

## **Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS-based IPTV interoperability test specification**

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Reference

RTS/TISPAN-06061-NGN-R3

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Keywords

IMS, interoperability, IPTV, testing

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
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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 interoperability tests for IMS-based IPTV system for NGN Release 3. It covers the use of main IPTV functionality via different methods as defined in NGN Release 2 as well as NGN Release 3 new use cases and features for IPTV and possible interactions with Voice/Data communications such as Social TV, Incoming Voice call management and notification on TV screen. Interoperability test descriptions have been specified following the ETSI IPT test specification framework described in EG 202 568 [i.1] and interoperability testing methodology defined in EG 202 237 [i.2], i.e. interoperability testing with a conformance relation. Each interoperability test description includes an end user test sequence as well as a table for checking of high level message flows at key standardized reference points in the TISPAN IMS-based IPTV infrastructure [1] and [2].

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# 2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

## 2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] ETSI TS 182 027 (V3.4.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Architecture; IPTV functions supported by the IMS subsystem".
- [2] ETSI TS 183 063 (V3.5.2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IMS-based IPTV stage 3 specification".
- [3] IETF RFC 2326: "Real Time Streaming Protocol (RTSP)".
- [4] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [5] ETSI TS 102 034: "Digital Video Broadcasting (DVB); Transport of MPEG-2 TS Based DVB Services over IP Based Networks".
- [6] IETF RFC 3376: "Internet Group Management protocol, Version 3".
- [7] IETF RFC 2616: "Hypertext Transfer Protocol - HTTP/1.1".
- [8] ETSI TS 183 048: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control System (RACS); Protocol Signalling flows specification; RACS Stage 3".
- [9] ETSI TS 183 017 (V2.3.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control: DIAMETER protocol for session based policy set-up information exchange between the Application Function (AF) and the Service Policy Decision Function (SPDF); Protocol specification".
- [10] ETSI TS 102 539: "Digital Video Broadcasting (DVB); Carriage of Broadband Content Guide (BCG) information over Internet Protocol (IP)".
- [11] ETSI TS 102 323: "Digital Video Broadcasting (DVB); Carriage and signalling of TV-Anytime information in DVB transport streams".

- [12] ETSI TS 181 016: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Service Layer Requirements to integrate NGN Services and IPTV".
- [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]".
- [14] OMA-TS-SIMPLE-IM-V1-0-20100322-C:"OMA: Instant Messaging using SIMPLE".

## 2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI EG 202 568: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); Testing: Methodology and Framework".
- [i.2] ETSI EG 202 237: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); Generic approach to interoperability testing".
- [i.3] K. Taniguchi and K. Ishikawa: "MSF IMS-based IPTV Test Plan for GMI 2008", Multi Service Forum (MSF) contribution 2008.169.06.
- [i.4] SCTE-130 part 1: "Advertising Systems Overview".

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## 3 Abbreviations

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

3GPP	3 <sup>rd</sup> Generation Partnership Project
A-RACS	Access - Resource and Admission Control Subsystem
AAA	AA-Answer
AAR	AA-Request
AS	(IMS) Application Server
BC	Broadcast
CF	(Test) Configuration
CoD	Content On Demand
CoDS	Content on Demand Server
CSCF	Call Session Control Function
EPG	Electronic Program Guide
FEC	Forward Error Correction
I-CSCF	Interrogating CSCF
IGMP	Internet Group Management Protocol
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IP EN	IP Edge Node
IPTV	Internet Protocol Television
MCF	Media Control Function
MDF	Media Delivery Function
MLD	Multicast Listener Discovery
nPVR	network-side Personal Video Recorder
P-CSCF	Proxy CSCF
PO	Point of Observation
PVRS	Personal Video Recorder Server
RCEF	Resource Control Enforcement Function
RTSP	Real Time Streaming Protocol
S-CSCF	Serving CSCF
SIP	Session Initiation Protocol
SDP	Session Description Protocol



SCF	Service Control Function
SDF	Service Discovery Function
SPDF	Service-based Policy Decision Function
SSF	Service Selection Function
STA	Session-Termination-Answer
STR	Session-Termination-Request
T&A	Transport and Access
TCP	Transmission Control Protocol
TD	Test Description
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
UGC	User Generated Content
UE	User Equipment
UPSF	User Profile Server Function
URI	Uniform Record Identifier

---

## 4 IMS-based IPTV Interoperability Test Specification

### 4.1 Introduction

The IMS-based IPTV interoperability test descriptions (TDs) defined in the following clauses are mainly derived from MSF 2008.169.06 [i.3], TS 183 063 [2] and TS 182 027 [1]. *More specifically, these TDs focus on SIP/SDP [5], HTTP [7], RTSP [4], IGMP [6] related messaging procedures without RACS described in clauses 5, 6, 7, 8 and 11 of TS 183 063 [2]. TDs where RACS is involved are described in part in TS 183 048 [8].*

*The use of FLUTE and DVBSTP transport protocols on Xa reference point as well as IPv6 MLD are at this point not within the scope of the present document.*

### 4.2 Test Prerequisites

#### 4.2.1 IP Version and protocols

##### 4.2.1.1 IP

The present document assumes that IP-based protocols all use IPv4.

