's note: UGC creation sesssion initiated by remoteUE is FFS.

Editor's note: it is FFS whether UE can send multicast stream to ECF/EFF.

Editor's note: it is FFS whether publication of UGC information is performed also between the UE and the SSF or only between the UE and the SCF.

### 8.9.3 UGC watching procedure

The UGC watching procedure comprises two major steps:

Step 1: Selection of UGC

- The selection of the UGC may be done through the SSF. Alternatively, UGC selection can be triggered by a content recommendation or a notification.

NOTE: Other ways of selecting UGC (notification from another UE) are out of scope of this release.

Step 2: Watching of UGC.

- The UE initiates a session with the SCF in order to watch the selected UGC.

Figure 34D depicts the typical steps of the UGC watching procedure.

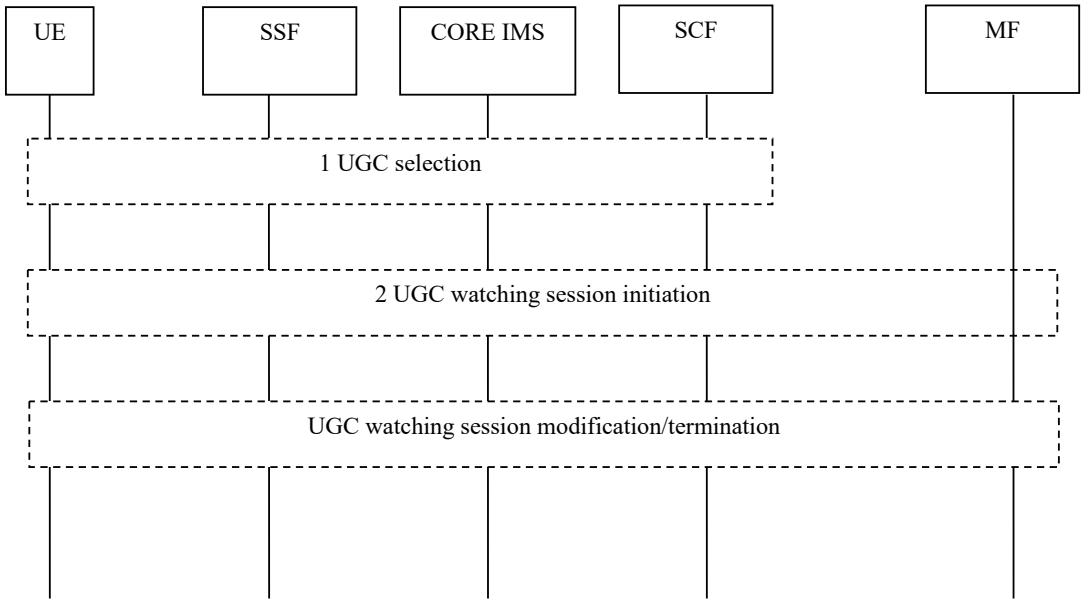


**Figure 34D: UGC watching procedure**

1) The UE selects UGC through service selection procedure with SSF as defined in clause 8.2 step 4. The SSF may restrict the list of UGC depending on user identity and UE capabilities. Alternatively, UGC availability is triggered through the notification procedure from the SCF as defined in clause 8.11.1 or recommendation procedure from the SCF as defined in clause 8.13.

2) The UE initiates a UGC watching session. The UGC watching session is equivalent to the CoD session. Therefore procedures defined in clause 8.4.1 apply.



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When the UE wishes to modify or to terminate the UGC session , it follows session modification/termination procedures as specified in clauses 8.4.2 and 8.4.3.

Editor's note: UGC session established through a BC session for multicasted content is FFS.

## 8.10 Personalized channel (PCh) service procedures

PCh service allows the users to tune in a single (virtual) channel and watch one or multiple pre-configured content items identified in the service profile (PCh information).

Before the PCh service is available to the user, the configuration procedure shall take place, through which particular IPTV content items (e.g. program from some BC service, movie from some CoD catalogue) are selected and scheduled in the PCh information.

The UE retrieves the specific PCh information from the SSF via service selection procedure as described in 8.2.

Before the user can view the content items in the PCh information, a session initiation procedure for the PCh service shall take place.

The figure 34E depicts the overview of PCh service procedures

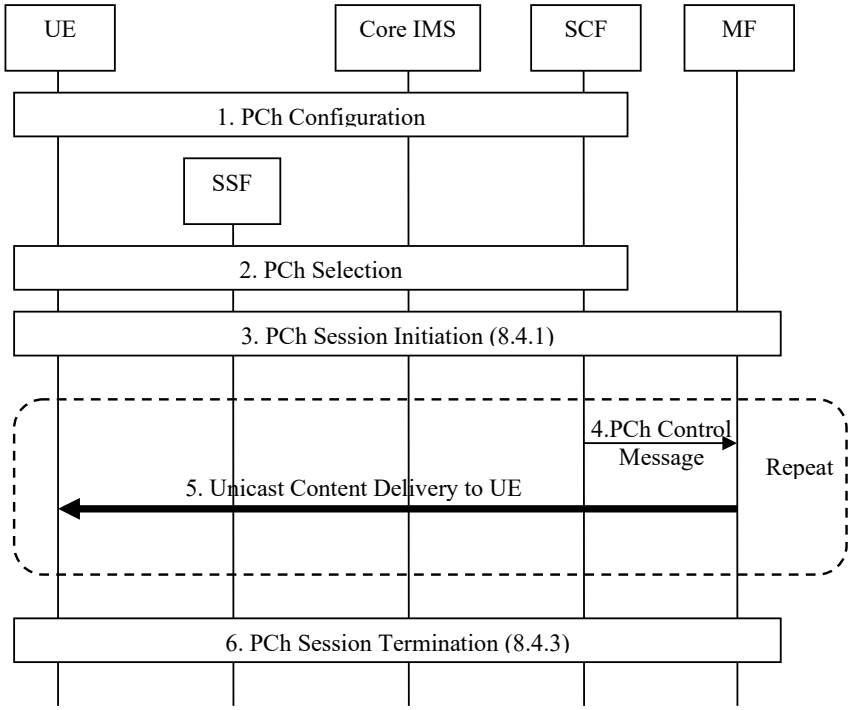


**Figure 34E Overview of PCh service procedures**

1) The PCh configuration procedure takes place between UE and SCF. The PCh information includes user id, PCh id and the time schedule of each item within the PCh list. This procedure comprises two major steps:

   - The declaration of the initial PCh information is similar with the UGC declaration procedure described in 8.9.2 (see step 1~step 2 of figure 34C). The initial PCh information, containing the PCh id, is created and returned based on user profile and content metadata.

   - The modification of existing PCh information refers to the one described in 8.12. In this step, content items may be added to or removed from the PCh list through the interactions through Ut reference point.



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2) The selection procedure of PCh information takes place either between UE and SSF as described in clause 8.2 or between UE and SCF as described in clause 8.11.1 or recommendation procedures. During this step, the UE retrieves the PCh id and other necessary network parameters to facilitate the initiation of PCh session (i.e. step 3). Optionally the time schedule can be also provided in this step.

3) The PCh session initiated by the UE, as similar with the one defined in 8.4.1 for CoD initiation procedure with the following differences:

- The session initiation request from the UE contains the PCh id;
- The SCF retrieves the PCh information (e.g. list of content to be played with the time schedule of each item) and sends it to the selected MF in addition to the PCh ID. The SCF may send either part of the PCh list (e.g. the first item) or the entire PCh information to the MF.
- The media negotiation procedure between UE and MF is for unicast delivery and control of the PCh content items, regardless of on-demand or live content.

4) If necessary, based on the current time, the SCF decides to send PCh control message to the MF, indicating the delivery of the upcoming PCh content item. The PCh control message contains one or multiple content ids within the PCh list, as well as the time schedule of each item.

NOTE: The SCF may decide to send the updated PCh control message in any of following cases:

a. The SCF does not send all of the PCh information to the MF in session initiation(i.e. in step 3), or

b. The PCh information is updated during the session, or

c. Breaks or overlapping occurs between two adjoint items during the session.

5) The indicated PCh content is delivered to the UE through the unicast content delivery channel established during step 3. The MF needs to fetch the content in advance or in real time.The MF may also perform the content adaptation or conversion before the unicast content is sent out to UE, e.g. multicast-unicast conversion, transcoding etc.

NOTE: The step 4 and step 5 can be repeated during the life time of PCh session, for the purpose of switch among multiple content items.

Editor's Note: How the MF fetches the PCh content item is FFS.

6) Initiated by the UE or the network, the PCh session is terminated at some time, as the ones defined in 8.4.3.

Editor’s Note: Other procedures for personalized channel service can be included.

# 8.11 Interaction procedures with other IPTV Services

Editor’s Note: The procedures for interaction with other IPTV services can be described in this clause.

## 8.11.1 Notification procedures

Notification procedure can be used for several purposes: notification that a CoD is available based on user’s prior subscription to that information, caller-Id on TV screen, reminder from a particular TV program based on user's setting, etc …

### 8.11.1.1 Notification procedures using signalling path

Figure 35 depicts the typical steps that occur when the SCF wants to notification the user on a particular event using signalling path.



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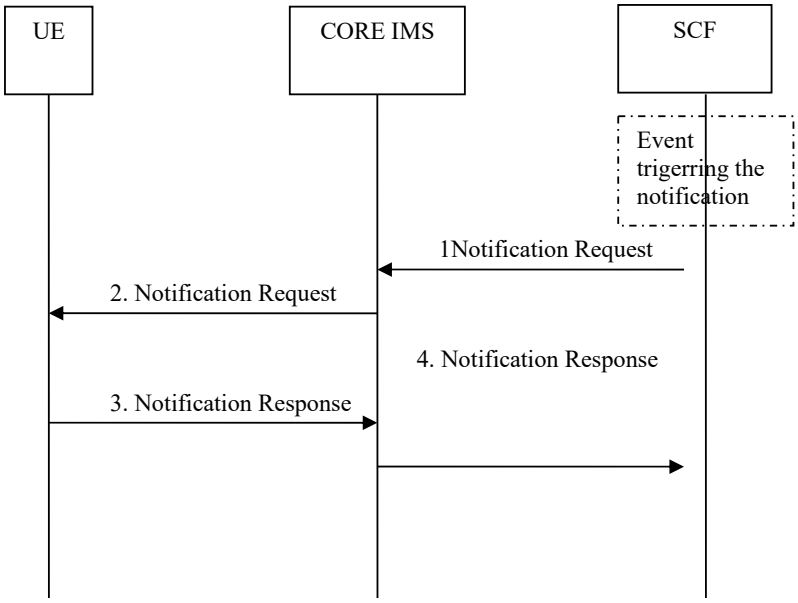


**Figure 35: notification procedure using signalling path**

Priori to the procedure, it is considered that the SCF has detected an event that would cause the notification to be sent to the UE. For example, it can be informed of an incoming call to the user. It could also be based on user's subscription dealing with a notification to be sent when a particular BC program/CoD content is available.

1) Based on the service logic, the SCF sends an Notification Request to the UE via the core IMS. The message shall contains at least:

   i. the reason of the notification: Examples include incoming phone-calls, CoD content or TV program notification based on reminder/subscription set by the user

   ii. related parameters: Examples include calling-number/URI, CoD content identifier or BC service ID, service provider id of the associated SSF from where the update service information may be retrieved, etc.

2) The core IMS forwards the Notification Request to the UE.

NOTE: The Notification may be displayed to the user.

3) The UE answers to the SCF via the core IMS.

4) The Notification Response is forwarded to the SCF.

After this step, the UE can take appropriate action (e.g. initiate a CoD session) based on user's decision.

### 8.11.1.2 Notification procedures using media path

Figure 35A depicts the steps that occur when the SCF and MF use the media path to send a notification to users who are watching a specific BC channel.



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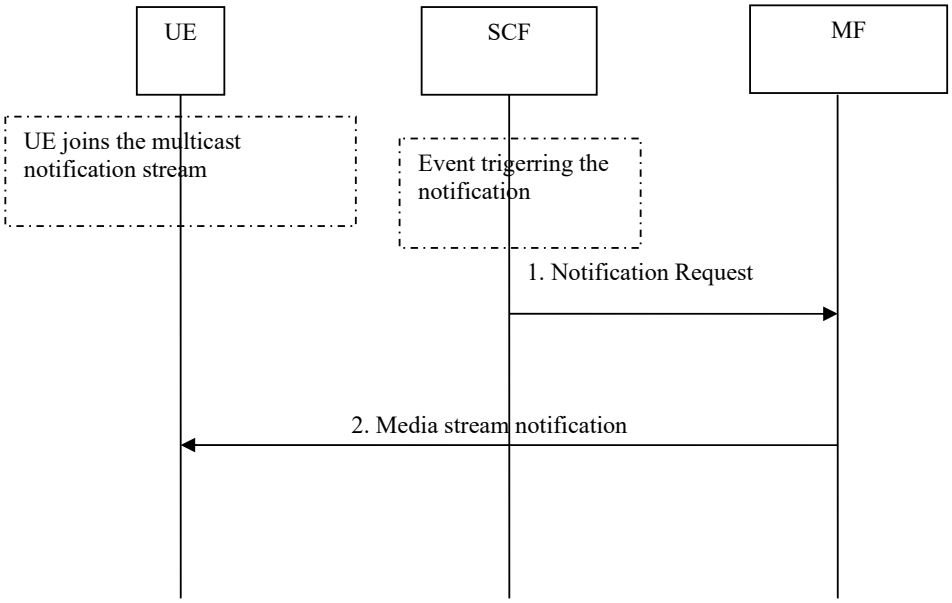


**Figure 35A: notification procedure using media path**

If the SCF has detected an event that would cause notification to be sent to users watching a specific BC channel, for example, a notification to users who have subscribed the content recommendation service about an upcoming BC program, then the SCF initiates a Notification Request. If the users want to receive the notification, they will have joined the specific notification multicast stream in addition to the BC service multicast streams.

Note: the parameters for joining the specific notification multicast stream need to be available to UE before it joins the multicast notifications stream.

1) SCF sends the notification to the selected MF (e.g. SCF retrieve MF from local configured information). The notification request shall contain at least:

   i. The reason of the notification: e.g. upcoming programs, floating ad or weather forecast.

   ii. Related parameters: e.g. BC service ID, service provider id etc.

2) MF delivers the notification to the specific notification multicast group.

Note: The multicast address for the notification channel may be pre-configured on the MF or it may get it from the notification request in step 1. Other options may be possible and out of scope of specification (or it may be FFS).

The UE joins the specific notification multicast stream, receives the notification and displays the notification to the user.

The UE can take appropriate action based on the user's decision.



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## 8.12 Procedures for IPTV User Profile Configuration

This clause describes the generic procedures for IPTV user profile configuration. These procedures may be used in conjunction with other procedures for delivery of other IPTV services - e.g. Content recommendation service, NPVR.

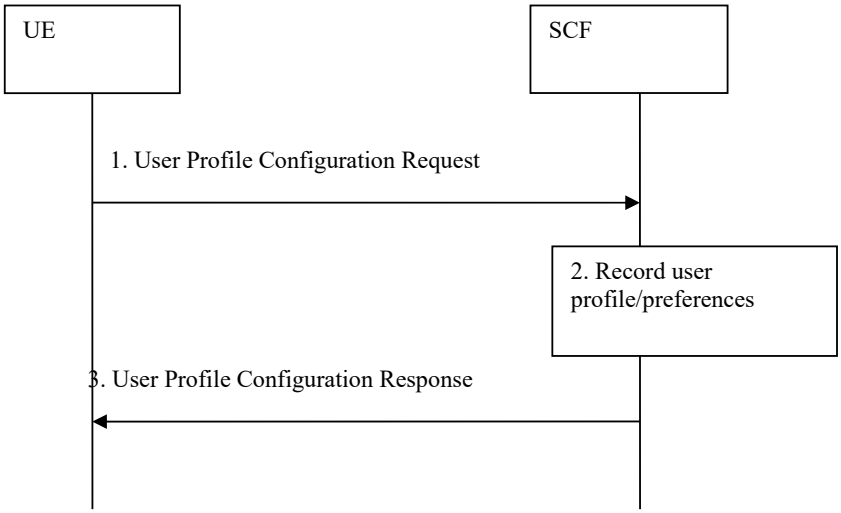


**Figure 35B: User Profile Configuration procedures**

1) The user (on UE) makes a request to the SCF to configure IPTV User profile settings

2) The SCF shall perform relevant authentication and authorization of the User Profile Configuration request by the user before permitting the request. The SCF records the profile settings as part of the IPTV user profile information as described in clause 7.3.1.

NOTE: In case the UE needs to directly contact a network functional element, (e.g. Service Control Function), it should perform GBA authentication, for key management purposes, during the session start-up phase. Please refer to TS 187 003 [5].

3) The UE is informed of the result of the IPTV user profile service configuration request

## 8.13 Content Recommendation service procedures

The content recommendation service (CRS) is used for providing recommendations to IPTV users or user groups.

The content recommendation service may make recommendations to user/groups based on different criteria which include user profile preferences settings, current viewing habits of user etc.

The CRS service procedures include 3 major steps:

1) CRS event detection. The events include request from the UE, new content arrival notification, presence update, trick play reports from MF, channel change report from UE etc. This step is triggered due to the user subscription or service provider's policy, and it may also be based on user request (e.g. for sepecific program or during specific time period).

2) CRS information generation for specific user. The CRS info includes one or more identifiers of the recommended content. The user profile (e.g. user preference, watching habits etc) is used for filtering/sorting of CRS info.

3) CRS information delivery to the UE. SCF sends the generated CRS information to specific UE(s).



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In the case when user profile settings are used for making content recommendations, the user preferences in IPTV profile are configured using procedures described in clause 8.12

The CRS information is delivered to the UE by the SCF using notification procedures as described in clause 8.11,. The UE may subsequently fetch the details about the recommended content from the SSF via procedurese described in clause 8.2.

Editor's note: Other mechanisms for delivery of content recommendations is FFS

Figure 35C depicts the typical steps for CRS.

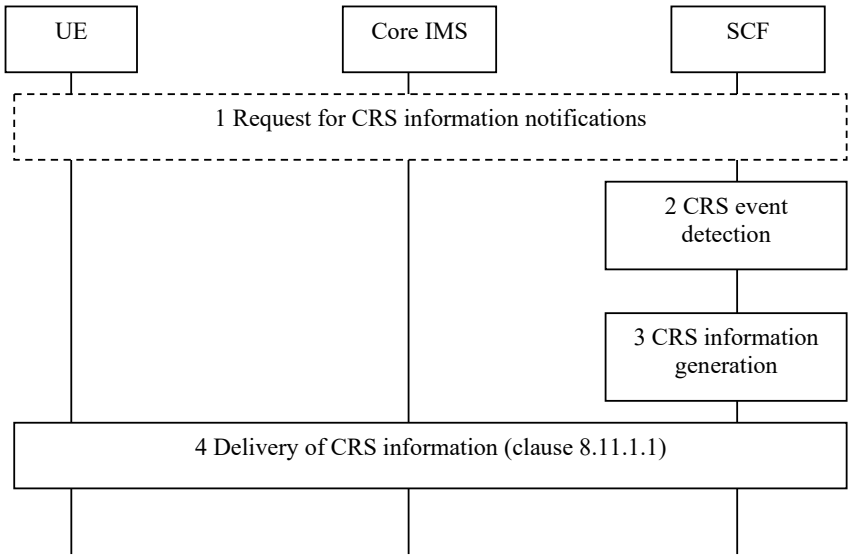


**Figure 35C signalling flows for CRS provided by SCF**

1) UE may optionaly send .a request to the SCF for CRS information notifications.

NOTE: This step is optional in case the user only wants to get notified during specific content play back or specific time period.

2) The SCF detects the CRS events based on user profile, user request or service provider's policy.

3) The SCF generates the requested CRS information for specific user. The CRS information includes one or more identifier(s) of the recommended content.