##### 4.2.1.2 RTSP

The present document assumes RTSP [3] messages are sent only via TCP.

##### 4.2.1.3 SIP

The present document assumes that all SIP [4] messages are sent via UDP to ensure retransmission procedures based on SIP only and to simplify the match procedure between the message flows and real network capture.

##### 4.2.1.4 IGMP

The present document assumes that IPTV aware UE requests for multicast group use IGMPv3 [6].

##### 4.2.1.5 Media transport

The present document assumes that content is transported using one of the following transport technologies: MPEG2TS encapsulation or direct RTP transport (e.g. H264 over RTP). Further it is assumed that transport of IPTV content within MPEG2-TS layer over RTP and UDP is performed according to the procedures defined in TS 102 034 [5].

## 4.2.2 Authentication and Security

### 4.2.2.1 SIP

The present document assumes that no SIP-based authentication is performed.

### 4.2.2.2 HTTP

Personalized service selection is out of the scope of the document. Hence, no HTTP authentication is required from the UE toward SSF or SCF. Also no authentication proxy is needed between the UE and the SCF.

## 4.2.3 Supported Options

### 4.2.3.1 Signalling Compression

"No SigComp" is the default signalling configuration in all test descriptions. Tests may be executed with signalling compression if the required nodes support it.

### 4.2.3.2 SIP Provisional Message Reliability

The present document assumes there is no use of SIP 100rel option tag.

### 4.2.3.3 SIP precondition option tag

The present document assumes there is no use of SIP precondition option tag.

### 4.2.3.4 SIP timer option tag (Session Timers)

The present document assumes there is use of SIP timer option tag which supports session timer extension. The inclusion of this option tag in a Supported header field of a SIP request or response indicates that the UE is capable of performing refreshes. The inclusion of this option tag in a Require header of a SIP request indicates that the IMS core network should understand the session timer extension to process the request. Its inclusion in a Require header field of a SIP response indicates that the UE should look for the Session-Expires header field in the response and process it according to [4].

## 4.2.4 Content related options

### 4.2.4.1 Encrypted contents

The present document assumes that encryption is not used for CoD or BC content provisioning.

### 4.2.4.2 Digital Rights Management

The present document assumes DRM is not used for CoD or BC content provisioning.

### 4.2.4.3 FEC

The present document assumes that FEC disabled for CoD and BC content provisioning.

## 4.2.5 Service discovery

Service discovery should follow the procedures defined in TS 102 539 [10] and TS 102 323 [11].

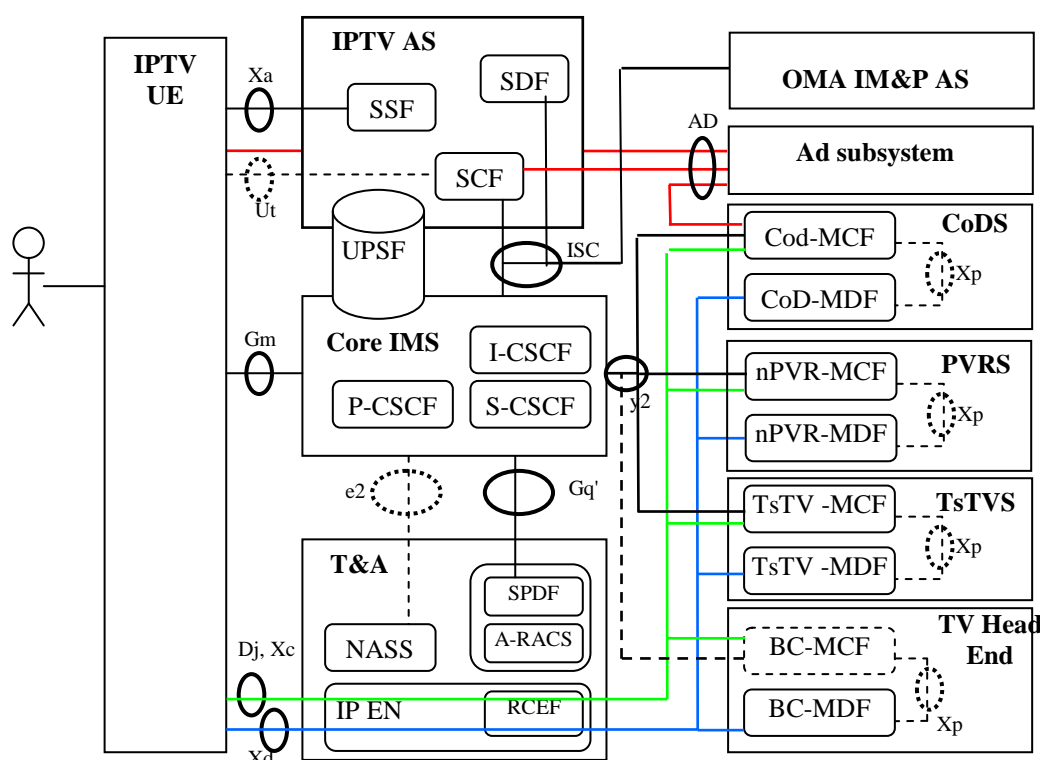
## 4.2.6 Miscellaneous

### 4.2.6.1 Network Address Translation (NAT) and Firewall function

The present document assumes there is neither NAT nor Firewall function activated.

## 4.3 Test Architecture

In figure 1, various nodes of an IMS-based IPTV system that pertain to testing are introduced. For each node configuration is described and relevant points of observation (POs) are identified. Based on these nodes a static test architecture is defined. Figure 1 shows the abstract test architecture of an IMS-based IPTV system based on the general IPTV architecture defined in [2], [8] and [9].



**Figure 1: IMS-based IPTV test architecture (referred as CF\_IMS\_IPTV)**

In figure 1, each node groups different IPTV logical functions. Interfaces within each node are considered internal and not taken into account in conformance criteria. It may however be of interest to also monitor these internal interfaces for debugging purposes.

Reference points (Ut, e2 and y2 towards BC-MCF) in dotted line are not in the scope of the present document.

**NOTE:** In a real IMS-based IPTV system some of the nodes shown in figure 1 may also be collocated in the same equipment. In this case it is however still assumed that their connecting interfaces are still available for monitoring purposes.

Each node framed with a solid line is considered Equipment under Test (EUT) in the context of the ETSI interoperability testing methodology [i.2]. The collection of all EUTs makes up the System Under Test (SUT). Dashed nodes indicate other equipment, i.e. support nodes, required to execute at least some of the tests. The latter nodes are considered not to be part of the SUT.

## 4.3.1 IPTV Nodes

### 4.3.1.1 Core IMS

This node contains P-CSCF, I-CSCF and S-CSCF functions as well as potentially (a part of) the UPSF.

#### 4.3.1.1.1 Relevant Reference Points

The Gm reference point between the IMS Core and the IP aware UE is used as a point of observation (PO) for testing purposes. The ISC reference point is between the IMS Core and IPTV AS and used as a PO for testing purposes. The y2 reference point is between the IMS Core and the PVRS and CoDS and used as a PO for testing purposes. The Gq' reference point is between the IMS Core and T&A and is used as a PO for testing purposes.

#### 4.3.1.1.2 Node Configuration

The Core IMS should be configured to support the pre-requisites outlined in clause 4.2.

The UPSF should be configured with the following user identities.

Private Identity	Public Identity (SIP URI)	Public Identity 2 (Tel URI)	Default Public Identity	Filter criteria
userIPTV_priv	userIPTV	na	1	contact IPTV AS

### 4.3.1.2 IPTV aware UE

#### 4.3.1.2.1 Relevant Reference Points

The Gm interface is used as a PO for interoperability tests towards the IMS Core.

The Xa interface is used as a PO for interoperability tests towards the IPTV AS.

The Xc and Xd (Dj) interfaces are used as POs for interoperability tests towards the PVRS, CoDS and TV Head End.

#### 4.3.1.2.2 Node Configuration

The IP aware UE should be configured to support the pre-requisites outlined in clause 4.2.

### 4.3.1.3 IPTV Application Server (AS)

This node contains SSF, SDF, and SCF functions as well as may contain also (a part of) the UPSF.

#### 4.3.1.3.1 Relevant Reference Points

The Xa interface is used as a PO towards the IPTV aware UE whereas the ISC interface is used as a PO towards the IMS Core.

#### 4.3.1.3.2 Node Configuration

The IPTV AS should be configured to support the pre-requisites outlined in clause 4.2.

The media content available in the PVRS, CoDS and TV Head End has to be described within the IPTV AS.

IPTV specific data information associated with the user has to be described within the IPTV AS [9].

### 4.3.1.4 OMA Instant Messaging and Presence Service (AS)

This node provides capabilities for Instant Messaging and Presence Service (TS 183 063 [2], clause 5.1.17.1).

#### 4.3.1.5 Content on Demand Server (CoDS)

This node contains CoD-MCF and CoD-MDF functions and services based on CoD as UGC.

##### 4.3.1.5.1 Relevant Reference Points

The y2 reference point is used as a PO between the Core IMS and the CoDS. The Xd reference point is used as PO between the UE and the CoDS.

##### 4.3.1.5.2 Node Configuration

The CoDS should be configured to support the pre-requisites outlined in clause 4.2.

The media contents as described in the EPGs have to be available on the CoDS.

#### 4.3.1.6 Personal Video Recorder Server (PVRs)

This node contains nPVR-MCF and nPVR-MDF functions.

##### 4.3.1.6.1 Relevant Reference Points

The y2 reference point is used as a PO between the Core IMS and the PVRs. The Xd reference point is used as PO between the UE and the PVRs.

##### 4.3.1.6.2 Node Configuration

The PVRs should be configured to support the pre-requisites outlined in clause 4.2.

The media contents as described in the EPGs have to be available on the PVRs.

#### 4.3.1.7 Transport and Access (T&A)

This node contains transport control and processing functions, A-RACS, SPDF, NASS and RCEF. The latter is located in the IP-Edge Node.

##### 4.3.1.7.1 Relevant Reference Points

The Xd, Xc and Dj reference points are used as POs between the UE and the transport node.