Editor's Note: How to generate the program related CRS information on the SCF is FFS.

4) SCF sends UE the generated CRS information using notification procedures described in clause 8.11.1.1.

## 8.14 Advertising (Ad) service procedures

There are several types of procedures in Advertising (Ad) service, including:

1) **Targeted ad insertion:** some selected ad content is provided to the UE during the IPTV content playback, based on the user profile (user preference, shopping habits, location information, etc.) and the IPTV service status (e.g. current BC program, commercial breaks or pause during content playback). Content replacement or multi-window rendering takes place within the insertion time period.

2) **Pull mode Advertising:** Advertising is content in its own right and can be selected by the UE, and the users can actively retrieve or interact with the ad content. Audio-visual content of this ad type can be provided to the users via similar procedures with CoD or BC. Other procedures for non audio-visual ad content provision, such as interactive ad and banners, may also be described here



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3) **Broadcast based Ad-insertion:** Ad content (local or regionalized) is inserted into the IPTV content that is broadcasted to the UE without factoring in any information related to user profile. Such ad content is not targeted any any specific user or user groups but it may be targeted to regions or zones depending on network topology.

   Editor's note: The exact location of the above text within the spec is FFS and is subject to whether there is any procedural impact on any of the functional entities

   Editor's note: The requirements on "traditional broadcast advertising" in TS 181 016 needs to be updated/removed to be aligned with this specification

NOTE: other procedure types of Ad service can be included.

Editor's Note: Contributions invited to discuss applicability/mapping of Advanced Advertising standards defined by SCTE (SCTE Wg5) to the architecture.

These Ad procedures shall conform to one of the following architecture options:

- Advertising tasks done by entities within the TISPAN IPTV system
- An external Advertising sub-system interconnected with TISPAN entities

NOTE: In the second option, the SCF acts as a broker to bundle information from IPTV user profile and service profile along with information on placement opportunities and sends it over to the external advertising sub-system which responds back to SCF with the ad-placement decisions (see Annex E).

### 8.14.1 Procedures for targeted ad insertion (TAI)

Ad insertion implies that an IPTV sesssion exists prior to the insertion time. The targeted ad is selected by the SCF(Ad) with regard to user profile (e.g. shopping habits) or other criteria, e.g current BC program.

IPTV content and ad content in the context of ad insertion can be described as:

- IPTV content: the content to be partially (or entirely) replaced during the IPTV session. There is usually some cue/hint related to the IPTV content used to trigger ad insertion, e.g. insertion time in content metadata.
- Ad content: the content which is inserted to the IPTV content during the ad insertion time. It is rendered sequentially or in parallel with the IPTV content.

The ad insertion can be performed at either UE side or MF side:

- When UE performs ad insertion, it is informed of ad insertion indication, receives both IPTV content and ad content at the same time, and renders them in a sequential or simultaneous way.
- When MF performs ad insertion, it is informed of ad insertion indication, retrieves both IPTV content and ad content at the same time, and delivers the combinded stream to the UE.

The major steps of TAI is as follows:

1) IPTV service status detection/awareness.

   The SCF(Ad) is responsible for the awareness/detection of the user's IPTV service status (e.g. the current BC program, the breaks in the BC service, or pause during CoD playback) through a variety of mechanisms.

   Places to insert Ad could be known in advance (predetermined) or detected during the play (unexpected). More details on Ad placement in Annex F.

Editor's Note: the means for detection of the user's IPTV service status is for FFS.

2) Ad content selection.

   One or more ad content(s) is selected with regard to user profile (e.g. shopping habits, user preference etc). The user's IPTV service status and/or the metadata of current content can also be used for locating of ad content targeted to specific user or user group.



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3) Ad content delivery

The selected ad content is delivered to the UE, before or after which essential ad insertion is performed (i.e., either at MF side or UE side)

Editor's Note: Terms SCF(BC/CoD/..), SCF(Ad), MF(BC/CoD/..) and MF(Ad) are used only for identification of different services, not intended to imply or assume multiple physical entities in Ad service.

#### 8.14.1.1 signalling flows for TAI at UE side

When the ad insertion takes place at UE side, the UE is informed by ad insertion indication from SCF in charge of Ad service, and initiates individual session request for Ad content, which implies that multiple sessions exist on the UE during the ad insertion time.

Figure 36 depicts the typical steps when UE is informed of targeted ad insertion indication.

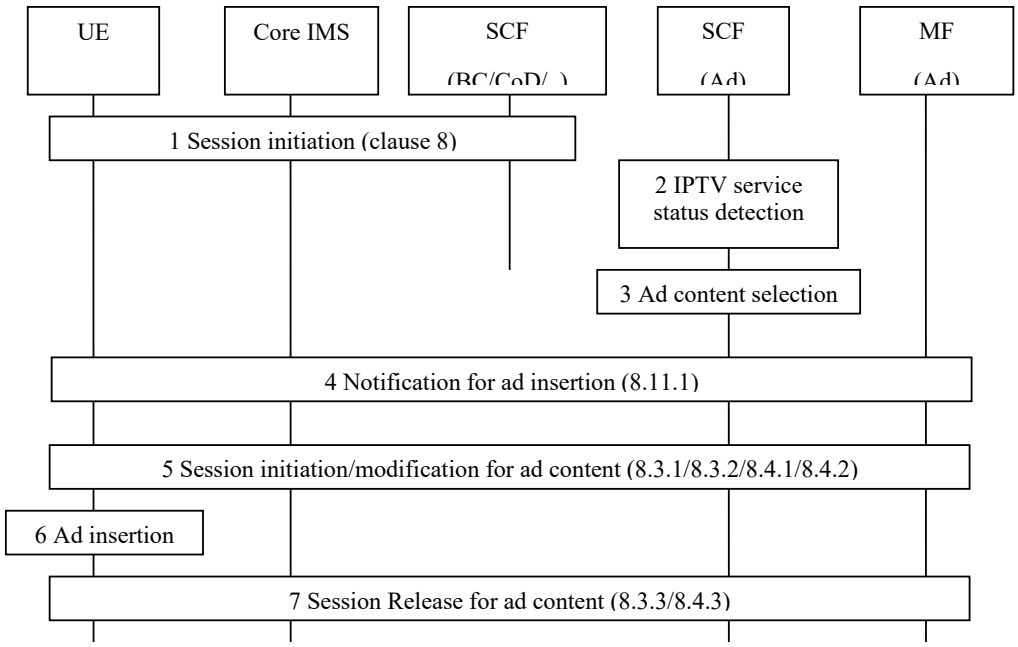


**Figure 36 signalling flows for UE performing TAI**

1) Some IPTV session is established between UE and SCF(BC/CoD/..) as procedures described in clause 8, e.g. BC session in clause 8.3, CoD session in clause 8.4 etc., and some IPTV content is delivered to the UE.

2) SCF(Ad) detects the ongoing IPTV service status (e.g. the current BC program ID, the commercial break of the program, the current CoD content id, the trick-play events etc) of specific user and decides to trigger ad insertion.

3) SCF(Ad) selects targeted ad content for the user, which can be inserted to the specific content. The user profile (e.g. shopping habits, user preference) is used to help locating of appropriate ad content targeted to specific user or user group.

4) SCF(Ad) sends UE the notification of ad insertion indication, using procedures specified in clause 8.11.1. The ad insertion indication includes the selected ad content identifier, the user id, insertion time (begin time and/or length), and other information needed for ad insertion.

5) UE initiates the session initiation or modification procedure for ad content acquisition and the selected ad content is delivered to the UE. During this step the procedures described in clause 8.3.1/8.3.2 for BC session or 8.4.1/8.4.2 for CoD session applies, with SCF(Ad) responsible for the Ad service control and MF(Ad) responsible for Ad content control and delivery.



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NOTE: the session modification is only possible when the same SCF handles CoD and Ad sessions.

6) The UE performs the ad insertion, i.e. renders the ad content exclusively or in parallel with the ongoing IPTV content (e.g. in PiP).

7) When the ad insertion times up, the session for ad content is released as procedures described in clause 8.3.3 or 8.4.3, and UE resumes the rendering of the IPTV content.

### 8.14.1.2 signalling flows for TAI at MF side

When the ad insertion takes place at MF, the MF is informed of the ad insertion indication from the SCF and performs the ad insertion, i.e. delivery ad content to the UE during the ad insertion time of IPTV content play back.

Figure 37 depicts the typical steps when MF is informed of the ad insertion indication.

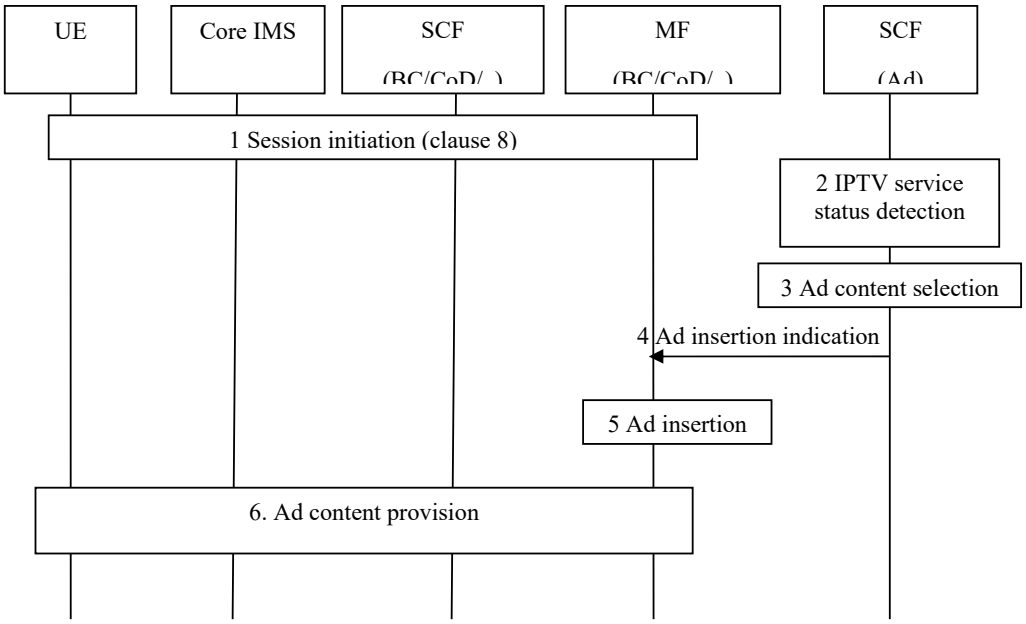


**Figure 37 signalling flows for MF performing TAI**

1) Some IPTV session is established between UE and SCF(BC/CoD/…) as procedures described in clause 8 , e.g. BC session in clause 8.3, CoD session in clause 8.4 etc., and some IPTV content is delivered to the UE.

2) SCF(Ad) detects the ongoing IPTV service status (e.g. the current BC program ID, the commercial break of the program, the current CoD content id, the trick-play events) of specific user and decides to trigger ad insertion.

3) SCF(Ad) selects targeted ad content for the user, which can be inserted to the specific IPTV content. The user profile (e.g. shopping habits, user preference etc.) is used to help locating of appropriate ad content targeted to specific user.

4) SCF(Ad) sends the ad insertion indication to the MF(BC/CoD/…). The indication includes the selected ad content identifier(s), the user id, insertion time (begin time and/or length), and other information needed for ad insertion.
Playlist information may be used as ad insertion indication.

NOTE: In the case of co-located entities, step 2~4 can be combined in step 1.

Editor's note: How the SCF identifies the cue messages within the IPTV content is FFS. Relationship between ad insertion indication and cue messages needs to be clarified



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5) MF(BC/CoD/…) acquires the selected ad content and performs ad insertion, i.e. the selected ad content is delivered separately from the IPTV content or it is inserted as part of ongoing IPTV content. The MF(BC/CoD/…) may perform transcoding if the codec of ad content is not supported by the UE. In the case when the ad content is delivered at part of the on-going IPTV content, the MF (BC/COD) shall use the cue-messages to determine when to insert the appropriate ad content. For ad-content that is delivered separately from the IPTV content, the cue messages are used to determine when to switch to ad content. The MF may perform session modification if needed (e.g; the ad content uses different network parameters, the stream is delivered separately, etc.).

Editor's note: How the SCF delivered ad-insertion points (out-of-band cue messages) works with the cue messages delivered as part of the IPTV content from content provider is to be considered

6) The ad content is provided to the UE during the ad insertion time.

Editor's Note: Other means to perform ad-insertion, as well as the means for ad content provision on MF are FFS. Reducing the number of options or indicating only capabilities to perform ad insertion and not detailing every solution should be considered.

## 8.15 Procedures for inter-destination media synchronization

Figure 38 provides an overview of the information flows for inter-destination content synchronization according to Mapping 1 from clause 5.4.2.

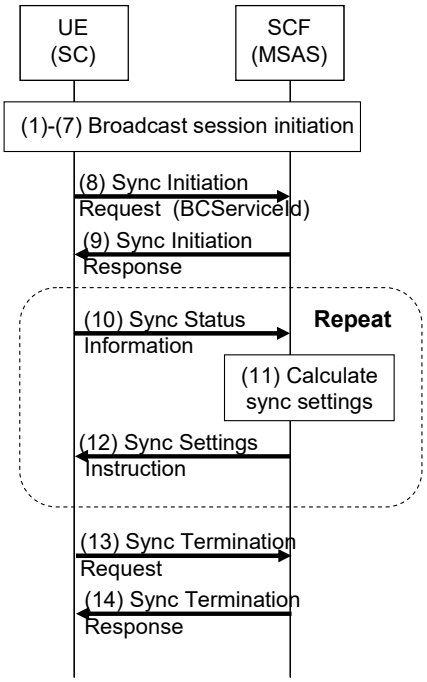


**Figure 38: Procedure for inter-destination content synchronization.**

(1)-(7) Broadcast session initiation according to clause 8.3.1.1.

The following steps (8)-(14) are all tunnelled over the broadcast session established in steps (1)-(7).

(8) The UE (SC) sends a synchronization initiation request to the SCF (MSAS), indicating that it wants to participate in the inter-destination synchronization process. The request includes the BCServiceId of the to-be-synchronized BC channel.

(9) The SCF confirms the participation of the UE in the inter-destination synchronization process.



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(10) The UE sends its synchronization status information to the SCF.

(11) The SCF aggregates synchronization status information from multiple UEs and calculates the appropriate synchronization settings for each UE.

NOTE: Examples of algorithms to calculate the synchronization settings instructions from collected synchronization status information may be found in [25].

(12) The SCF sends a synchronization settings instruction to the UE.

Steps (10) - (12) may be repeated at regular time intervals.

(13) The UE sends a synchronization termination request, indicating that it is no longer active in the inter-destination synchronization process. This could be e.g. because of a channel change by the UE.

(14) The SCF confirms the termination of the UE's participation in the inter-destination synchronization process

NOTE: The UE can initiate and terminate multiple synchronization sessions within a broadcast session, both consecutive and simultaneous.

The above procedures are also applicable for the inter-destination media synchronisation for CoD, N-PVR, Ad, UGC and Shared Content with the following changes.

- The session in steps (1)-(7) is a CoD, N-PVR, Ad, UGC or Shared Content session, respectively.
- In case of CoD, the request in step (8) includes the CoDId (see clause 7.4.1)
- In case of N-PVR, the request in step (8) includes the NPVRContentId (see clause 7.4.1)
- In case of Ad, the request in step (8) includes the ad content id (see clause 8.14.1)
- In case of UGC the request in step (8) includes the UGC content id (see clause 8.9.2)
- In case of Shared Content the request in step (8) includes the Shared Service Content Identifier (see clause 8.21.2)

Editor's Note: It is for further study to define a term for the super-class of BCServiceId, CoDId, NPVRContentId, ad content id, UGC content id, the Shared Service Identifier and those yet to be defined. A suggestion is "Content Service Id", as all the identifiers identify a specific instance of a content service.

The procedures according to Mapping 2 from clause 5.4.2 are the same as above with the following changes.

- Steps (1) to (7) are not applicable.
- Tunnelling over the broadcast session is not applicable
- The MSAS is an elementary function of the SCF or a stand-alone Application Server.
- The SC is an elementary function of the Transport Functions.

Editor's Note: A solution is needed how the SC and the MSAS identify the media streams, as different identifiers are used at the IPTV Service level (e.g. BCServiceId, CoDId, …) and at the Transport Functions level (e.g. unicast and multicast IP addresses).

## 8.16 Signalling flows for network-controlled trick play

Figure 39 provides the signalling flow for controlling trick play of a Broadcast TV channel, CoD or N-PVR session by a network element. In order to apply trick modes to a Broadcast TV channel, a BC TV with trick play session must first be established.



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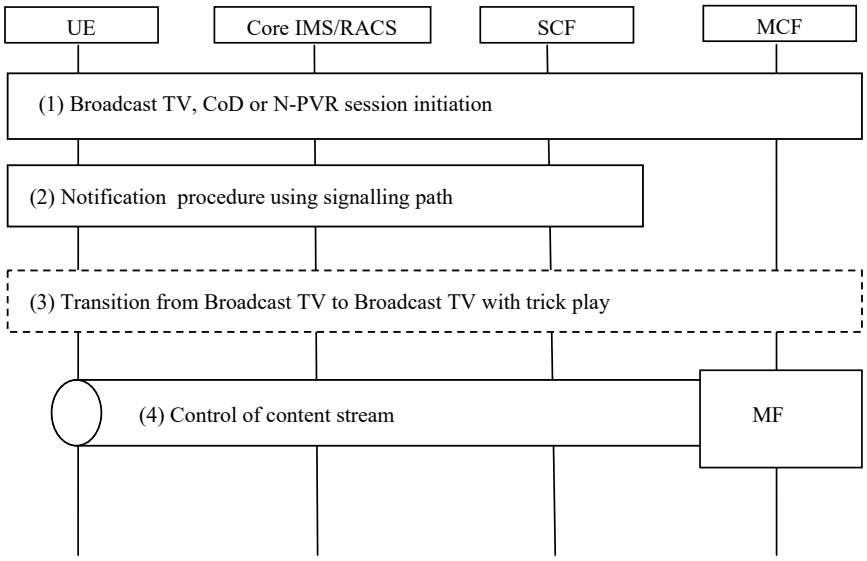


**Figure 39: Signalling flow for network-controlled trick play**

1) Broadcast TV, CoD or N-PVR session initiation.

NOTE 1: The Broadcast TV, CoD or N-PVR sessions shall be initiated by the appropriate procedures in clauses 8.3.1 8.4.1 and 8.5.2, respectively.

2) Based on an event detected by the SCF, e.g. a trigger received from an external application, the SCF sends a notification to the UE to request stream control. The notification procedure from Clause 8.11.1.1. shall be applied. The notification response includes media action data.

Editor's note: the reason and relevant parameters contained within the notification request are for further study and can be worked out in stage 3.

3) If the existing session is a Broadcast TV session, a transition from BC TV to BC TV with trick play takes place according to Clause 8.3.5.

4) The UE uses the content control channel to perform the trick play command, , e.g. "pause", "fast forward", etc.

NOTE 2: How the SCF is triggered by external applications and how media action data is sent from the SCF to external applications is not described by this procedure.

# 8.17 Push Procedures

## 8.17.1 Push CoD session

Figure 39A provides an overview of the information flows for initialization of Push CoD session.