Gq' reference point is used as Pos between SPDF and CORE IMS.

##### 4.3.1.7.2 Node Configuration

The T&A should be configured to support the pre-requisites outlined in clause 4.2.

Regarding multicast support, the function has to implement IGMPv3, IGMPv2 with SSM (source specific mapping) and in case the multicast sources are not directly connected a CORE network a multicast protocol (e.g.: PIM).

### 4.3.2 External Nodes

This clause lists nodes which are required for performing some of the interoperability tests but not consider to be part of the SUT, i.e. supporting equipment required for the execution of tests.

#### 4.3.2.1 TV Head End

This node contains BC-MDF and BC-MCF functions.

#### 4.3.2.1.1 Relevant Reference Points

The Xd reference point is used as PO between the UE and the TV Head End.

y2 reference point is used between CORE IMS and BC-MCF. It is not a PO so far.

#### 4.3.2.2 Node Configuration

The TV Head End should be configured to support the pre-requisites outlined in clause 4.2.

TV End Head should provide at least one BC channel unconditionally.

#### 4.3.2.3 Time Shifted TV Server

This node contains TsTV-MDF and TsTV -MCF functions.

##### 4.3.2.3.1 Relevant Reference Points

The Xd reference point is used as PO between the UE and the TsTV Server.

y2 reference point is used between CORE IMS and TsTV-MCF. It is not a PO so far.

##### 4.3.2.4 Node Configuration

The TsTV Server should be configured to support the pre-requisites outlined in clause 4.2.

#### 4.3.2.5 Advertising Nodes

The nodes described below are involved in the different types of Advertising architecture (TS 182 027 [1], clause 8.4 and annex E).

##### 4.3.2.5.1 Internal Advertising Nodes

NOTE: Internal Advertising Nodes not covered by the present document.

##### 4.3.2.5.2 SCTE-130 Advertising Nodes

This is the Advertising architecture defined by SCTE-130 ([i.4]). TISPAN and SCTE-130 entities communicate through three AD interfaces are: ADz, ADx and ADy.

###### 4.3.2.5.2.1 Relevant Reference Points

ADz reference point is used as PO between the UE and the external SCTE-130 Advertizing Sub-system.

ADx reference point is used between SCF and the external SCTE-130 Advertizing Sub-system.

ADy reference point is used between MCF and the external SCTE-130 Advertizing Sub-system.

##### 4.3.2.5.3 OMA MobAd Advertising Nodes

NOTE: OMA MobAd Advertising Nodes not covered by the present document.

### 4.3.3 Summary of interfaces and protocols

Figure 1 includes also IPTV reference points to be monitored in interoperability testing.

Figure 2 identifies again the relevant reference points and provides more information about the protocols they use.

FE/ Reference point (protocol)	UE	IMS core	UPSF	SDF	SSF	SCF	MCF	MDF	ECF/ EFF
UE	---	Gm (SIP/SDP)	---	via Core IMS (SIP/SDP)	Xa (HTTP, DVBSTP, FLUTE)	Ut (HTTP), via Core IMS (SIP/SDP)	Xc (RTSP) (Note 1)	Xd (UDP/RTP /RTCP/ HTTP) (Note 1)	Dj, Di IGMP/ MLD
IMS core	Gm (SIP/SDP)	---	Cx (Diameter)	ISC (SIP/SDP)	---	ISC (SIP/SDP)	y2 (SIP/SDP)	---	---
UPSF	---	Cx (Diameter)	---	Sh (Diameter)	---	Sh (Diameter)	---	---	---
SDF	via Core IMS (SIP/SDP)	ISC (SIP/SDP)	Sh (Diameter)	---	---	---	---	---	---
SSF	Xa (HTTP, DVBSTP, FLUTE)	---	---	---	---	Ss' (not defined)	---	---	---
SCF	Ut (HTTP), via Core IMS (SIP/SDP)	ISC (SIP/SDP)	Sh (Diameter)	---	Ss' (not defined)	---	via Core IMS and y2 (SIP/SDP)	---	---
MCF	Xc (RTSP) (Note 1)	y2 (SIP/SDP)	---	---	---	via Core IMS and y2 (SIP/SDP)	---	Xp (not defined)	---
MDF	Xd (UDP/RTP/ RTCP/HTT P) (Note 1)	---	---	---	---	---	Xp (not defined)	---	---
ECF/ EFF	Dj, Di IGMP/ MLD	---	---	---	---	---	---	---	---

NOTE 1: As described in TS 182 027 [1], clauses 6.4 and 6.5, Xc and Xd are logical reference points that can be decomposed into Dj and possibly Di, Ds or Iz reference points depending on the location of the MCF or MDF, and the HTTP is used for the content download.

NOTE 2: Annex H lists compliance requirements for the protocols listed in this table.

**Figure 2: Summary of relevant reference points and protocols**

In addition, Gq' between IMS Core and TA carries diameter protocol.

### 4.3.4 Method 1 and Method 2

In the interoperability test descriptions defined in the present document, two methods regarding the procedures using RTSP for IMS-based IPTV are used. More information on these methods is available in clause 7 and annex Q of [2].

## 4.4 Test Descriptions

This clause defines IMS-based IPTV interoperability test descriptions (TD) for systems composed of equipment by different vendors. Each TD includes a test sequence describing user interactions with IPTV equipment as well as messages exchanged between IPTV equipment at selected standardized reference points.

TD identifiers are constructed from a test suite identifier, a test group identifier and a test number. Table 1 summarizes the main identifiers used in the present document.

Table 1: Summary of TD identifier prefixes

Test Description Identifier Prefix	Scope of the test	Clause	
TD_IMS_IPTV_ADS	Service attachment, discovery and selection	4.4.1	4.4.1.1 Manual configuration of SSF information in pull mode 4.4.1.2 Automatic provisioning of SSF in pull mode 4.4.1.3 Automatic provisioning of SSF in push mode
TD_IMS_IPTV_BC	Broadcast TV	4.4.2	4.4.2.1 Session initiation without RACS 4.4.2.2 Channel Zapping without RACS 4.4.2.3 Session termination without RACS 4.4.2.4 Session initiation with RACS 4.4.2.5 Channel Zapping with RACS 4.4.2.6 Session termination with RACS
TD_IMS_IPTV_BC1	Broadcast TV with trick mode using method 1	4.4.3	4.4.3.1 Initiate trick-play on a live broadcast channel 4.4.3.2 Play in trick-play mode 4.4.3.3 Simple fast forward trick-play 4.4.3.4 Fast backward trick-play to beginning of recorded content 4.4.3.5 Fast forward to move from trick-play to live broadcast mode
TD_IMS_IPTV_BC2	Broadcast TV with trick mode using method 2	4.4.4	4.4.4.1 Initiate trick-play on a live broadcast channel 4.4.4.2 Play in trick-play mode 4.4.4.3 Simple fast forward trick-play 4.4.4.5 Fast forward to move from trick-play to live broadcast mode
TD_IMS_IPTV_CoD1	Content on Demand using method 1	4.4.5	4.4.5.1 Start CoD 4.4.5.2 Pause CoD with trick-play 4.4.5.3 Play CoD in trick-play mode 4.4.5.4 Simple fast forward of CoD using trick-play 4.4.5.5 Simple fast backward on CoD using trick-play 4.4.5.6 Jump to specific location in CoD content 4.4.5.7 Quit watching CoD 4.4.5.8 Resume CoD 4.4.5.9 CoD termination by IPTV AS 4.4.5.10 End of CoD
TD_IMS_IPTV_CoD2	Content on Demand using method 2	4.4.6	4.4.6.1 Start CoD 4.4.6.2 Pause CoD with trick-play 4.4.6.3 Play CoD with trick-play 4.4.6.4 Fast forward CoD using trick-play 4.4.6.5 Fast backward CoD using trick-play 4.4.6.6 Jump to specific location in CoD content 4.4.6.7 Terminate CoD 4.4.6.8 Resume CoD 4.4.6.9 CoD termination by IPTV AS 4.4.6.10 CoD termination at the end of stream
TD_IMS_IPTV_nP1	nPVR using method 1	4.4.7	4.4.7.1 Impulsive recording request 4.4.7.2 Scheduled recording request 4.4.7.3 Watching a recorded nPVR content
TD_IMS_IPTV_nP2	nPVR using method 2	4.4.8	4.4.8.1 Impulsive recording request 4.4.8.2 Scheduled recording request 4.4.8.3 Watching a recorded content
TD_IMS_IPTV_UGC	User Generated Content (UGC)	4.4.9	4.4.9.1 UGC declaration procedures 4.4.9.2 UGC creation procedures 4.4.9.3 UGC Watching procedures
TD_IMS_IPTV_Not	Notification	4.4.10	4.4.10.1 Sending Notification
TD_IMS_IPTV_IM	Instant Messaging	4.4.11	4.4.11.1 Instant Messaging sending 4.4.11.2 Instant Messaging receiving



Test Description Identifier Prefix	Scope of the test	Clause	
TD_IMS_IPTV_pCoD	PushCod	4.4.12	4.4.12.1 UE-initiated Content download for unicast download 4.4.12.2 UE-initiated Content download for unicast progressive download
TD_IMS_IPTV_TAI2	Targeted Ad Insertion – SCTE	4.4.13	4.4.13.1 TAI by notification at UE side 4.4.13.2 TAI by content insertion at UE side 4.4.13.3 TAI by content insertion at MF side
TD_IMS_IPTV_EMI	Emergency Information	4.4.14	4.4.14.1 Emergency Information by Notification  4.4.14.2 Emergency Information by Content Insertion
TD_IMS_IPTV_ICM	Incoming call management	4.4.15	4.4.15.1 Incoming call notification 4.4.15.2 Incoming call handling 4.4.15.3 Incoming call rejection 4.4.15.4 Incoming call acceptance on IPTV UE 4.4.15.5 Incoming call forwarding to other UE
TD_IMS_IPTV_TsTV	Time Shifted TV	4.4.16	4.4.16.1 Watching a recorded TsTV content
TD_IMS_IPTV_PC	Parental Control	4.4.17	4.4.17.1 Parental control applied for BC 4.4.17.2 Parental control applied for CoD 4.4.17.3 Parental control applied for UGC 4.4.17.4 Parental control applied for PVR
TD_IMS_IPTV_CM	Content Marker Service (CM)	4.4.18	4.4.18.1 Content Marker Creation 4.4.18.2 Content Marker handling 4.4.18.3 Content Marker presentation 4.4.18.4 Content Marker usage
TD_IMS_IPTV_CR	Content Recommendation (CR)	4.4.19	4.4.19.1 Content Recommendation profile configuration 4.4.19.2 Content Recommendation by notification
TD_IMS_IPTV_PRE	Presence	4.4.20	4.4.20.1 Subscribing to presence 4.4.20.2 Receiving presence notifications
TD_IMS_IPTV_ST2	Service Continuation	4.4.21	4.4.21.1 Service Continuation between IPTV UEs