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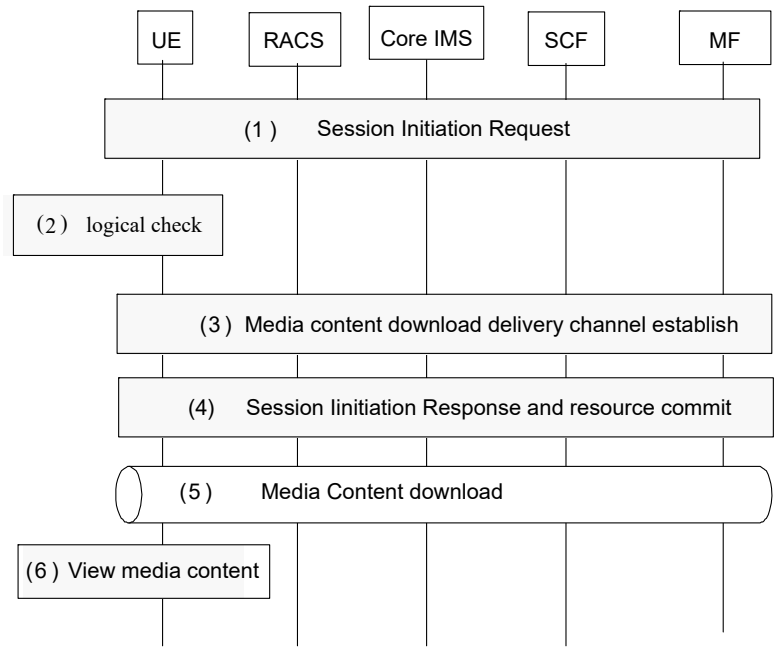


**Figure 39A**

1) The SCF identifies the recommended media content which will be sent to the UE(s), and then sends a session initiation request to the UE (described in clause 8.4.1.1 Figure 21A from step 1 to step 4).

2) The UE check if it will accept the push CoD content.

NOTE: The checking criteria can include one or more methods such as its storage capability to compare with size of the media content, the configuration of the UE if it will accept the CoD content, the selection of the User if the user accept the content.

3) If the UE accepts the request, signalling procedures for establishment of a media content download delivery channels network parameters necessary to handle the service between the UE and the MF based on the procedures in 8.4.1.2

4) The UE confirms the establishment of the dialogue with the SCF and commit the resource previously reserved. (described in clause 8.4.1.1 Figure 21A from step 6 to step 11).

5) After this point, the selected MF can deliver the media content to the UE (ie. media content download to the UE). UE saves it in its storage device.

6) The UE can view the media content stored in its storage device.

Editor's note: SCF push of other content (e.g. recorded BC program) is FFS.

Editor's note: This procedure is need to be alignment with other CoD procedures.

## 8.18 Unicast Content Upload/Download Procedures

The procedures described here are for upload/download cases distinguished from streaming cases (described in 8.4).

NOTE: The generic content upload/download procedures described below can be referred by IPTV services such as UGC upload/download, Ad etc.

The unicast content upload/download session may be initiated by either by UE or SCF.



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### 8.18.1 Signalling Flows for UE-initiated Unicast Content Upload/Download

Figure 39B depicts the typical steps that occur when the UE initiate a request to upload/download content by unicast.

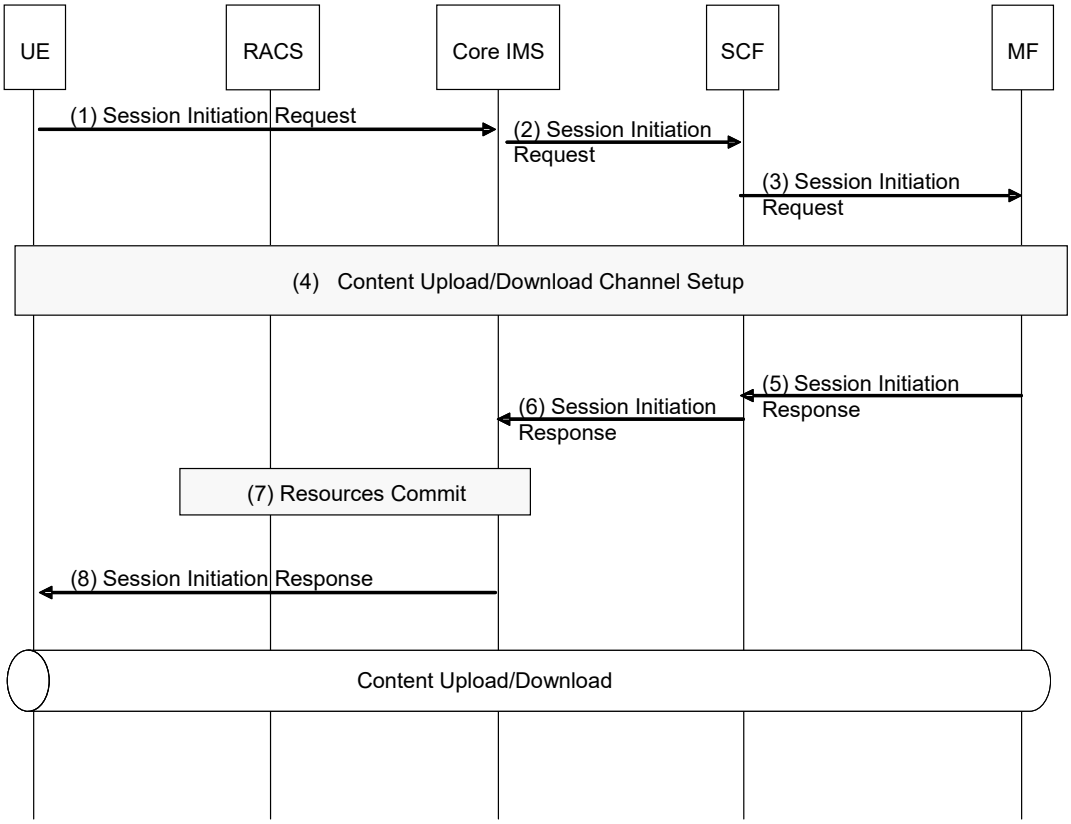


**Figure 39B UE-initiated unicast content upload/download session initiation**

1) The UE initiates an upload/download request to the SCF.

2) The session initiation request is routed by the Core IMS entities up to the SCF.

3) The SCF performs service authorization. If the UE is allowed to upload/download contents, the SCF forwards the session initiation request to the selected MF which handles media content upload/download.

4) Signalling procedures for the establishment of content upload/download channel take place between the UE and the MF.

Editor's Note: The detailed procedures including the need for content channel negotiation, resource reservation and others (e.g. local storage evaluation on UE) in this step should be considered and further contributions are needed.

5) The MF confirms the establishment of the dialogue with the UE.

6) The SCF sends this confirmation to the Core IMS.

7) The P-CSCF within the Core IMS interacts with the RACS to commit all resources previously reserved. This includes opening pinholes for exchanging content delivery.

8) The P-CSCF forwards the dialogue confirmation to the UE.

### 8.18.2 Signalling Flows for SCF-initiated Unicast Content Upload/Download

Editor's Note: The unicast procedures for SCF-initiated content upload/download can be described in this clause.



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## 8.19 Multicast Content Upload/Download Procedures

The procedures described here are for upload/download cases distinguished from streaming cases (described in 8.3).

NOTE: The generic content upload/download procedures described below can be referred by IPTV services such as UGC upload/download, Push CoD etc.

The multicast content upload/download session may be initiated by either by UE or SCF.

### 8.19.1 Signalling Flows for UE-initiated Multicast Content Upload/Download

Editor's Note: The multicast procedures for UE-initiated content upload/download can be described in this clause.

### 8.19.2 Signalling Flows for SCF-initiated Multicast Content Upload/Download

Editor's Note: The multicast procedures for SCF-initiated content upload/download can be described in this clause.

## 8.20 signalling flows for restricted trick play

The restricted trick play procedure can be used by network to disallow specified trick play functions on any segment of the content.

Figure 39C depicts the typical signalling flow of restricted trick play.

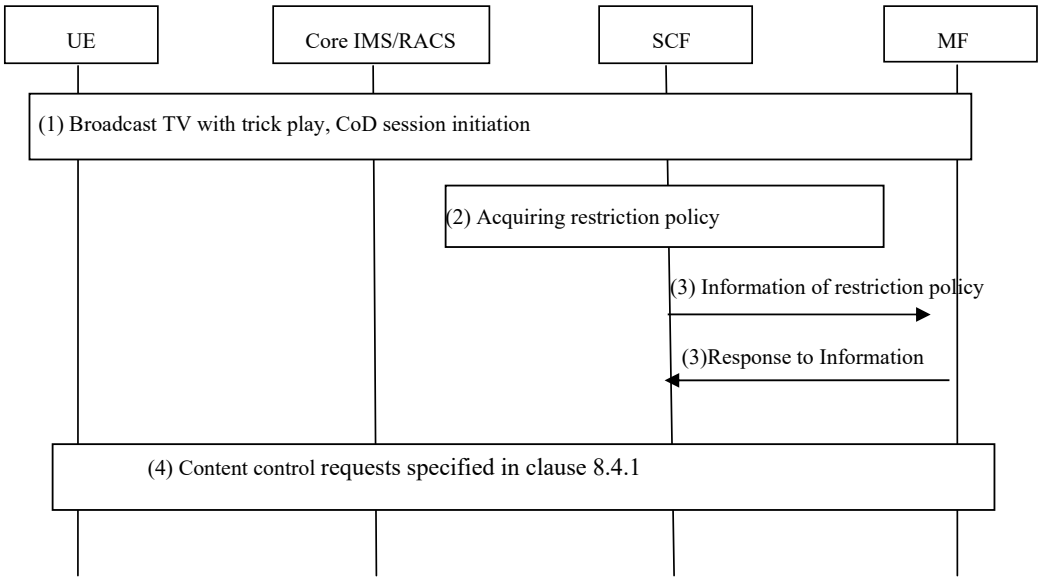


**Figure 39C procedure of restrict trick play**

1) Broadcast TV with trick play, CoD session initiation. The Broadcast TV with trick play session use the procedures specified in clauses 8.3.1, and the CoD session use the procedures specified in clauses 8.4.1.

2) SCF acquires the restriction policy on trick play according to the information of initial request, e.g. the content ID, user ID.

NOTE 1: For example, SCF may fetch the pre-configured restriction policy from the content metada based on the CoD content ID; SCF may also generate the restriction policy based on the user subscription data and/or the content ID.

3) SCF transmits restriction policy to MF, and informs MF to implement restriction.



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4) When the MF receives UE's content control requests specified in clause 8.4.1 (Signalling flows for CoD session initiation), MF executes the restricted trick play according to the policy, such as deny return a forbidden response to UE in case trick play is disallowed.

NOTE 2: The steps 2 and 3 may happened at any time during or after the step1 initiation session.

# 8.21 Shared Service Control (SSC) procedures

## 8.21.1 Overview

Shared Service Control procedures allow a group of users sharing the control commands related to a service (e.g. BC, CoD) and correlating the sessions related to the same service.

The virtual place established to share the services is called an SSC room. This room has only one service running at a time ; this service may be BC / CoD / UGC / NPVR / PCh services as defined in the present specification.

The following figure gives an example of shared service control between two users.

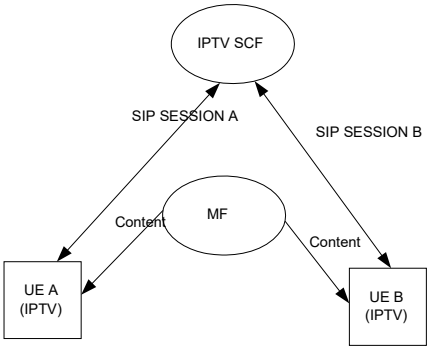


**Figure 39D**

SSC procedures comprise three types:

- **creating an SSC room:** this type of procedure allows a user to create an SSC room, indicating a list of users associated to the room, policies and related rights. Optionally, the room is associated with a specific service.
- **selecting and entering an SSC room**: this type of procedure allows a user to select an SSC room and to enter it. Optionally, a service is selected (e.g. BC, CoD), linking it to a room. The procedure ends with initiating the related session.
- **controlling the service:** this type of procedure allows a authorised user to perform service control commands (e.g. trick-play, channel change) to the service associated to the room.

## 8.21.2 Room creation procedure for SSC

Figure 39E depicts the typical steps that occur when the UE creates an SSC room and publishes related information.



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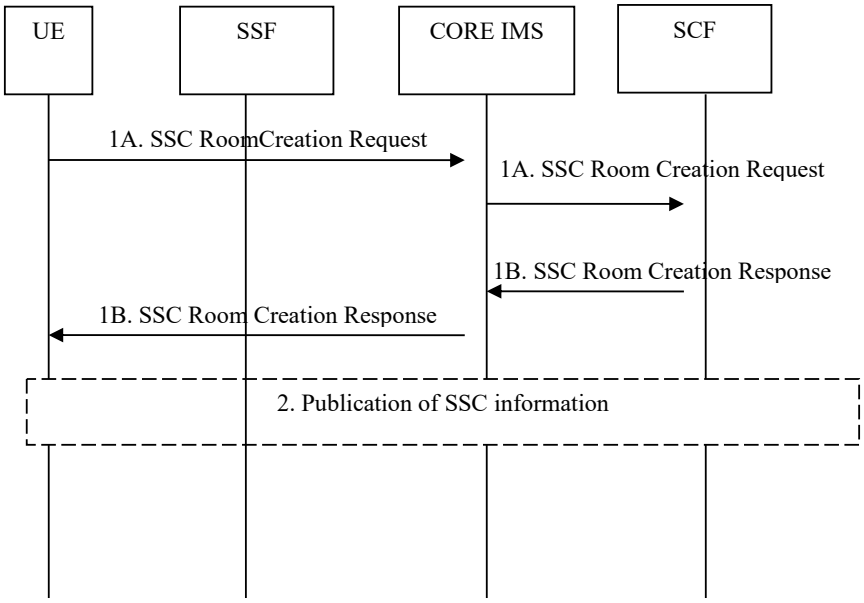


**Figure 39E: SSC Room Creation procedure**

1A) The UE sends a SSC Room Creation Request through the Core IMS to the SCF. This request may contain information such as:

- the service identifier if the room is associated with only one service item,
- and optionnaly additional information such asa list of users allowed to join the room and associated rights (e.g. trick-play authorisation on the content, initiation of a service linked to the room).

1B) The SCF checks if the user has the rights to create the room and records the SSC room information. It sends an SSC Room creation Response including the SSC room identifier through to core IMS to the UE..

2) Publication of SSC room information. The SCF may optionaly publish the information about this new SSC room to the users in the list indicated in SSC room creation request.

NOTE: This procedure can be repeated when the service is being shared in order to update SSC room information. In that case the request will indicate the SSC room identifier.

### 8.21.3 Room selection procedure for SSC

The room selection procedure comprises the following steps:

Step 1: SSC room selection .

- Using the SSC room identifier, the UE selects the room it wants to join and retrieves associated parameters

Step 2: Entering the selected SSC room

- The UE enters the room and initiates a service session. If no service is associated with the room at the time of entering, the UE first selects a service.

Figure 39F depicts the typical steps that occur during the room selection procedure.



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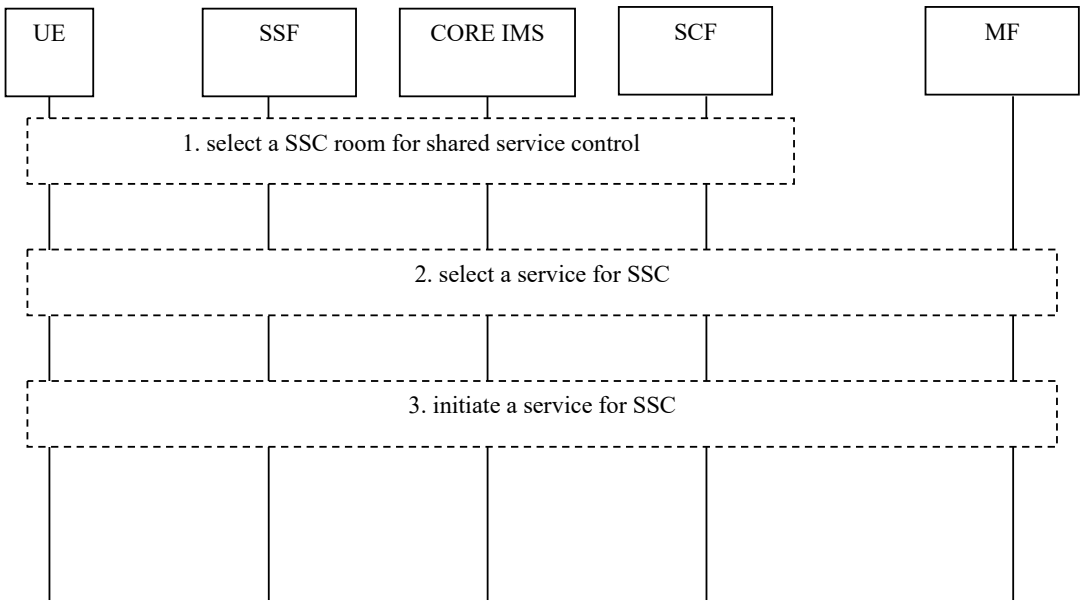


**Figure 39F: room selection procedure for SSC**

1) The UE selects a SSC room based on the room identifier through service selection procedure with SSF as defined in clause 8.2 step 4, notification procedure from SCF as defined in clause 8.11.1, recommendation procedures as defined in clause 8.13 or through messaging procedure with other UE as defined in clause 9.3. In the response, the SCF responds with information of the SSC room, e.g. service id currently being watched in the SSC room, offset of the content at the present.

2) If no service is active in the SSC room, the UE selects a BC or CoD service through service selection procedure with SSF as defined in clause 8.2 step 4, notification procedure from SCF as defined in clause 8.11.1, recommendation procedures as defined in clause 8.13 or through messaging procedure with other UE as defined in clause 9.3.

3) In case of CoD each UE that enters the room initiates a CoD session indicating the selected content as defined in 8.4.1 for CoD. It additionaly indicates a SSC identifier. In addition to rights checking described in 8.4.1, the SCF shall check if the user has the rights to enter the room, which includes SSC room member authorisation and Service ID check,. If a session has already been established by another UE within the same SSC room, the SCF shall correlate this session with the new one using the SSC room identifier and selects the same MF. It shall indicate to the MF that this session has to be correlated with the other within the same SSC room ID.

   In case of BC, if no BC session is ongoing, each UE that wants to enter the room initiates a BC session indicating the selected content as defined in 8.3.1. It additionaly indicates a SSC room identifier. The BC service indicated in the session initiation request shall be the one of the shared content. If a BC session is on-going, the UE shall switch to the BC service being watched by other users of the same SSC room as defined in clause 8.3.4 and shall indicate to the SCF the BC service identifier and SSC room identifier. The SCF shall check if the user has the rights to be part of the group of users sharing the control.

Editor's note: the case where the SCF selects an MF for each UE is FFS.

Editor's note: restriction has to be defined to have the same SCF handling all the users' sessions.

If synchronization is needed for sharing content, the procedures in 8.15 shall be applied.

### 8.21.4 Shared service control procedure

Depending on the room policies, one or more UEs may perform control commands to the service. This control is then reflected in any other session concerning this shared service. If the room policies indicate room moderation, interactions between service control commands received from different users are also handled to resolve any command conflicts.



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NOTE1: The extent of room control can be described by the room policy and is subject to application design. Conflict between service commands are resolved by the application.

NOTE2: If synchronization is needed for sharing content services, the procedures in 8.15 will be applied.

Editor's note: How the UE is informed of the content control's right is FFS.

Editor's note: UGC and N-PVR cases have to be taken into account.

Editor's note: For BC channel change, the case where users do not share the same BC Service package is FFS.

### 8.21.4.1 SCF-based shared service control procedure

Figure 39G depicts the typical steps that occur when one of the UEs involved in the shared service issues a service control command.