#### 4.4.1 Service Attachment, Service Discovery and Selection

In the following TDs, we consider step 1 of the IPTV Aware UE start-up procedure, i.e. Network attachment (UE to NASS), as being out of the scope of the test.

## 4.4.1.1 Manual configuration of SSF information in pull mode

Interoperability Test Description									
<b>Identifier:</b>	TD_ IMS_IPTV_ADS_0001 (MSF S3A-0101)								
<b>Summary:</b>	UE displays EPG with manual SSF address configuration								
<b>References:</b>	TS 182 027 [1], clause 8.2; TS 183 063 [2], clause 6.1.1								
<b>Configuration:</b>	CF_ IMS_IPTV								
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS								
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>IPTV AS is configured not to act as a third-party registrar (push mode is disabled)</li> <li>UE is configured statically with SSF information</li> <li>UE and IPTV AS support the same EPG format</li> </ul>								
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User starts UE</td> </tr> <tr> <td>2</td> <td>User requests EPG</td> </tr> <tr> <td>3</td> <td>Verify that UE displays EPG</td> </tr> </tbody> </table>	Step		1	User starts UE	2	User requests EPG	3	Verify that UE displays EPG
Step									
1	User starts UE								
2	User requests EPG								
3	Verify that UE displays EPG								
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table				
Check									
1	Message exchange follows the below table								

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					User starts UE
2			→			SIP	UE sends SIP REGISTER to CORE via Gm
3			←			SIP	CORE sends SIP 200 OK to UE via Gm
4				→		HTTP	UE sends HTTP GET to AS via Xa (1 to n times)
5				←		HTTP	AS sends HTTP 200 OK to UE via Xa (1 to n times)
6		→					User requests EPG
7		←					UE displays EPG

Steps 4 and 5 may be repeated multiple times. Each HTTP message pair carries information (EPG) different from vendors.

## 4.4.1.2 Automatic provisioning of SSF in pull mode

Interoperability Test Description									
<b>Identifier:</b>	TD_IMS_IPTV_ADS_0002 (MSF S3A-0101)								
<b>Summary:</b>	UE displays EPG with automatic SSF provision in pull mode								
<b>References:</b>	TS 182 027 [1], clause 8.2; TS 183 063 [2], clauses 5.1.2.2 and 6.1.1								
<b>Configuration:</b>	CF_IMS_IPTV								
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS								
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>IPTV AS is configured not to act as a third-party registrar (push mode is disabled)</li> <li>Core IMS is configured to forward service attachment information request to IPTV AS</li> <li>UE is configured to request the EPG</li> <li>UE and IPTV AS support the same EPG format</li> </ul>								
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User starts UE</td> </tr> <tr> <td>2</td> <td>User requests EPG</td> </tr> <tr> <td>3</td> <td>Verify that UE displays EPG</td> </tr> </tbody> </table>	Step		1	User starts UE	2	User requests EPG	3	Verify that UE displays EPG
Step									
1	User starts UE								
2	User requests EPG								
3	Verify that UE displays EPG								
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table				
Check									
1	Message exchange follows the below table								

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					User starts UE
2		→				SIP	UE sends SIP REGISTER to CORE via Gm
3		←				SIP	CORE sends SIP 200 OK to UE via Gm
2		→				SIP	UE sends SIP SUBSCRIBE to CORE via Gm
3		←				SIP	CORE sends SIP SUBSCRIBE to AS via ISC
4		←				SIP	AS sends SIP 200 OK to CORE via ISC
5		←				SIP	CORE sends SIP 200 OK to UE via Gm
6		←				SIP	AS sends SIP NOTIFY to CORE via ISC
7		←				SIP	CORE sends SIP NOTIFY to UE via Gm
8		→				SIP	UE sends SIP 200 OK to CORE via Gm
9		←				SIP	CORE sends SIP 200 OK to AS via ISC
10		→				HTTP	UE sends HTTP GET to AS via Xa (1 to n times)
11		←				HTTP	AS sends HTTP 200 OK to UE via Xa (1 to n times)
12	→						User requests EPG
13	←						UE displays EPG

Steps 10 and 11 can be repeated multiple times. Each HTTP message pair carries information different from vendors.

## 4.4.1.3 Automatic provisioning of SSF in push mode

Interoperability Test Description									
<b>Identifier:</b>	TD_IMS_IPTV_ADS_0003 (MSF S3A-0101)								
<b>Summary:</b>	UE can display EPG with automatic SSF provision in push mode								
<b>References:</b>	TS 182 027 [1], clause 8.2; TS 183 063 [2], clauses 5.1.2.1 and 6.1.1								
<b>Configuration:</b>	CF_IMS_IPTV								
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS								
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>IPTV AS is configured to act as a third-party registrar (push mode enabled)</li> <li>UPSF is configured to provide SSF information to SDF</li> <li>UE is configured for SSF provision in push mode</li> <li>UE and IPTV AS support the same EPG format</li> </ul>								
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User starts UE</td> </tr> <tr> <td>2</td> <td>User requests EPG</td> </tr> <tr> <td>3</td> <td>Verify that UE displays EPG</td> </tr> </tbody> </table>	Step		1	User starts UE	2	User requests EPG	3	Verify that UE displays EPG
Step									
1	User starts UE								
2	User requests EPG								
3	Verify that UE displays EPG								
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table				
Check									
1	Message exchange follows the below table								

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					User starts UE
2			→			SIP	UE sends SIP REGISTER to CORE via Gm
3			←			SIP	CORE sends SIP 200 OK to UE via Gm
4					→	SIP	CORE sends SIP REGISTER to AS via ISC
5					←	SIP	AS sends SIP 200 OK to CORE via ISC
6					←	SIP	AS sends SIP MESSAGE to CORE via ISC
7			←			SIP	CORE sends SIP MESSAGE to UE via Gm
8					→	SIP	UE sends SIP 200 OK to CORE via Gm
9					→	SIP	CORE sends SIP 200 OK to AS via ISC
10					→	HTTP	UE sends HTTP GET to AS via Xa (1 to n times)
11					←	HTTP	AS sends HTTP 200 OK to UE via Xa (1 to n times)
12		→					User requests EPG
13		←					UE displays EPG

Steps 10 and 11 can be repeated multiple times. Each HTTP message pair carries information different from vendors.

## 4.4.2 Broadcast TV

### 4.4.2.1 Session initiation without RACS

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_BC_0001 (S3A-0201)	
<b>Summary:</b>	User requests to watch broadcast TV channel	
<b>References:</b>	TS 182 027 [1], clause 8.3.1; TS 183 063 [2], clauses 5.1.3.1 and 8.1.2.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV HEAD END, T&A	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE is registered in Core IMS and received EPG from IPTV AS (see TD_IMS_IPTV_ADS_0001/2/3)</li> <li>• EPG has at least one broadcast channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End</li> <li>• UE is configured not to request QoS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to watch a broadcast TV channel
	2	Verify that UE displays the selected broadcast TV channel
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S			
1		→						User requests to watch a broadcast TV channel
2				→			SIP	UE sends SIP INVITE to CORE via Gm
3					→		SIP	CORE sends SIP INVITE to AS via ISC
4					←		SIP	AS sends SIP 200 OK to CORE via ISC
5		←					SIP	CORE sends SIP 200 OK to UE via Gm
6				→			SIP	UE sends SIP ACK to CORE via Gm
7					→		SIP	CORE sends SIP ACK to AS via ISC
8				→			IGMP	UE sends IGMP JOIN to T&A via Dj
9		←						UE displays the selected broadcast TV channel
10				→			SIP	UE sends SIP INFO to CORE via Gm
11					→		SIP	CORE sends SIP INFO to AS via ISC

The SIP INFO messages are sent out with a delay after IGMP join message. If the channel is changed again within the delay, the INFO message is not sent out.

There is no strict sequence of the SIP and IGMP messages. The IGMP JOIN message may be sent before or after sending SIP ACK.

## 4.4.2.2 Channel Zapping without RACS

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC_0002 (S3A-0301)						
<b>Summary:</b>	User changes to a HD channel while watching a SD broadcast TV						
<b>References:</b>	TS 182 027 [1], clause 8.3.4; TS 183 063 [2], clauses 5.1.3.5 and 8.1.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV HEAD END, T&A						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE is registered in Core IMS and displaying a broadcast TV channel (see TD_IMS_IPTV_BC_0001)</li> <li>• The EPG has at least 2 broadcast channels</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End</li> <li>• UE is configured not to request QoS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User changes to another broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that UE displays the other broadcast TV channel</td> </tr> </tbody> </table>	Step		1	User changes to another broadcast TV channel	2	Verify that UE displays the other broadcast TV channel
Step							
1	User changes to another broadcast TV channel						
2	Verify that UE displays the other broadcast TV channel						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					User changes to another broadcast TV channel
2			→			IGMP	UE sends IGMP LEAVE INFO to T&A via Dj
3			→			SIP	UE sends SIP re-INVITE to CORE via ISC (optional)
4				→		SIP	CORE sends SIP re-INVITE to AS via ISC (optional)
5					←	SIP	AS sends SIP OK to CORE via ISC (optional)
6		←				SIP	CORE sends SIP OK to UE via ISC (optional)
7		→				IGMP	UE sends IGMP JOIN INFO to T&A via Dj
8	←						Verify that UE displays the other broadcast TV channel
9			→			SIP	UE sends SIP INFO to AS via ISC
10				→		SIP	CORE sends SIP INFO to AS via ISC

The SIP INFO messages are sent out with a delay after an IGMP JOIN message. If the channel is changed again within the delay, the SIP INFO message is not sent out.