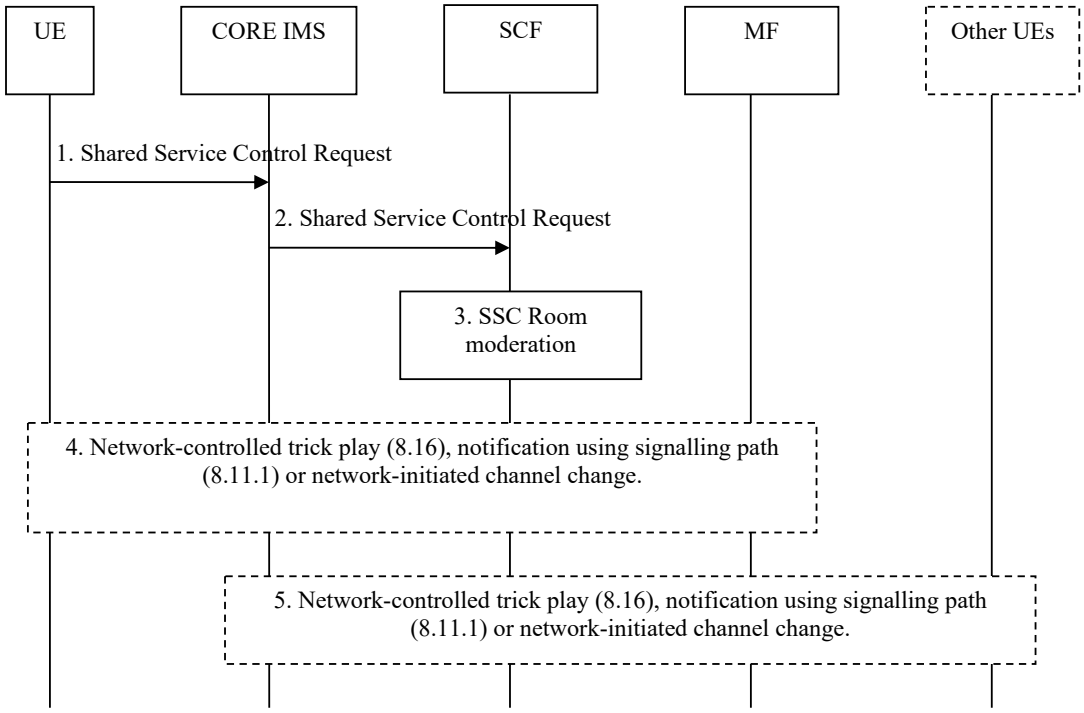


**Figure 39G: SCF-based shared service control procedure**

1) The UE sends a request for controlling the shared service to core IMS. The request includes the service control command that is to be performed (e.g. trick play, channel change).

2) Core IMS forwards the shared content control request to the SCF.

3) The SCF performs room moderation (e.g. by checking the received service control requests and detecting the IPTV service states of the UEs involved in the shared service) and performs control authorization depending on this information. The control authorization can include e.g. allocation of temporary master control to the UE and performing appropriate command queueing.

4) If the UE request for shared service control is authorized, the SCF instructs the UE to perform this service command. For shared CoD service, the network-initiated trick play procedure from clause 8.16 shall be employed. For BC with trick play, the SCF will perform session modification. For BC channel change, the SCF notifies the UE to change the channel. If the UE request for shared content control is not authorized, the SCF may notify the UE of the failed authorization using the notification procedure in clause 8.11.1.

NOTE: although the network-initiated trick play procedure from clause 8.16 is used in step 4, the shared service control procedure is initiated from the UE.



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Editor's note: the procedure for network-initiated-channel change is FFS. It can be similar to the network-initiated trick play procedure and reuse the notification procedure from clause 8.11.1.1.

5) The SCF instructs all other UEs that share the service to perform the service command. For shared CoD service command, the network-initiated trick play procedure from clause 8.16 shall be employed. For BC with trick play, the SCF will perform session modification. For BC channel change, the SCF notifies the UE to change the channel.

Editor's note: restriction has to be defined to have the same SCF handling all the users' sessions.

### 8.21.4.2 MF-based service control procedure for CoD

In the situation where a shared CoD service takes place and the same MF can be selected for this service, the following MF-based service control procedure can be used.

Figure 39H depicts the typical steps that occur when one of the UEs involved in this shared CoD service issues a service control command.

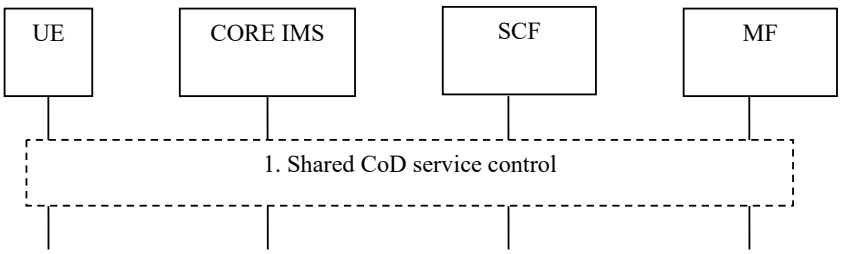


**Figure 39H: MF-based shared service control procedure for CoD**

1) After shared CoD session initiation is completed, the UE may control the shared service if authorised. Any CoD control message (e.g. trick-mode) shall be reflected to other session(s) sharing the service. The MF will apply the trick-mode to all the sessions sharing the same shared service identifier.

Editor's note: It should be investigated whether or not this procedure does lead to loss of RTSP state sync between UE and MF.

## 8.22 Personalized Service Composition (PSC) procedures

This clause describes procedures for the PSC service where multiple BC and or CoD sessions are composed into a single Personalized Service Composition. Existing BC/CoD procedures are used for session setup in order to compose the PSC. Additional steps include selection and configuration of the PSC between the UE and SSF, handling of cases where there are insufficient resources available for the full PSC and synchronization of the PSC constituting media streams.

NOTE: This clause only applies when multiple BC and/or CoD sessions need to be associated with each other at the SCF and/or other functional entities. Initiating multiple not-associated BC/CoD sessions and including multiple media streams within a single BC or CoD session are implicitly covered by clauses 8.3.1 and 8.4.1.

The following compositions of multicast and unicast media streams are supported.

- UE receiving multiple multicast streams within multiple BC sessions;
- UE receiving multiple unicast streams within multiple CoD sessions.
- UE receiving any combination of multicast and unicast streams within BC and/or CoD sessions.

Figure 39I depicts the typical steps that occur during the establishment of a Personalized Service Composition session and its constituting BC/CoD sessions.



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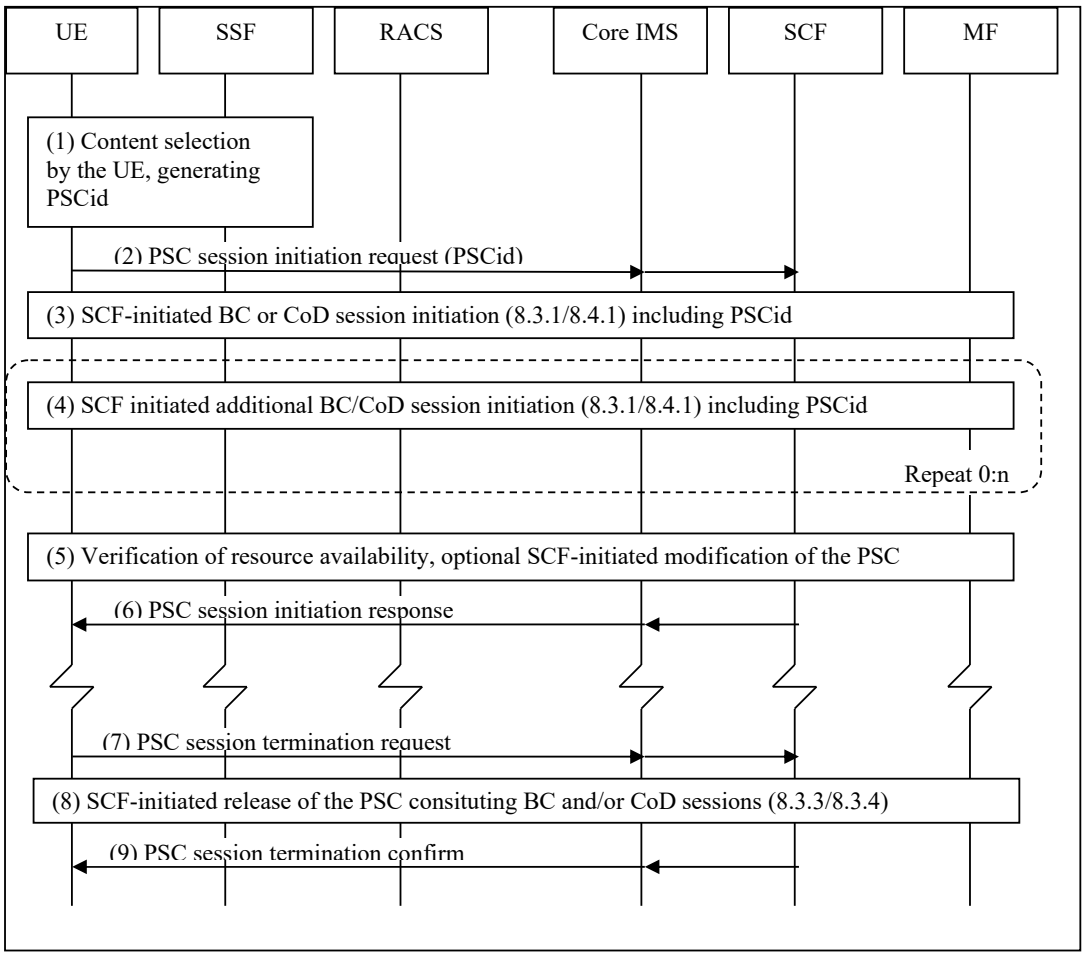


**Figure 39l: Signaling flows for Personalized Service Composition**

1) The UE makes a selection of a Personalized Service Composition (PSC) from the SSF. The PSC, to be composed from multiple BC and/or CoD sessions, is either preconfigured in the SSF or configured by the user. The UE generates a PSCid that correlates the different BC/CoD sessions in the PSC.

NOTE: PSC combinations of multiple BC and/or CoD sessions may require more complex EPG data, as supported by e.g. OMA BCAST service guide.

NOTE: Users can bookmark a particular PSC combination including its PSCid for future usage.

2) The UE initiates a PSC session with the SCF. The PSC session initiation request contains the PSCid and content identifiers of the PSC constituting BC/CoD sessions. Such content identifiers are for example BCServiceId (clause 7.4.1), CoDId (clause 7.4.1), NPVRContentId (clause 7.4.1), ad content id (clause 8.14.1) UGC content id (8.9.2) and/or shared content identifier (see 8.21.2). It may also contain handling instructions, e.g. instruction for the case that there is insufficient bandwidth to constitute all requested BC/CoD sessions simultaneously.

3) The SCF initiates a BoC or CoD session to the UE, following the procedures of clause 8.3.1 Figure 13 or clause 8.4.1 Figure 21A. The session initiation request includes the PSCid which is used by the UE to correlate the incoming BC/CoD session initiation request with the PSC session.

4) The SCF initiates additional BoC and/or CoD sessions to the UE to build the PSC. Step 4) may be repeated zero or more times.

5) The SCF verifies resources availability. If step 3) and/or one or more of the steps 4) fails due to insufficient resources, then the SCF may try and set up an alternative offer that is either preconfigured in the SCF or signalled as handling instructions in step 2). Examples of such an alternative offer are downgrading, not-



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initiating or terminating one or more of the PSC constituting BC/CoD sessions, or terminating the PSC session as a whole.

Editor's Note: SCF-initiated PSC session is for further study.

Editor's Note: UE-initiation of the PSC-constituting BC/CoD sessions is for further study.

6) The SCF confirms the establishment of the PSC session.

At this point, the PSC constituting BC/CoD sessions and their associated media streams are available at the UE and they can be presented to the user as a composite, e.g. picture-in-picture, replacing an audio stream, etcetera.

If synchronization is needed between the media streams within the PSC, the procedures in 8.15 will be applied.

Once the PSC session is established, the UE or the SCF may use the PSCid and the associated PSC constituting BC/CoD sessions to perform actions on the PSC as a whole, for example adding or removing PSC constituting BC/CoD sessions; N-PVR recording the PSC; or terminating the PSC session as a whole.

Editor's Note: Modification of a PSC session is for further study.

Editor's Note: Adding existing BC or CoD sessions to a PSC session is for further study.

Editor's Note: N-PVR recording of a PSC is for further study.

Editor's Note: Continue viewing a PSC on another device is for further study.

Editor's Note: Bookmarking a PSC is for further study.

Editor's Note: Shared PSC content is for further study.

Editor's Note: PSC trick play is for further study.

When the PSC session is no longer needed, it is terminated by the UE or SCF.

7) The UE sends a PSC session termination request to the SCF.

8) The SCF terminates the PSC constituting BC/CoD sessions following the procedures of clause 8.3.3 Figure 18 and/or clause 8.4.3 Figure 30.

9) The SCF confirms the PSC session termination to the UE.

Editor's Note: Implicit termination of the PSC session by terminating all of its constituting BC/CoD sessions is for further study.

## 8.23 Signalling flows for IPTV Content Marker service procedures

IPTV Content Marker service procedures consist of two types. (See clause 7.5.2).

- Storing of IPTV Content Marker data: this type of procedure allows a user to store configurable pointers to content (entire content or parts of content, e.g. favourite scene) and be able to quickly access that content
- Retrieving of IPTV Content Marker data: this type of procedure allows a user to exchange and share IPTV favourite data.

### 8.23.1 IPTV Content Marker storing procedures

Figure 39J provides an overview of the information flows for IPTV Favourite storing. This procedure can occur at any time during IPTV services (BC/CoD/N-PVR/etc).



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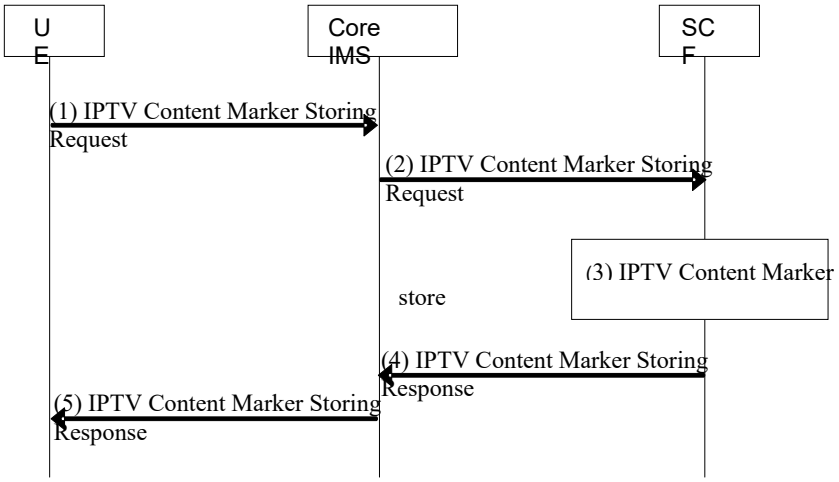


**Figure 39J IPTV Content Marker storing procedure**

1) The UE sends a IPTV Content Marker storing request to save content information. This content information may include various information, e.g. the entire/scene of content with/without current watching.

2) The IMS core forwards this request to the SCF.

3) The SCF stores the indicated content information as Content Marker data for this user. The data model of IPTV Content Marker items is defined in clause 7.5.2.

4) The SCF confirms storage of IPTV Content Marker data.

5) The IMS core forwards the response to the UE.

## 8.23.2 IPTV Content Marker retrieval procedures

Figure 39K provides an overview of the information flows for IPTV Content Marker retrieval. This procedure can occur at any time and may be used to share IPTV Content Markers.

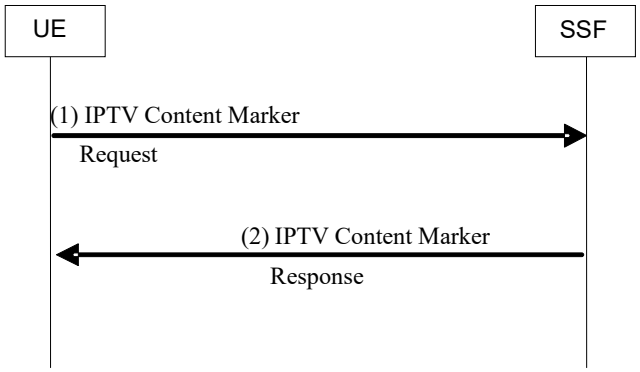


**Figure 39K IPTV Content Marker retrieval procedure**

1) The UE sends a IPTV Content Marker retrieval request.

2) The SSF returns IPTV Content Marker retrieval response. The response shall contain the user's IPTV Content Markers. If there is any user id in IPTVContentMarkerSourceUser parameter, then the SSF response also contains the indicated user's IPTV Content Marker data. When retrieving that user's IPTV Content Marker data, the SSF shall perform authorization according to that other user's IPTVContentMarkerAuthorizedViewUser settings.



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Alteratively, the UE may fetch the IPTV Content Markers from the SCF. In that case the SCF shall generate the IPTV Content Marker retrieval response. This response shall contain the user's IPTV Content Markers. If there is any user id in IPTVContentMarkerSourceUser parameter, then the SCF response also contains the indicated user's IPTV Content Marker data. When retrieving that user's IPTV Content Marker data, the SCF shall perform authorization according to that other user's IPTVContentMarkerAuthorizedViewUser settings.

# 9 Interactions between IPTV services and other TISPAN services

Several approaches can be employed for realizing the interaction between IPTV services and other TISPAN services. This paragraph describes approaches that are considered within the TISPAN architecture, e.g. where application servers interact directly through Core IMS. Two other approaches involving 3GPP SCIM and OSA/Parlay methods are described in Annex C.

## 9.1 Presence and IPTV

Editor's Note: Evolution of the Release 2 procedures for Presence and IPTV could be developed in Release 3.

IPTV services may be combined with the presence service capability. This clause describes the mechanisms that apply when IPTV services are combined with the presence service capability.

These mechanisms may also be used for other purposes then publishing user presence information. For example they may be used to gather statistics about BC TV Service or user behaviour information.

### 9.1.1 Presence architecture and functional description

The architecture and functional description of the presence service capability when used in relation to the IPTV services conform to TS 182 008 [10].

### 9.1.2 Presence attributes for IPTV

The Presence attributes defined in TS 182 008 [10] apply.

In addition, the following specific IPTV attributes shall be supported:

- BC service activated;
- CoD service activated;
- PVR service activated.

If the IPTV presence attribute "channel currently accessed" is supported, then the machine-readable part of the identification of the channel shall be globally unique. The term globally unique here means that there is no ambiguity in the identification of the channel if presentity and watcher (for terminology, see in TS 182 008 [10]) are with different network operators and/or in different countries.

The following specific IPTV attributes may also be supported:

- BC TV Service currently accessed;
- programme currently watched, when available;
- content currently accessed.
- current service state (e.g. paused, playing, in trick play mode)

Editor's note: additional mechanism may be required if Presence mechanism is not adequate for providing these attributes.

It is up to user's decision to include specific IPTV attributes in presence document.



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Editor's note: how to cope with the relation between a user publishing Presence attributes and subscribing to services requiring Presence information is FFS.

When the "BC service activated" attribute is included in a presence document, the attributes "BC TV Service currently accessed" and "programme currently watched" may also be included, depending on user preferences. These attributes shall not be present in a document if the "BC service activated" attribute is not present.

When the "CoD service activated" or the "PVR service activated" attribute is included in a presence document, the attribute "content currently accessed" may also be included depending on user preferences. This attribute shall not be present if the "CoD service activated" or the "PVR service activated attribute" is not present.

### 9.1.3 SIP related procedure

The SIP related procedures defined in ES 283 030 [13] apply.

The publication of CoD related presence information happens:

- after completion of CoD session initiation procedure;
- after completion of CoD session termination procedure.

The publication of BC related presence information happens:

- after completion of BC session initiation procedure;
- after completion of the BC session termination procedure;
- optionally, when the UE successfully subscribes to a particular multicast channel (i.e. channel hopping).

In order to cope with overload possibly caused by numerous channel-hopping, it shall be possible to define a timer set up to limit the number of publications. This timer is started and reinitialised after each channel change. Publication shall only be sent when the timer elapses.

## 9.2 Incoming call management

Editor's Note: The procedures for incoming call management service can be described in this clause.

## 9.3 Message and IPTV

Editor's Note: The procedures for message and IPTV service can be described in this clause.

### 9.3.1 Messaging procedures

Messaging procedure is used for several purposes: where messages are sent between users or between system and users. Following procedures may be primarily used for immediate messaging described in TS 181 016 [13B] in section in 6.2.3 to provide services specified in TS 122 340 [13C] together with IPTV services. Several additional specific use cases described in TS 181 016 [13B] (e.g. in section in Annex A) require integration of existing messaging systems (in this case IMS based messaging) with IPTV service logic to provide blended IPTV and messaging service (e.g. messaging during BC service or chat discussion related to content or related to used IPTV service, etc.).

Figure 40 depicts the typical steps that occur when the UE wants to send message from one user to one or more other users using signalling path.



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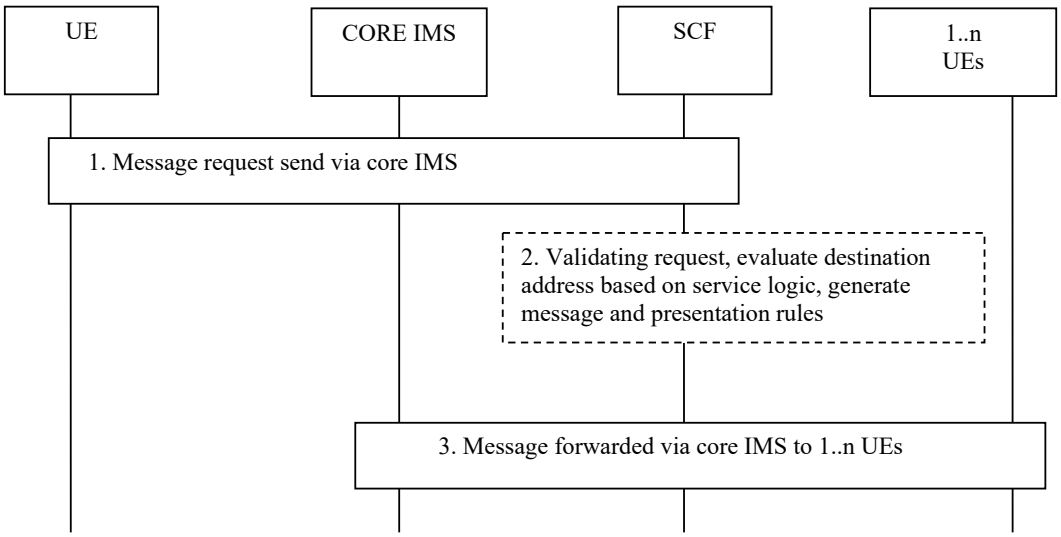


**Figure 40: messaging procedure using signalling path**

1) UE sends a message request via IMS core to SCF using signalling path for IMS messaging mechanisms [2]. Message contains message itself (supporting different media content types as in [13C]) and also parameters which identify related IPTV service blended with this messaging procedure.

2) SCF evaluates appropriate destination UEs for delivery message to specified group of users (as users interaction related with IPTV services) based on service logic (and other conditions e.g. user profile or messaging rules) specified for required IPTV service. SCF may also modify/generate messages (original message may be included together with additional IPTV related information e.g. watched channel, form of presentation of message, etc.).

3) SCF sends message (original/modified) via IMS core using IMS messaging framework [2] to one or more UEs.

### 9.3.2 Procedures for deliver messages of BC service using media path

This clause describes mechanisms of deliver messages that are associated with a BC service using media path.

These mechanisms may be used for some purposes. For example they may be used to participate in a comment service associated with a BC program; one user can send his comment to the SCF using IMS immediate message services, then the SCF and the MF deliver the comments to all users who subscribed to the comment service associated with the BC service.

Figure 41 depicts the typical steps that occur when one user sends IMS immediate messages SCF, and SCF and MF deliver the message to users who subscribed to the message services associated with the BC service.

NOTE: the parameters for joining the multicast group, i.e. multicast address, need to be available to UE before it receives the messages delivered using media path.



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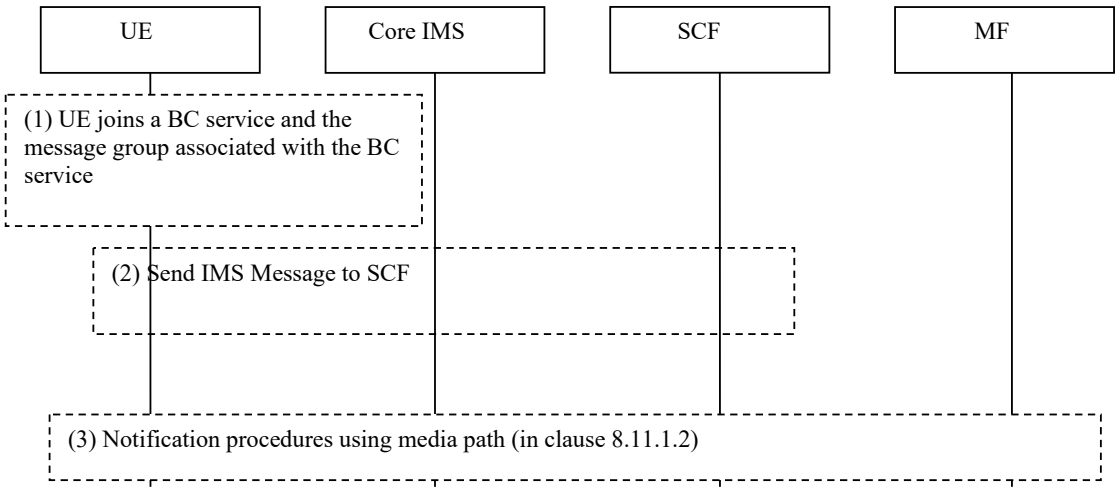


**Figure 41: Deliver messages of BC service using media path**

1) UE joins a BC service and the messages multicast group associated with the BC service, e.g. comment services of a BC service.

2) UE initiates an IMS immediate message request carrying the message, which is specified in TS 123 506 [2]. The immediate message is routed by Core IMS to the SCF in charge of the delivery of messages associated with the BC service.

3) The SCF and MF deliver the message to UEs which join the same message multicast group associated with the BC service. The procedures use mechanisms of delivering notification using media path specified in clause 8.11.1.2, and the message delivery notification request from SCF to the selected MF at least contains parameters of BC service ID and the message.

## 9.4 Event Handling involving the SCF

Event handling by the SCF takes place if the SCF receives events from other NGN application servers. SCF involvement is required depending on the event and the user profile configuration. Examples include incoming call management involving multiple UE's (e.g. pause on incoming call), emergency warning and alerting systems, or parental control. In such cases the SCF needs to correlate the event with the right UE and apply service logic to determine the applicable action to the UE and/or MF.

Editor's note: whether this procedure is also applicable for handling events from external applications (e.g. those in Appendix C) is FFS.



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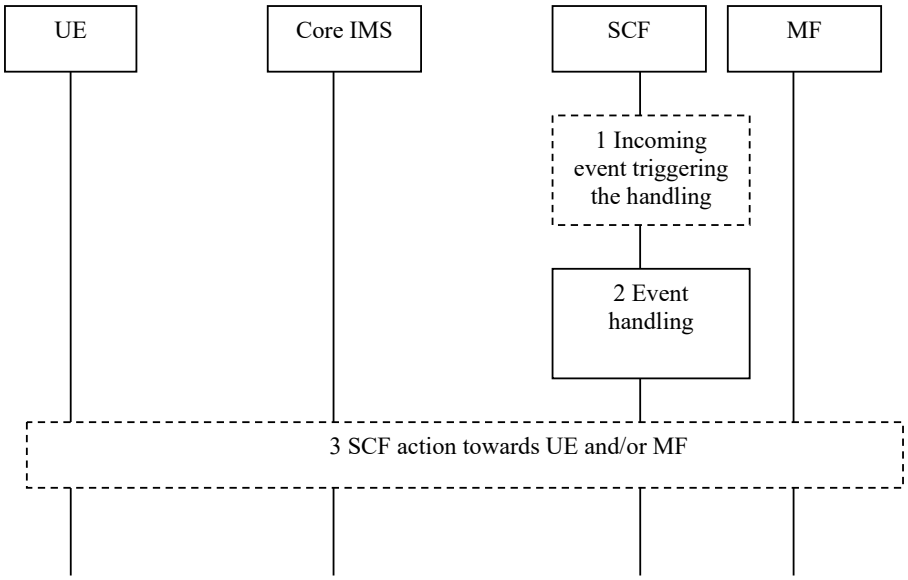


**Figure 42: Event handling involving the SCF.**

1) The SCF receives an incoming event which requires handling.

NOTE: It is up to the IPTV Service Provider, on behalf of the user and/or based on the service requirements, to decide when to route an incoming event to the SCF a or send it directly to the UE.

2) The SCF correlates the incoming event with the designated user/group of users and/or UE's, performs authentication and detects the ongoing IPTV service status.

NOTE: The SCF can decide which (if any) further actions to perform, e.g. based on user preferences and detected service state.

3) The SCF performs an action towards the UE and or MF, e.g. it can send a notification to the UE or instruct the UE to send a trick play command / change the channel.

# 10 Security

Editor's Note: Evolution of the Release 2 security aspects could be developed in Release 3. For this, collaboration with WG7 work is needed.

Editor's Note: WG7 distinguishes between Media and Service Security. This section may need to be aligned with WG7 terminology.

## 10.1 Authentication

Authentication procedures for the Ut reference point conforms to TS 187 003 [5].

## 10.2 Content Security

The locations and related reference points of the following elementary functions are defined in TS 187 003 [5]. They are reproduced below for information.

For content security the following elementary functions are used:

- Content licensing: This elementary function handles the licenses issuing related functions, including generation and distribution of the licenses to the desired entities.



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- Key management: This elementary function handles the management of the security keys, including generate and provide the keys and corresponding parameters to the desired entities.
- Content encryption: This elementary function handles the content protection related operations, e.g. content encryption and encapsulation operations, etc.

These three elementary functions may be flexibly located in existing functional entities or new ones as a whole or in independent parts.

NOTE: Some of these elementary functions may be executed on-line (in real-time) or off-line (in this case could be part of the management).

# 11 Charging

Editor's Note: Evolution of the Release 2 charging aspects could be developed in Release 3.

IMS charging principles apply as defined in ES 282 010 [16].

Editor's Note: Are there any limitations of IMS based billing model which limits its use for IPTV? Could be criteria for IPTV services charging (e.g. TV-Channel vs. Session Charging) a differ from existing IMS services criteria, thus might lead TISPAN to specified additional requirements to IMS charging (e.g. towards SA5).

# 12 Management

Editor's Note: In Release 3 the Release 2 management section could be evolved.

## 12.1 Management requirements

For each IPTV service, several entities require to be provisioned with necessary network parameters (e.g. multicast addresses for multicast services, source of original content, etc) and to associate specific content or service with these network parameters. These entities are:

- the SSF, as it needs to provide the UE with the content identifier associated to an IPTV service and possibly with a set of network parameters (control and/or content channel descriptions) necessary to initiate an IPTV session;
- the MFs, as they need to associate a content identifier with multicast or unicast streams to be delivered to the UE;
- the SCF, as it may also need to provide the UE with network parameters in response to service initiation requests, in configurations where the SSF does not provide this information beforehand.

Consistent information has to be provisioned on these entities.

## 12.2 Content management

Content management functionalities are responsible for managing acquisition of content and service information (e.g. metadata) from content and its metadata sources of content provider, controlling validation and/or processing/adaptation to the required format and also to provide management functionalities for supporting distribution of the prepared content to the media delivery function and distribution of content among different media delivery functions.

NOTE: Content management is used in the case of offline or online ingest of the content. The online ingest means receiving content directly streamed from the content provider. The offline ingest refers to content files delivered by other means than the online (e.g. such on physical media like DVD, CD, etc.). The content management is used by the IPTV service provider to statically provision the content.



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Content management functionalities can consist of the following groups of elementary functions:

- Content acquisition - responsible for content management functionalities needed to acquire, aggregate and import content/metadata from multiple external sources of content providers.
- Content validation/adaptation - after acquisition it could be necessary to manage content/metadata format validation and verification as well as to define a relation between content and its metadata. Management can also control media or metadata adaptation and/or processing (e.g. transcoding, packaging, scheduling, resolution conversion, editing, etc) to the required type of media files or streams.
- Content distribution Control - management functionalities for control the distribution of content and its metadata from content providers when content acquisition/ content validation/adaptation were performed to appropriate functional entity (e.g. media files storage in MDF). This function handles the whole lifecycle of the content and provide management support for its distribution to media delivery distributed architecture (e.g. uploads on video streamers, moving according to management criteria such as popularity, regionalization, un-referenced content, MDF resources and so on). Additionally, this function can control the content distribution among MDFs (e.g. delete content in some MDFs, moving content from one MDF to other MDFs) according to some criteria such as content popularity.

# 13 Support of Metadata

Editor's Note: In Release 3 the Release 2 Metadata section could be evolved.

Editor's Note: Content metadata may be delivered along with the content (from MDF). In case this case metadata might differ from the metadata stored in the SSF – how to handle this case is FFS, maybe WG8 needs to be consulted. Also, IPTV CRS might be a service requiring the SCF to access metadata.

## 13.1 Introduction

IPTV Metadata enriches the service experience of the IPTV Services a user has access to. IPTV Metadata may originate from the User, the NGN Service Provider, the Application Provider or the Content Provider. The Metadata should be processed, filtered and enriched by involved IPTV solution entities in order to improve the user experience.

NOTE 1: Processing, Filtering and Enriching Metadata may be based on techniques like personal preferences, additional subscribed-to services and other means and are out of scope of the present document.

NOTE 2: How user originated Metadata is injected into the IPTV solution is out of scope of the present document.

The access to Metadata may be considered as a service in itself which shall be protected by appropriate service authorization means before the Metadata is delivered to the UE.

## 13.2 SSF support

IPTV Metadata may be delivered outside of an IPTV service session by the SSF.

Xa shall be used for the Metadata delivery.

## 13.3 SCF/MF support

IPTV Metadata may be delivered as part of a normal IPTV service session or inside an IPTV service session dedicated to Metadata delivery. In the first case, the Metadata is sent in addition to Media as part of the IPTV session. In either case the Metadata capabilities are negotiated during session setup or session modification between UE and SCF. The Metadata itself is delivered via the MDF through unicast or multicast via Xd.



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# 14 Support of Mobility Capabilities

To support the mobility capabilities of IPTV services, the UE shall support roaming in the Visited Network. When the UE is located in the Visited Network, it can access the IPTV services in its own home network. Sometimes when the IPTV Service Provider servers both home network and visited network, the MF can server both visited network and home network. Annex D give interconnection examples to support of mobility capabilities.

Editor's Note: Different type of interconnection of visited and home network applied for IMS roaming is FFS.

# Annex A (informative): Integration of non-SIP-AS Service Discovery Function in IMS based IPTV

Editor's Note: In Release 3, an evolution of this section may be needed.

## A.1 Introduction

Clause 5 defines Service Discovery and Selection (SD and S) as a two step process consisting of Service Discovery and Service Selection. While clause 5 focuses on discovering services by an SIP based SDF entity, the Service Selection uses non-SIP mechanisms. This annex describes using non-SIP SDF to reuse standard non-SIP Service Discovery technologies such as DVB-IP Service Discovery as specified in TS 102 034 [6].



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# A.2 Architecture

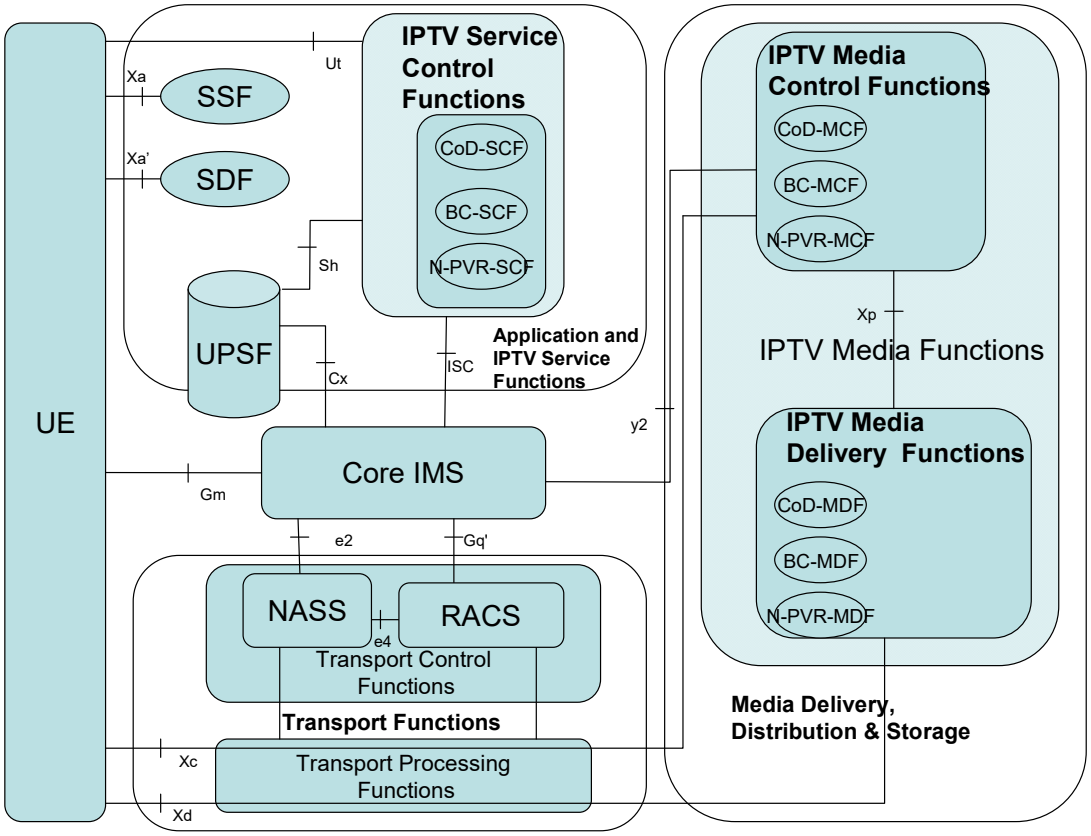


**Figure A.1: Functional architecture for IPTV services integrating non-SIP SDF**

## A.2.1 Functional entities

Figure A.1 depicts the IMS based IPTV architecture based on figure A.2 using a non-SIP AS SDF for Service Discovery. All entities are defined in clause 5.

## A.2.2 Reference points

Figure A.1 depicts the IMS based IPTV architecture based on figure A.2 using a non-SIP AS SDF for Service Discovery. All shown reference points are defined in clause 6 except Xa' which is described in the following clause.

### A.2.2.1 UE - SDF (Xa')

This reference point delivers Service Discovery Information, i.e. SSF addresses in the form of URIs and/or ip-address, from the SDF to the UE. Both Unicast and Multicast delivery of this information is possible.

The use of Xa' conforms to TS 102 034 [6] clause 5.2.5, where the term "HNED" is to be replaced by "UE" and where "Location(s)" carries the SSF address(es).



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## A.2.3 Procedures

### A.2.3.1 IPTV service attachment and selection

Figure A.2 defines steps 3 and 4 of figure 9 in case the SDF is not SIP-AS based.

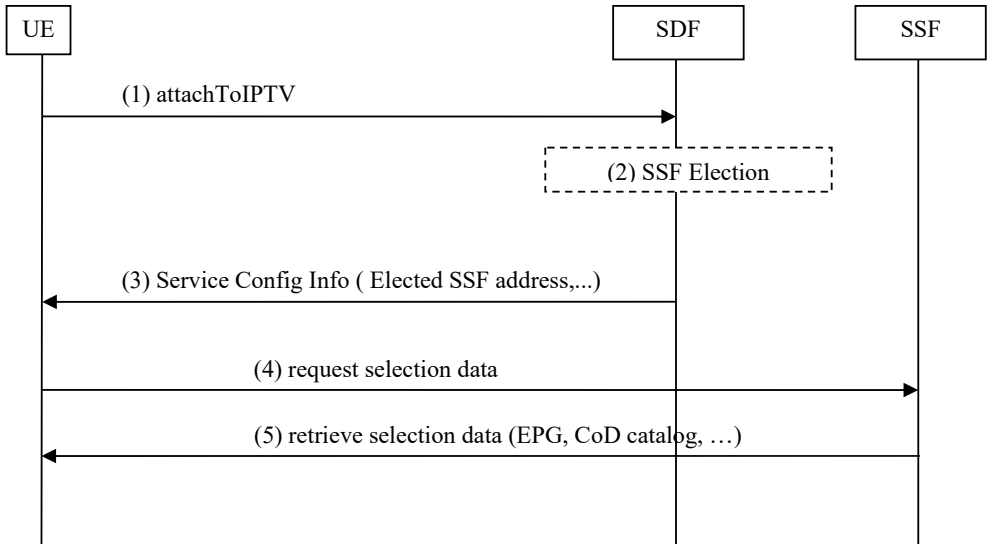


**Figure A.2: IPTV service attachment and selection**

1) The UE requests the SDF it was assigned. This assignment may have occurred during the network attachment phase, during offline provisioning or by other means.

2) The SDF determines the proper SSF (or SSFs). It is for further study how the SDF may take into account the UE's capabilities, the user's profile and/or the location of the UE (Personalized Service Discovery).

3) Configuration information that includes the SSF address(es) is (are) routed back to the UE.

4) The UE requests the SSF to get the selection data.

5) The SSF delivers the requested data to the UE.

NOTE: If a non-SIP AS SDF is used for IPTV service attachment, no IMS registration prior to step (1) of figure A.2 is required. Therefore, step 2 of figure 9 (IMS registration) can occur in parallel to, before or after the procedure described in figure A.2.



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# Annex B (informative): Push CoD Procedures

## B.1 Push CoD session

*Editor's note: Contributions discussing the signalling flows for Push CoD are invited*

Before the User Equipment can view the content, a session initiation procedure shall take place as described in clause B.1.1.

### B.1.1 Overall signalling flows for Push CoD session Initiation

Figure B.1 provides an overview of the information flows for initialization of the Push CoD session.

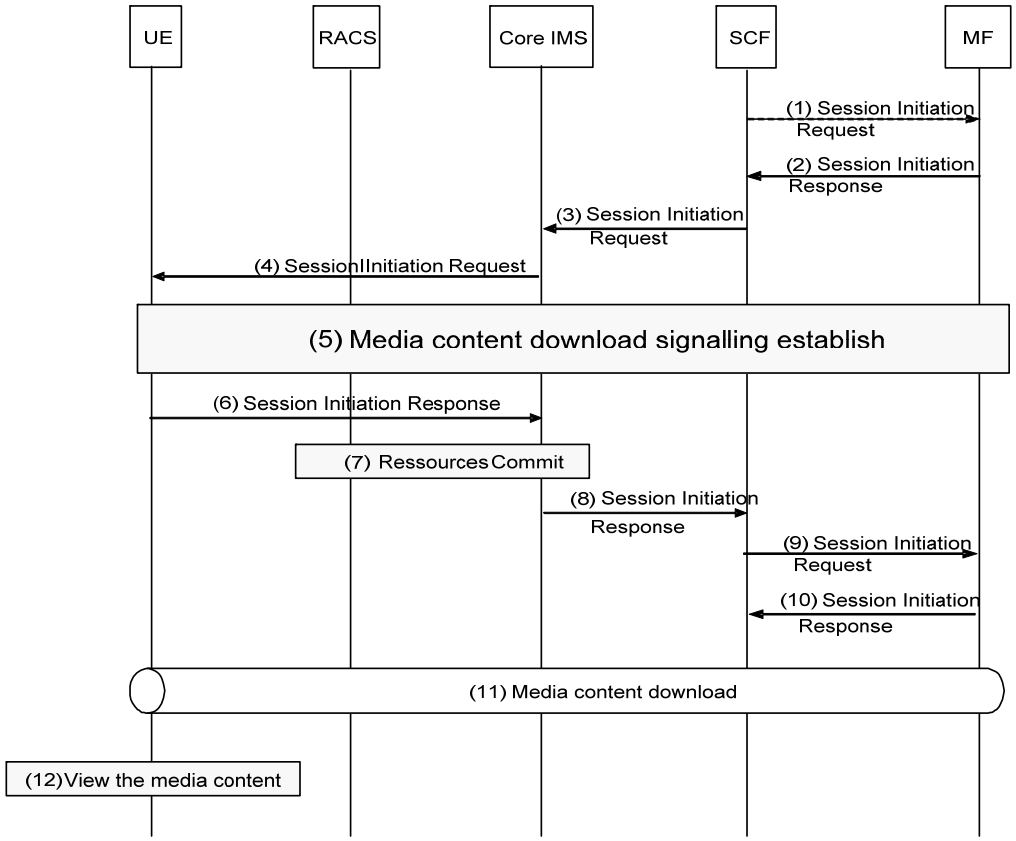


**Figure B.1**

1) The SCF identifies the recommended media content which will be sent to the UE(s), and then sends a session initiation request to the selected MF.

2) The MF confirms receiving the session initiation request from the SCF.

3) The SCF sends a session initiation request including parameters such as the size and URL of media content to the core IMS.



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4) The Core IMS forwards the session initiation request to the UE.

5) Signalling procedures for establishment of a media content download between the UE and the MF

6) The UE confirms the establishment of the dialogue with the SCF.

7) The P-CSCF within the Core IMS interacts with the RACS to commit all resources previously reserved. This includes opening pinholes for exchanging content control messages and/or content delivery.

8) The core IMS forwards this confirmation to the SCF.

9) The SCF confirms the establishment of the dialogue with the MF.

10) The MF confirms receiving the establishment of the dialogue with the SCF.

After this point, UE can download the media content from the selected MF and save it in its storage device. Then the UE can view the media content in its storage device.

## B.1.2 Media download Negotiation

The following clauses go into details related to step 5 in the session initiation in clause B.1.1.

### B.1.2.1 Signalling flows for the establishment of the content download from MF

Figure B.2 shows information flows applicable when network parameters necessary to handle the Push CoD service are provided by the MF as part of the session initiation procedure. This set of information flows assume that the UE does not receive a description of the network parameters required from the SSF before initiating the session.

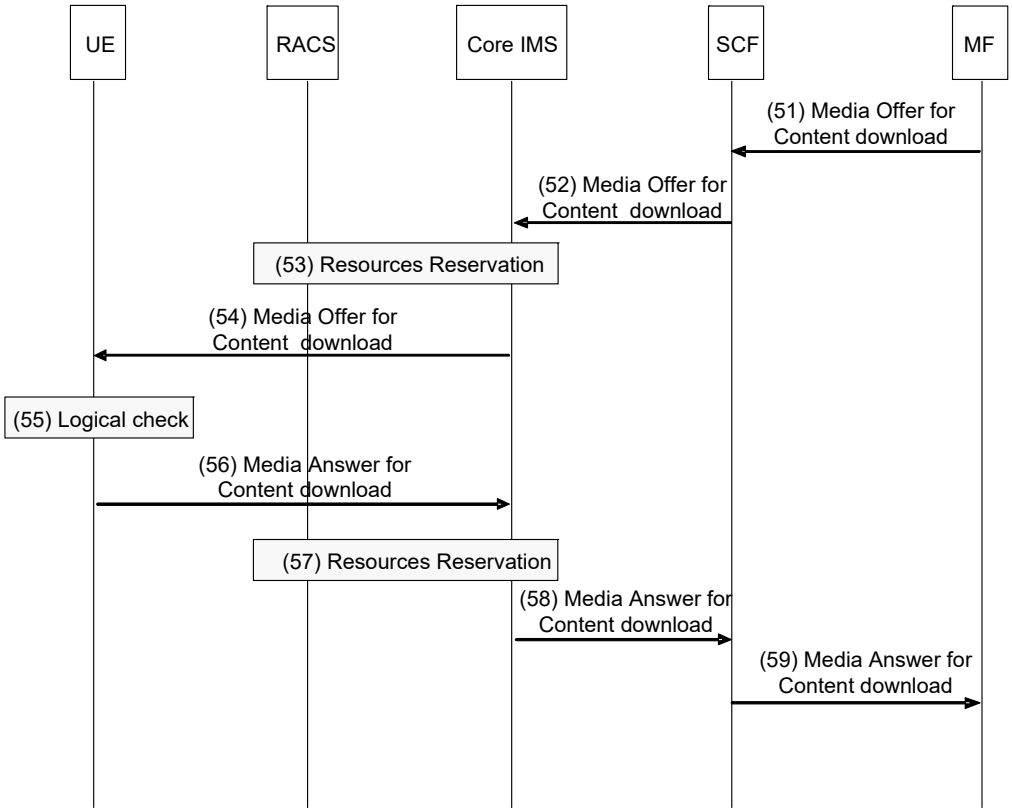




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**Figure B.2**

(51) The MF initiates negotiation of a content download signalling with the UE, by sending a media offer to the SCF.

(52) The media offer is forwarded to the Core IMS.

(53) The P-CSCF within the Core IMS interacts with the RACS to reserve transport resources for the content download.

(54) The P-CSCF within the Core IMS forwards the media offer to the UE.

(55) The UE check its storage capability to compare with size of the media content. Also user can select if UE will receive the content.

(56) If the UE can receive the media content and/or the user agrees to store the media content, the UE provides a media answer to the Core IMS.

(57) The P-CSCF within the Core IMS interacts with the RACS to update the reservation (optional).

(58) The media answer for the content download is propagated to the SCF.

(59) The SCF forwards the media answer to the MF.

### B.1.2.2 Signalling flows for the establishment of the content download from UE

Figure B.3 provides an overview of the information flows for UE-initiated negotiation of the network parameters necessary to handle the Push CoD service. This set of information flows assume that the UE receives a description of the network parameters required from the SSF before initiating the session.

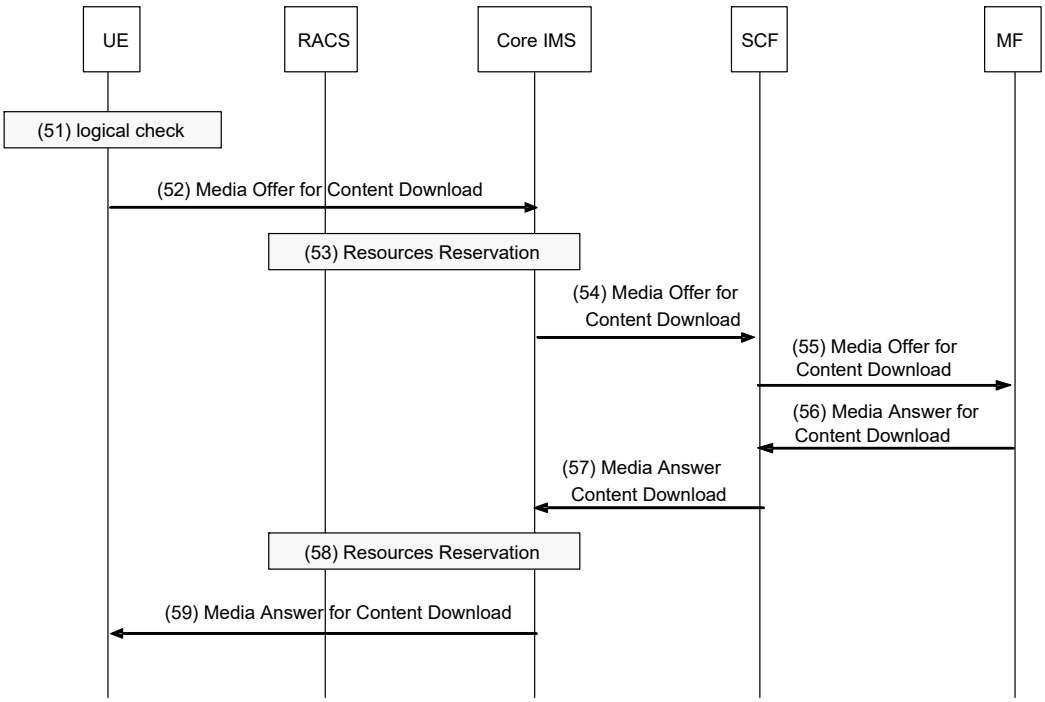


**Figure B.3**

(51) The UE check its storage capability to compare with size of the media content. Also user can select if UE will receive the content.



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(52) If the UE can receive the media content and/or the user agrees the store the media content, the UE initiates negotiation of a content download with the MF, by sending a media offer to the Core IMS.

(53) The P-CSCF within the Core IMS interacts with the RACS to reserve transport resources for the content control channel and one or more content delivery channels.

(54) The media offer is forwarded to the SCF.

(55) The SCF forwards the media offer to the MF.

(56) The MF provides a media answer to the SCF.

(57) The SCF forward the media answer to the Core IMS.

(58) Within the Core IMS, the P-CSCF interacts with the RACS to update the previous reservation (optional).

(59) The media answer for the content control channel and one or more content delivery channels is propagated to the UE.

# Annex C (informative): Architectures for Interactions between IPTV services and other TISPAN services

This Annex contains examples of architectures that can enable the interaction between IPTV services and other TISPAN services. The examples of architectures given refer to existing work and serve to clarify how service interaction can achieved by using this existing work. For these architectures, it is assumed that service interaction requires a dedicated Application Server that may explicitly implement the blended service functionality (e.g. pausing the TV on incoming call, or watching apart together). Such an AS can be seen as an external application with respect to the TISPAN IPTV architecture.

## C.1 Interaction based on an OSA/Parlay/Parlay X SCS

This approach is based an OSA/Parlay/Parlay X Service Capability Server (SCS), that provisions standardized interfaces and APIs to external and third party application servers. The use of such an SCS is described in ETSI ES 204 915 [18], ETSI ES 202 504 [19], 3GPP TS 29.198 [20] and 3GPP TS 29.199 [21].

### C.1.1 Service Capability Server (SCS)

The OSA SCS acts as a secure gateway between the underlying network and the application with the OSA architecture. It is responsible for providing specific service abilities to third party applications. An SCS further serves to make an abstraction of the functionality offered by the network, in effect offering the service capability features of the underlying network to the third party applications.

### C.1.2 Architecture

Figure C.1 shows a simplified version of the IMS-based IPTV architecture from Figure 2 in section 5.1.1., with interfaces to an SCS and subsequent external applications.



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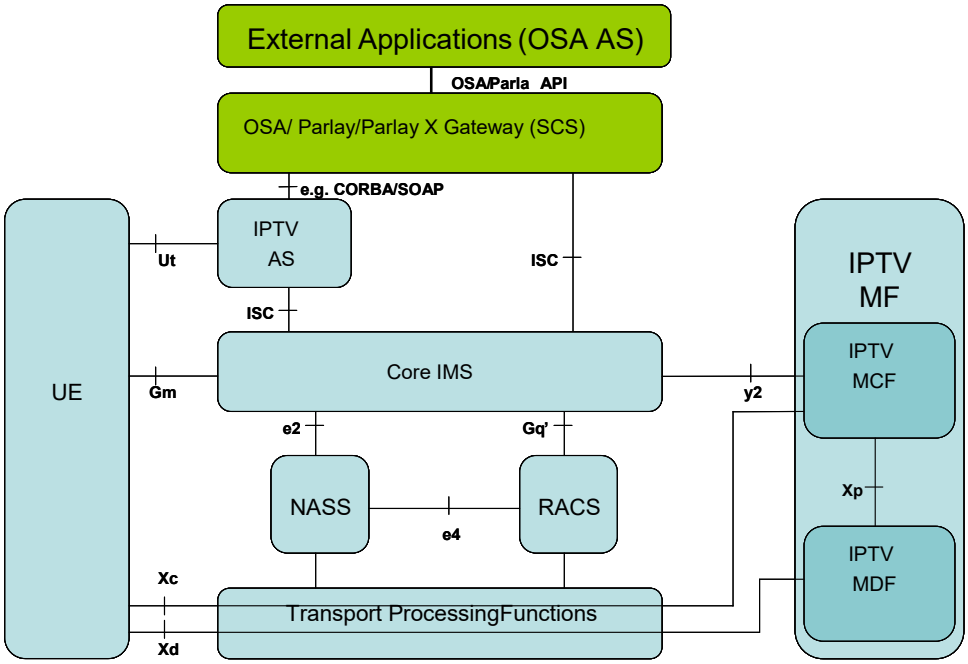


**Figure C.1 – Interaction between TISPAN IMS-based IPTV architecture and an OSA/Parlay/Parlay X SCS.**

## C.2 Interaction based on a 3GPP SCIM

This approach is based on a Service Capability Interaction Manager (SCIM), that allows for service association and dynamic service triggering. The use of such an SCIM is described in 3GPP TS 23.002 [22], 3GPP TS 23.218 [23] and 3GPP TR 23.810 [24].

### C.2.1 Service Capability Interaction Manager (SCIM)

The Service Capability Interaction Manager (SCIM)is a function that manages the interaction between IPTV services and other NGN services, by e.g. associating the IPTV services with other NGN services and dynamic triggering the services in the ongoing session based on the information about the relational session or user's status.

### C.2.2 Architecture

Figure B.2 shows a simplified version of the IMS-based IPTV architecture from Figure 2 in section 5.1.1., with interfaces to an SCIM and subsequent external applications.



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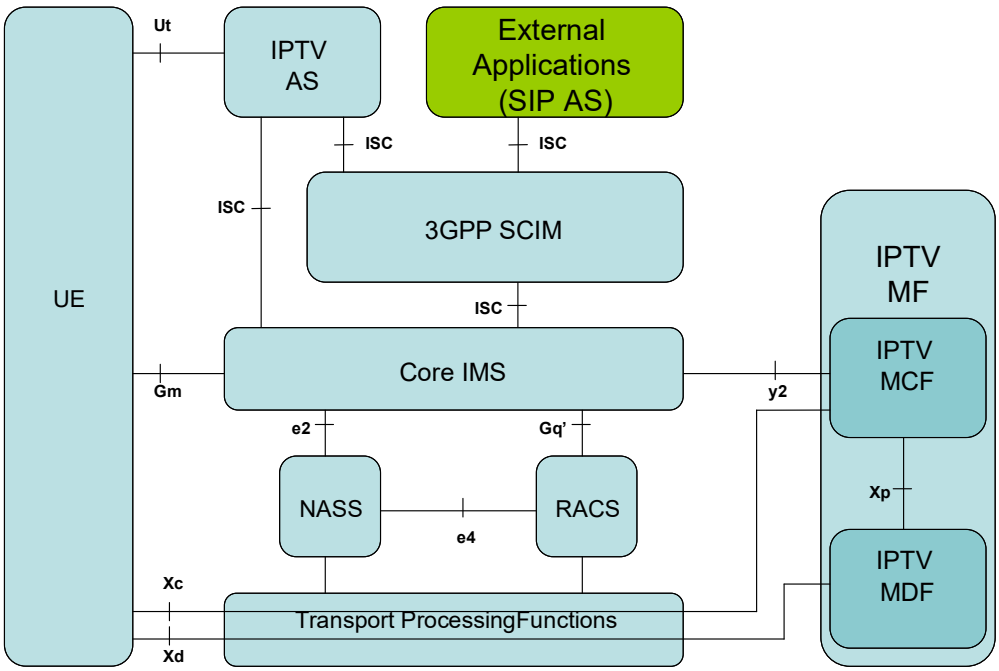


**Figure C.2 – Interaction between TISPAN IMS-based IPTV architecture and a 3GPP SCIM.**

# Annex D (informative): Mapping of elementary functions

## D.1 Mapping of elementary functions to generic capabilities

Editor's note: Contributions discussing correct mapping of elementary function to generic capabilities are invited. When new functionality or service will be added also implication for this section could be considered to have it synchronized with normative text.

Mapping of elementary functions in Table D.1 show which elementary function (listed in 5.1.4) are applicable to generic capabilities (described in 5.1.3A).

**Table D.1: Mapping of elementary functions to generic capabilities**

| | Elementary function | Discover & select content | Service control | Service interact. | Media control | Deliver media | Content protection | Content mng. & distribution | Service interaction |
|---|---|---|---|---|---|---|---|---|---|
| 1 | network attachment | | X | | | | | | |
| 2 | registration | | X | | | | | | |
| 3 | resource management | | X | | | | | | |
| 4 | charging information | | X | | | | | | |
| 5 | service discovery | X | | | | | | | |



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| | Elementary function | Discover & select content | Service control | Service interact. | Media control | Deliver media | Content protection | Content mng. & distribution | Service interaction |
|---|---|---|---|---|---|---|---|---|---|
| 6 | service authorization | | X | X | | | | | |
| 7 | service selection | X | | | | | | | X |
| 8 | service initiation | | X | X | | | | | |
| 9 | service control | | X | X | | | | | X |
| 10 | service information handling | X | X | X | | | | | X |
| 11 | service configuration | | X | | | | | | |
| 12 | session initiation | | X | X | | | | | |
| 13 | session modification | | X | X | | | | | |
| 14 | session termination | | X | X | | | | | |
| 15 | multicast based media delivery | | | | | X | | | |
| 16 | unicast based media delivery | | | | | X | | | |
| 17 | content download/upload | | | | | X | | | |
| 18 | control of multicast streaming | | X | | X | | | | |
| 19 | control of unicast streaming | | | X | X | | | | |
| 20 | control of download/ upload | | | | | | | | |
| 21 | content ingestion/receiving | | | | | X | | X | |
| 22 | content recording | | | | X | | | | |
| 23 | content storage | | | | X | | | | |
| 24 | content adaptation | | | | | X | | | |
| 25 | content acquisition | | | | | | | X | |
| 26 | content validation | | | | | | | X | |
| 27 | content distribution | | | | | | | X | |
| 28 | content licencing | | | | | | X | | |
| 29 | key management | | | | | | X | | |
| 30 | content encryption | | | | | | X | | |
| 31 | user profile/data mng. | | | | | | | | X |
| 32 | accounting/right control | | X | | | | | | X |
| 33 | status/state (changes) detection/reporting | | X | X | | X | | | X |
| 34 | common notification | | X | X | | | | | X |
| 35 | messaging | | | X | | | | | X |
| 36 | presence | | | X | | | | | X |
| 37 | inter-destination media synchronization | | | X | | X | | | X |



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# D.2 Mapping of elementary functions to functional entities

Editor's note: Contributions discussing correct mapping of elementary function to functional entities are invited. When new functionality or service will be added also implication for this section could be considered to have it synchronized with normative text.

Mapping of elementary functions in Table D.2 show which elementary function (listed in 5.1.4) are applicable to functional entities (described in 5.1.3).

**Table D.2: Mapping of elementary functions to functional entities**

| | **Elementary function** | **UE** | **SSF** | **SDF** | **Core IMS** | **SCF** | **UPSF** | **MCF** | **MDF** |
|---|---|---|---|---|---|---|---|---|---|
| 1 | network attachment | X | | | X | | | | |
| 2 | registration | X | | | X | X | | | |
| 3 | resource management | | | | X | | | | |
| 4 | charging information | | | | X | X | | | X |
| 5 | service discovery | | | X | | | | | |
| 6 | service authorization | X | | X | X | | | | |
| 7 | service selection | X | X | | | | | | |
| 8 | service initiation | X | | | | X | | | |
| 9 | service control | X | | | X | X | | | |
| 10 | service information handling | X | | X | | | | | |
| 11 | service configuration | X | | | X | X | | | |
| 12 | session initiation | X | | | X | X | | | |
| 13 | session modification | X | | | X | X | | | |
| 14 | session termination | | | | X | X | | | |
| 15 | multicast based media delivery | | | | | | | | X |
| 16 | unicast based media delivery | X | | | | | | | X |
| 17 | content download/ upload | X | | | | | | | X |
| 18 | control of multicast streaming | X | | | | | | X | |
| 19 | control of unicast streaming | X | | | | | | X | |
| 20 | control of download/ upload | X | | | | | | X | |
| 21 | content ingestion/receiving | X | | | | | | | X |
| 22 | content recording | X | | | | | | | X |
| 23 | content storage | X | | | | | | | X |
| 24 | content adaptation | | | | | | | | X |
| 25 | content acquisition | | | | | | | | |



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| | Elementary function | UE | SSF | SDF | Core IMS | SCF | UPSF | MCF | MDF |
|---|---|---|---|---|---|---|---|---|---|
| 26 | content validation | | | | | | | | |
| 27 | content distribution | | | | | | | | |
| 28 | content licencing | | | | | | | | |
| 29 | key management | | | | | | | | |
| 30 | content encryption | | | | | | | | X |
| 31 | user profile/data mng. | X | | | | X | X | | |
| 32 | accounting/right control | | | | X | X | X | | |
| 33 | status/state (changes) detection/reporting | X | | | | X | | X | X |
| 34 | common notification | X | | | | X | | | |
| 35 | messaging | X | | | | X | | | |
| 36 | presence | X | | | | X | | | |
| 37 | inter-destination media synchronization | X | | | | X | | | |

# D.3 Mapping of elementary functions to IPTV services

Editor's note: Contributions discussing correct mapping of elementary function to IPTV services are invited. When new functionality or service will be added also implication for this section could be considered to have it synchronized with normative text.

Mapping of elementary functions in Table D.3 show which elementary function (listed in 5.1.4) are applicable for described IPTV services (described in TS 181 016 [13B]).

**Table D.3: Mapping of elementary functions to IPTV services**

| | Elementary function | BC | CoD | nPVR | cPVR | BCwTP | UGC | Push CoD | Ad. | CRS | Notif. | Msg | Presence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | network attachment | x | x | x | x | x | x | x | x | x | x | x | x |
| 2 | registration | x | x | x | x | x | x | x | x | x | x | x | x |
| 3 | resource management | x | x | x | | x | x | x | x | | | | |
| 4 | charging information | x | x | | | | x | x | | | | x | |
| 5 | service discovery | x | | x | | | x | | | | | | |
| 6 | service authorization | x | x | x | x | x | x | x | x | x | x | x | x |
| 7 | service selection | x | | x | x | x | x | x | | | | | |
| 8 | service initiation | x | x | x | x | x | x | x | x | x | x | x | x |
| 9 | service control | x | x | x | x | x | x | x | x | x | x | x | x |
| 10 | service information handling | | | | | | x | | | x | | | |
| 11 | service configuration | x | x | x | x | x | x | x | x | x | x | x | x |



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| | Elementary function | BC | CoD | nPVR | cPVR | BCwTP | UGC | Push CoD | Ad. | CRS | Notif. | Msg | Presence |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | session initiation | x | x | x | | | | x | | | | | |
| 13 | session modification | x | x | x | | x | x | x | | | | | |
| 14 | session termination | x | x | x | x | x | x | x | x | x | | | |
| 15 | multicast based media delivery | x | | | | x | | | x | | x | | |
| 16 | unicast based media delivery | | x | x | | x | x | | x | | x | | |
| 17 | content download/ upload | | | | | | x | x | x | | | | |
| 18 | control of multicast streaming | x | x | x | x | x | x | x | | | | | |
| 19 | control of unicast streaming | x | x | x | x | x | x | x | | | | | |
| 20 | control of download/ upload | x | x | x | x | x | x | x | | | | | |
| 21 | content ingestion/receiving | x | x | x | x | x | x | x | | | | | |
| 22 | content recording | | | x | x | x | | | | | | | |
| 23 | content storage | | x | x | x | | x | | x | | | | |
| 24 | content adaptation | x | x | | | | | | x | | | | |
| 25 | content acquisition | x | x | | | x | x | x | x | | | | |
| 26 | content validation | x | x | | | x | x | x | | | | | |
| 27 | content distribution | x | x | | | x | x | x | x | | | | |
| 28 | content licencing | x | x | | | x | x | x | | | | | |
| 29 | key management | x | x | | | x | x | x | | | | | |
| 30 | content encryption | x | x | | | x | x | x | | | | | |
| 31 | user profile/data mng. | | | | | | | | x | x | | | x |
| 32 | accounting/right control | x | x | x | x | x | x | x | | | x | x | |
| 33 | status/state (changes) detection/reporting | | x | x | | x | x | x | x | x | x | | x |
| 34 | common notification | | | | | | | | x | x | x | | |
| 35 | messaging | | | | | | | | | x | | x | |
| 36 | presence | | | | | | | | | x | | | x |
| 37 | inter-destination media synchronization | x | x | | | x | x | | x | | | | |



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# Annex E (Informative): Architecture for advertising

Annex E describes a mapping of the functional entities defined by other Advertising standards with the TISPAN IPTV functional entities, and describes the interaction between the two.

Editor's note : Further contributions are expected to introduce external advertising (e.g. OMA Mobile Advertising Enabler, …etc)

Editor's note : Advertising procedures involving external advertising system should be introduced in this annex.

## E.1 SCTE-130 advertising architecture option

This clause specifies the map between TISPAN entities and SCTE-130 entities and complete architecture for advertising and necessary interfaces between TISPAN and SCTE-130 entities.

### E.1.1 Definitions

SCTE-130 has defined the following advertising entities in [26]:

- **Ad Decision Service (ADS)**: The Ad Decision Service determines how advertising content is combined with non-advertising (i.e. entertainment) content assets. The decisions made by an ADS may be straightforward (i.e. specific ad content placed at a specific time in a specific asset) or arbitrarily complex (based on subscriber data, advertising zone, etc.).
- **Ad Management Service (ADM)**: The Ad Management Service defines messages in support of ad insertion activities. The primary consumer of these messages is an ADS. The message interfaces exposed by an ADM allow for both preconfigured ad decisions as well as real-time fulfillment models. ADM detection of a placement opportunity is outside the scope of the specification. However, the ADM may be a service consumer of a POIS and/or a CIS in order to obtain such information.
- **Content Information Service (CIS)**: The Content Information Service manages metadata describing all the assets (both advertising assets and non-advertising assets) available to the other SCTE 130 logical services. The CIS provides query and notification interfaces to the other logical services.
- **Placement Opportunity Information Service (POIS)**: The Placement Opportunity Information Service (POIS) holds, maintains, or retains descriptions of placement opportunities.
- **Subscriber Information Service (SIS)**: The Subscriber Information Service manages the per-subscriber information relevant to ad placement decisions. The SIS provides mechanisms surrounding privacy issues.

### E.1.2 Mapping between TISPAN entities and SCTE-130 entities

Placement Opportunity Information Service (POIS) and Ad Decision Service (ADS) are considered out of scope of TISPAN architecture because placement opportunities providing and Advert placement decision are not defined as TISPAN entities tasks. Link between ADS and ADM is considered as a reference point in scope of TISPAN.

Other modules can be mapped with current TISPAN entities as they cover TISPAN entities tasks.

In the table below, is presented entities defined in the SCTE-130, their roles and concerned TISPAN entities:

**Table E.1 :**

| SCTE-130 entity name | Role | TISPAN Entity concerned | TISPAN entity task covered |
|---|---|---|---|



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| | | | |
|---|---|---|---|
| POIS | Provides placement opportunities | Out of scope<br><br>(external entity) | - |
| SIS | Manage subscriber information relevant for Ad | SCF / UPSF / External entity | SCF task from § 5.1.5.2 :<br><br>Select appropriate ad content for specific user or user group, **based on user profile** (e.g. user preference, shopping habits, location information, etc.) and IPTV service status (e.g. current BC program ID, commercial break in BC service or pause during CoD content playback).. |
| CIS | Manage assets metadata | SCF | SCF task from § 5.1.5.2 :<br><br>**Select appropriate ad content** for specific user or user group, based on user profile (e.g. user preference, shopping habits, location information, etc.) and IPTV service status (e.g. current BC program ID, commercial break in BC service or pause during CoD content playback).. |
| ADM | Provides placement opportunities based on POIS and CIS information<br><br>Defines messages for Ad insertion Activities | SCF (for TAI) and MCF (for Broadcast) | SCF tasks from § 5.1.5.2 :<br><br>Select appropriate ad content for specific user or user group, based on user profile (e.g. user preference, shopping habits, location information, etc.) and IPTV service status (e.g. **current BC program ID, commercial break in BC service or pause during CoD content playback**)..<br><br>Send ad insertion indication to MF<br><br>MCF tasks from § 5.1.5.3 :<br><br>Handle ad insertion control of MDF, i.e. control the fetching of the ad content and synchronization between ad content and IPTV content, including accounting for delay or drift in broadcast TV schedules. |



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| | | | |
|---|---|---|---|
| ADS | Decide ad placement relative to content based on ADM placement opportunities | Out of scope<br><br>(external entity) | - |

## E.1.3 SCTE-130 based Advertising Architecture

Figure E.1 shows the interfaces between the SCTE-130 advertising specific entities and the TISPAN IPTV architecture.

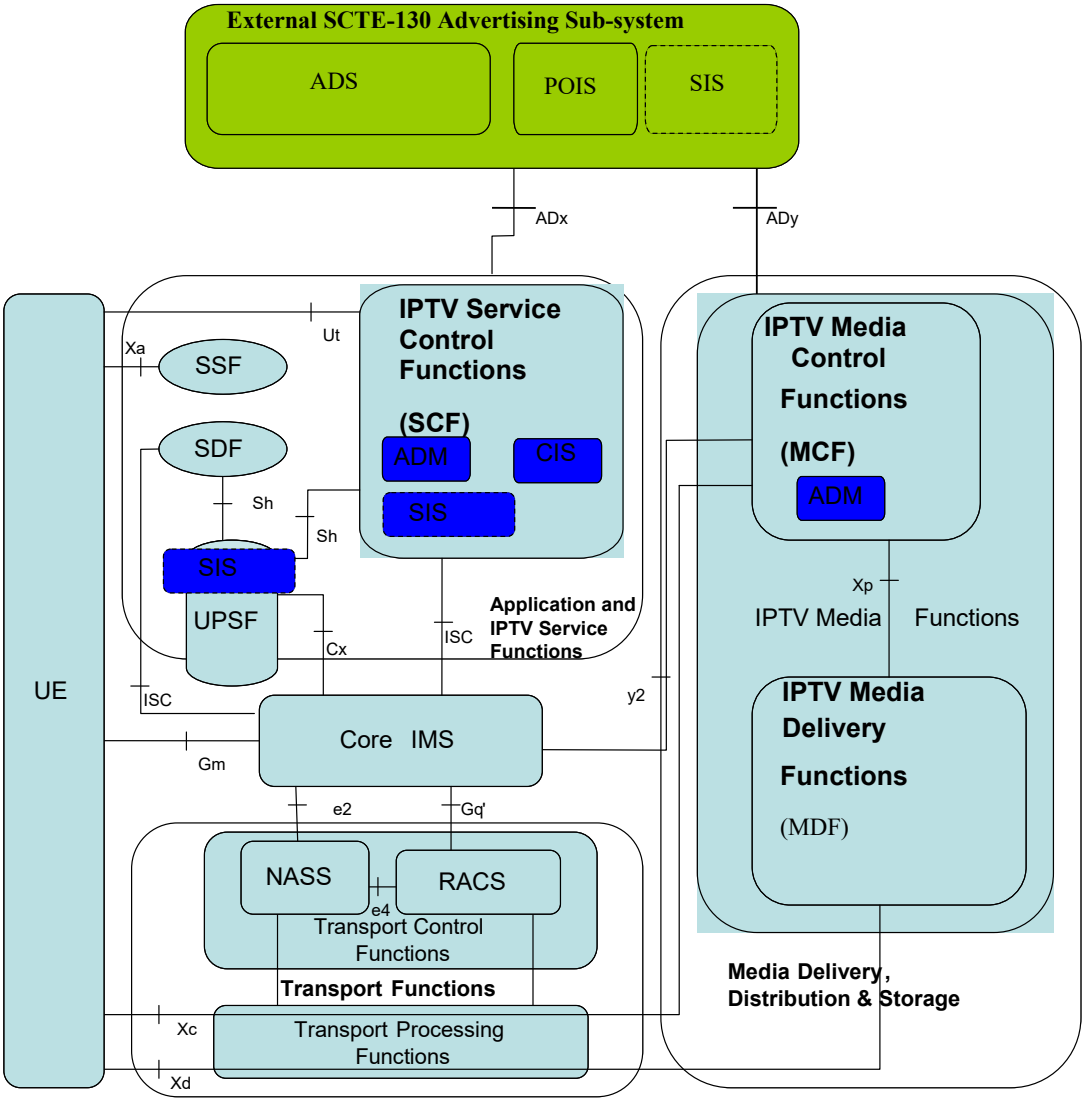


**Figure E.1 – Interaction between TISPAN IMS-based IPTV architecture and SCTE-130 advert entities**

The SCF entity is interconnected with the Ad Decision service by the ADx reference point to request for placement decision.

POIS is an external entity. SIS may be either covered by SCF, by SCF and UPSF, or an external entity interfaced with SCF.

The MF entity is interconnected with the Ad Decision service by the ADy reference point to made ad-selection and ad-placement requests for broadcast services



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## E.1.4 Reference points

### E.1.4.1 IPTV Service Control Functions (SCF) – SCTE-130 External Ad system (ADx)

This reference point is used to exchange advertising related messages between SCF and an SCTE-130 external Advertising sub-system.

ADx reference point should be used to send and receive messages from/to the ADS, POIS and SIS entities and the TISPAN IPTV SCF

The use of ADx between SCF and ADS conforms to SCTE130-3 [28].

### E.1.4.2 IPTV Media Function (MF) – SCTE-130 External Ad system (ADy)

This reference point is used to exchange advertising related messages between MF and an SCTE-130 external Advertising sub-system for broadcast services

ADy reference point should be used to send and receive messages from/to the ADS and the TISPAN IPTV MF.

The MF entity is interconnected with the Ad Decision service by the ADy reference point to made ad-selection and ad-placement requests for broadcast services

The use of ADy between MCF and ADS conforms to SCTE130-3 [28].

Editors note: Whether the ADy reference point must be the same as ADx is FFS

# Annex F (informative): Ad placement options

This annex presents several possibilities of instanciation of Ad placement by existing mechanism from other SDOs.

## F.1 IPTV Ad placement: SCTE-130 option

In SCTE-130 [28], four types of ad insertion opportunities exists:

- Pre-roll (a placement opportunity preceding an entertainment asset)
- Post-roll (a placement opportunity following the play out of an entertainment asset)
- Interstitial (a placement opportunity occurring during the play out of an entertainment asset)
- Pause (placement opportunity as a result of a subscriber pressing the pause button)

They can be separated in two options : predetermined placement opportunities (Pre/Post roll and Interstitial) and unexpected placement opportunities (Pause).

The predetermined option should be used for the following types of stored contents : BC, COD, NPVR and UGC contents.

The unexpected option could be used for all sorts of stored contents: BC with trick mode, COD, NPVR, UGC, timeshift.



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# Annex G (informative): Interconnection Models to support of Mobility Capabilities

## G.1 Interconnection model

Figure G.1 illustrates the model of interconnection with the Visited Network within Core IMS involved. UE can request IPTV services in the Home Network by connecting to the Visited Network. Core IMS in the Visited Network can request resources from the RACS in the Visited Network through the interface Gq'. Core IMS in the Home Network can request resources from the RACS in the Home Network through the interface Gq'. UE can attach to the Visited Network through the interface e1 so that the NASS in the Visited Network can assign IP address for the UE and discovery the address of P-CSCF in the Visited Network. Core IMS in the Visited Network can transfer the IPTV service request from the UE through the interface Ic to the Core IMS in the Home Network through the connection of their own IBCF(Intermediate Breakout Control Function). UE can connect the SSF to select IPTV services through the interface Xa which is already defined. UE can connect to the IPTV SCF to configure parameters through the interface Ut which is already defined. Core IMS in both network connect to their own UPSF to get user profiles through their own interface Cx.

Editor's note: Using IMS roaming for IPTV services cross home and visited network may need additional investigation (probably involvement of WG4, WG7, WG8) about the interconnection and also need to be clarified if mentioned interfaces could cross domains.

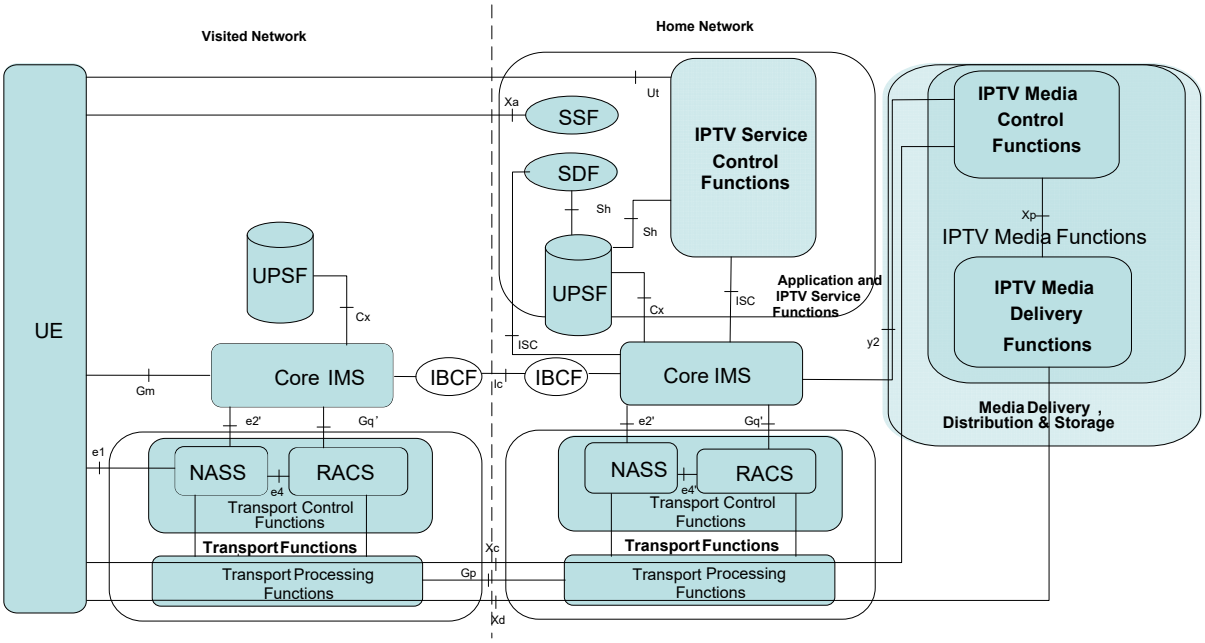


**Figure G.1**

## G.2 Signalling flows

The sub-clauses below explain the signalling flows of UE start-up procedures and CoD procedures when the UE is located in the Visited Network. In Broadcast procedures, N-PVR and other services, they are similar as CoD procedures.

NOTE: Following procedure are indicative to show one possible way how should IMS roaming be handle between home and visited network.



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## G.2.1 UE start-up procedures

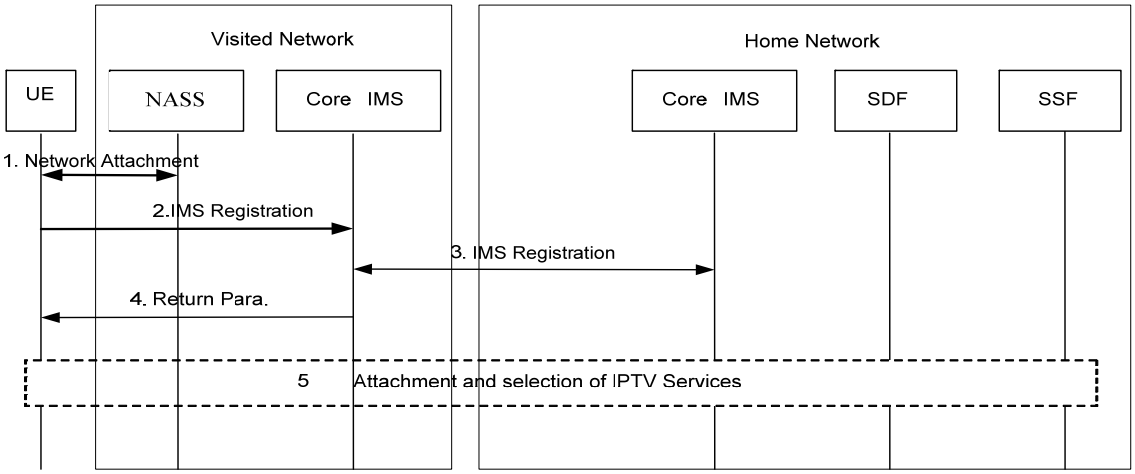


**Figure G.2**

1) Network Attachment
In this step the UE attaches to the network. The procedures for network attachment are defined in ES 282 004 [3]. This step includes IP configuration, P-CSCF address discovery of Visited Network, etc.

2) IMS Registration in Visited Network
In this step, the UE performs regular IMS Registration as defined in TS 182 006 [2].

3) P-CSCF within Core IMS in Visited Network submits the registration request to the I-CSCF within the Core IMS in the Home Network.

In this step, the UE performs regular IMS Registration as defined in TS 123 002.

4) Core IMS in the Visited Network return parameters (e.g. P-CSCF address of Home Network) to the UE.

5) The step is the same as step 3~4 in Figure 9 of clause 8.2.



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## G.2.2 CoD procedures

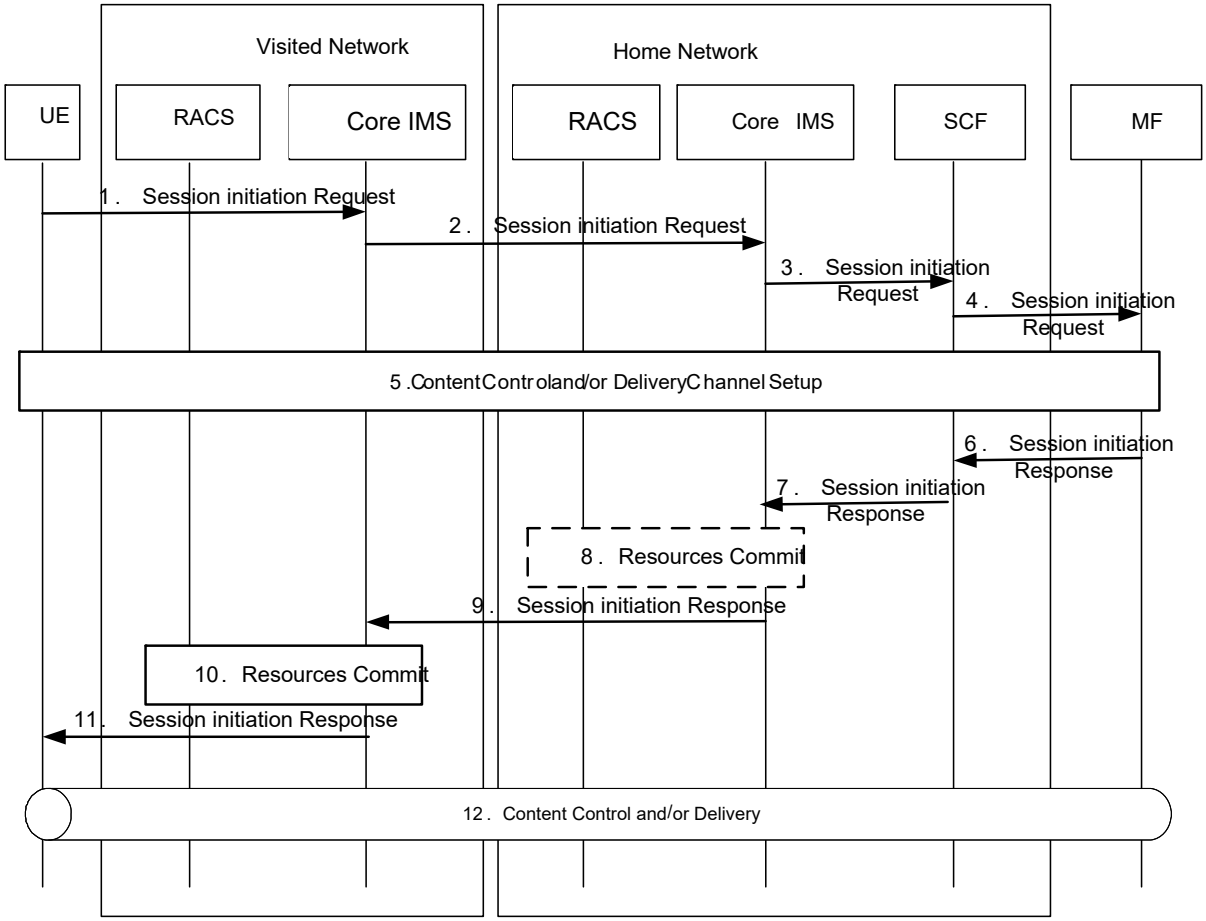


**Figure G.3**

1) The UE initiates a dialogue to the CoD service and submit the request to the Core IMS in the Visited Network.

2) Core IMS in the Visited Network forwards the request to the Core IMS in the Home Network.

3) The session initiation request is routed by the Core IMS in the Home Network up to the SCF.

4) The SCF performs service authorization as described in clause 5.1. If the UE is allowed to access the content, the SCF forwards the session initiation request to the selected MF.

5) Signalling procedures for establishment of a content control channel and optionally content delivery channels take place between the UE and the MF (see similar clause 8.4.1.1).

6~8) The steps are the same as step 7~10 not including step 8 in the figure 21 of clause 8.4.1.1.

9) The Core IMS in the Home Network forwards this confirmation to the Core IMS in the Visited Network.

10) The P-CSCF within the Core IMS in the Visited Network interacts with the RACS in the Visited Network to commit all resources previously reserved. This includes opening pinholes for exchanging content control messages and/or content delivery.

11) The P-CSCF in the Visited Network forwards the dialogue confirmation to the UE.

After this point, UE may use the content control channel to request content to be streamed and the actual content will then be delivered to the UE. The content control channel will also be used to carry UE requests for controlling the streams, e.g. "pause", "fast forward", etc.



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NOTE: Resources reserve/commit between Core IMS and RACS in the home network is optional when selected MF in the visited network servers the UE.



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# Annex H(informative): Change history:

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **WG Doc.** | **CR** | **Rev** | **CAT** | **Title / Comment** | **Current Version** | **New Version** |
| 30-05-08 | 17bTD256r1 | 001 | | A | Fixing Figure 34 in TS 182 027 for Release 3. Corresponds to 17bTD260 | 3.0.0 | 3.0.1 |
| 30-05-08 | 17bTD255r2 | 002 | 1 | D | 16 Editor's notes on Release 3, Guidance to contributors | 3.0.0 | 3.0.1 |
| 06-06-08 | 17bTD195r3 | 003 | 1 | B | Notification procedures | 3.0.0 | 3.0.1 |
| 02-07-08 | 18WTD074r2 | 004 | | F | Corrections in step numbering | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD052r4 | 005 | 1 | B | WI2070 User generated content in IPTV architecture | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD070r3 | 006 | | B | Modification of content distribution related description in clause 12 | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD086r2 | 007 | | D | Proposal for ToC of TS182 027 on value added services | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD138r3 | 008 | | B | Service Control function for IPTV content recommendation service | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD139r2 | 009 | | B | Include procedures for IPTV recommendation service | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD140r1 | 010 | | D | Clarification of notification service | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD181r1 | 011 | | B | Network-initiated CoD session | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD071r6 | 012 | | B | Support Push CoD service in IMS-based IPTV Architecture | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD082r4 | 013 | | C | Reselection of MDF | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD083r7 | 014 | | C | Notification using media path | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD085r2 | 015 | | B | Advertising functions in IPTV architecture | 3.0.1 | 3.0.2 |
| 02-07-08 | 18WTD084r3 | 016 | | B | User Profile for Parent Control | 3.0.1 | 3.0.2 |
| 01-10-08 | 18bTD288r1 | 017 | | D | WI2070 ToC Drafting: Changes to clauses 5 and 8 | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD194r1 | 018 | | B | Session Transfer procedure | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD257r1 | 019 | | A | WI2070, adding references to stage 1 | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD143r2 | 020 | | B | Sharing Bookmarks Between Multiple IPTV Users | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD170r3 | 021 | | D | Generic SCF and MF | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD169r2 | 022 | | D | "CoD-based" UGC procedures | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD085r2 | 023 | | B | UGC Functions in IPTV Architecture | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD080r3 | 024 | | B | IPTV Advertising Service Procedures | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD076r2 | 025 | | B | Procedure of CoD content preview | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD079r3 | 026 | 1 | B | Personalized Channel Functions | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD128r3 | 027 | | B | Architectures for NGN Service Blending | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD131r3 | 028 | | B | WI2070 Synchronization Architecture | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD196r2 | 029 | | A | Correction of inconsistency of IPTV presence timer definition between stage 2 and 3 | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD091r5 | 030 | | C | Clarification of Push CoD service | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD224r4 | 031 | | B | WI2070 messaging | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD130r3 | 032 | | B | Network-controlled Trick Play | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD081r4 | 033 | | B | Deliver Messages Associated with a BC Service Using Media Path | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD094r6 | 034 | | B | Clarification of Network initiated service | 3.0.2 | 3.0.3 |
| 01-10-08 | 18bTD095r4 | 035 | | B | Procedures of Network initiated BC service | 3.0.2 | 3.0.3 |
| 06-11-08 | 19WTD047r1 | 036 | | D | Typo Correction Fig C1 | 3.0.2 | 3.0.4 |
| 06-11-08 | 19WTD192r2 | 037 | | B | IPTV Elementary functions | 3.0.2 | 3.0.4 |
| 06-11-08 | 19WTD179r1 | 038 | | B | Addition of playlist generation task for SCF | 3.0.2 | 3.0.4 |
| 06-11-08 | 19WTD093r2 | 039 | | B | Functions and Procedures for CRS | 3.0.2 | 3.0.4 |
| 06-11-08 | 19WTD175r2 | 040 | | F | Cleaning up references [2] and [12] | 3.0.2 | 3.0.4 |
| 06-11-08 | 19WTD140r2 | 041 | | F | Advertising Procedures- Name Update | 3.0.2 | 3.0.4 |
| 06-11-08 | 19WTD143r3 | 042 | | B | Advertising Procedures- MCF Role | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD091r2 | 043 | | B | Capability of SCF on event detection | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD092r3 | 044 | | B | PVR procedures | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD094r3 | 045 | | B | Procedures for PPV Service | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD050r2 | 046 | | B | User Generated Content Session Coordination | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD051r2 | 047 | | B | User Generated Content Procedures Coordination note | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD095r2 | 048 | | B | Uploading of UGC Content Description | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD144r3 | 049 | | C | Traditional Broadcast Advertising Procedures | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD111r2 | 050 | | F | COD offset use | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD177r3 | 051 | | B | IPTV Bookmark data model | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD142r7 | 052 | | C | Advertising Procedures- MDF Role | 3.0.2 | 3.0.4 |
| 12-11-08 | 19WTD149r1 | 053 | | F | Alignment of terminology for the IMS-based IPTV procedures | 3.0.2 | 3.0.4 |
| 14-11-08 | | | | | CRs 17 to 53 TB approved at TISPAN#19 and clean-up by ETSI Secretariat | 3.0.4 | 3.1.0 |
| 05-12-08 | 19bTD169r2 | 054 | | D | WI2070 editorial fixes | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD164r1 | 055 | | A | Deleting informative reference to IPTV stage 1 | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD054r1 | 056 | | F | Editorial change | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD117r1 | 057 | | B | Personalized Stream Composition | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD184r2 | 058 | | C | Targeted ad insertion clarification | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD125r4 | 059 | | B | IPTV Service Access History Data Model | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD112r2 | 060 | | C | Clarification of notification procedures | 3.1.0 | 3.1.2 |



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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 05-12-08 | 19bTD131r1 | 061 | | B | Elementary functions mapping | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD180r1 | 062 | | A | Multiple services packages in BC session initiation | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD185r1 | 063 | | F | Clarification on User Profile configuration | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD086r3 | 064 | | B | Modification of targeted advertising flows for CoD services | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD153r2 | 065 | | F | Signalling flow at MF side | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD113r2 | 066 | | B | Event Handling-Involving SCF | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD114r2 | 067 | | B | IPTV Status Detection | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD059r3 | 068 | | B | PCh Specific Information | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD087r3 | 069 | | B | Addition of Signalling flows of playlist generation by SCF and playlist acquisition by MF from SCF | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD128r5 | 070 | | B | Push CoD service procedures | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD182r1 | 071 | | F | Obsolete use of BC MCF/SCF | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD218r2 | 072 | | D | Editor notes for open issues | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD055r3 | 073 | | B | Add Signalling Flows for CoD service action data update | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD061r3 | 074 | | B | Generic Content Upload/Download Procedures | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD056r4 | 075 | | B | Procedures for Restricted Trick Play | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD152r5 | 076 | | B | Advert alignment SCTE | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD154r3 | 077 | | F | Content recommendation attributes in user profile | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD130r4 | 078 | | B | IPTV roaming in IMS-based IPTV Architecture | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD183r4 | 079 | | B | Shared content procedures | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD212r5 | 080 | | C | PPV- Adding required step to call flows in clause 8.3.8 | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD181r2 | 081 | | C | Alternative solution for PPV | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD193r4 | 082 | | D | Clarification of CoD Session Transfer | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD129r7 | 083 | | C | Modification of UGC procedures | 3.1.0 | 3.1.2 |
| 05-12-08 | 19bTD060r3 | 084 | | B | Personalized Channel Procedures | 3.1.0 | 3.1.2 |
| 30-01-09 | 19tTD197r1 | 085 | | D | Editor's note on relationship between Xc and BC tasks | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD078r3 | 086 | | C | Clarification of UGC Creation Procedure | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD079r2 | 087 | | C | Clarification of UGC Watching Procedure | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD080r4 | 088 | | B | Procedure for Personal Service Composition | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD081r2 | 089 | | C | Synchronization of Shared Content | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD082r2 | 090 | | B | Synchronization Procedures | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD147r1 | 091 | | C | Playlist parameters | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD202r2 | 092 | | D | Cleanup of IPTV Bookmark Terminology | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD149r3 | 093 | | B | Shared Service Control procedure | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD183r2 | 094 | | F | Modification on procedures for shared content | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD101r1 | 095 | | F | Modifications to Flows and Assumptions in Session Transfer | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD107r2 | 096 | | B | Signalling Flows for IPTV Favourites procedures | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD185r3 | 097 | | B | Reuse Media Channel for CoD Services | 3.1.2 | 3.1.3 |
| 30-01-09 | 19tTD076r3 | 098 | | B | Service Commands for Shared Room Procedure | 3.1.2 | 3.1.3 |

# History

| Document history | | |
|---|---|---|
| V3.0.0 | May 2008 | First input draft to TISPAN#17bis |
| V3.0.1 | May 2008 | Output draft of TISPAN#17bis ,17bTD331r1 |
| V3.0.2 | July 2008 | Output draft of TISPAN#18WG, 18WTD075 |
| V3.0.3 | October 2008 | Output draft of TISPAN#18bis, 18bTD336 |
| V3.0.4 | November 2008 | Output draft of TISPAN#19WG, 19WTD217 |
| V3.1.0 | November 2008 | CRs 17 to 53 TB approved at TISPAN#19 and clean-up by ETSI Secretariat |
| V3.1.2 | December 2008 | Output draft of TISPAN#19bis, 19bTD171 |
| V3.1.3 | January 2009 | Output draft of TISPAN#19ter, 19tTD212 |



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