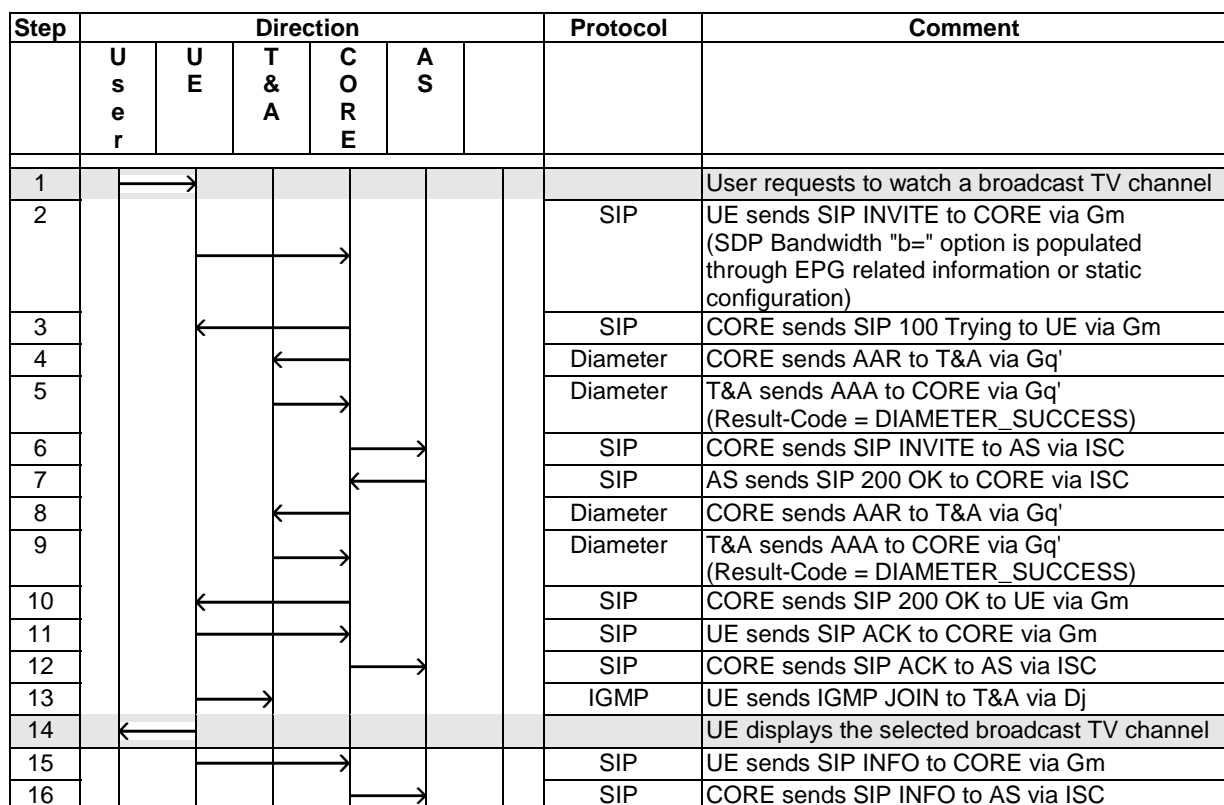
## 4.4.2.3 Session termination without RACS

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC_0003 (S3A-0401)						
<b>Summary:</b>	User quits watching broadcast TV						
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clauses 5.1.4.2 and 7.2.1						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV HEAD END, T&A						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>User is registered in Core IMS using userIPTV_priv identity</li> <li>UE is displaying a broadcast TV channel (see TD_IMS_IPTV_BC_0001)</li> <li>EPG has at least one broadcast TV channel</li> <li>T&amp;A is configured with multicast rights for the UE</li> <li>TV Head End broadcasting TV content in real-time using multicast</li> <li>UE supports content protocols and coding used by TV Head End</li> <li>UE is configured not to request QoS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User quits watching the broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that the UE does not display the broadcast TV channel anymore</td> </tr> </tbody> </table>	Step		1	User quits watching the broadcast TV channel	2	Verify that the UE does not display the broadcast TV channel anymore
Step							
1	User quits watching the broadcast TV channel						
2	Verify that the UE does not display the broadcast TV channel anymore						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					User quits watching the broadcast TV channel
2			→			IGMP	UE sends IGMP LEAVE INFO to T&A via Dj
3		←					UE does not display the broadcast TV channel anymore
4			→			SIP	UE sends SIP BYE to CORE via Gm
5				→		SIP	CORE sends SIP BYE to AS via ISC
6					←	SIP	AS sends SIP 200 OK to CORE via ISC
7		←				SIP	CORE sends SIP 200 OK to UE via Gm

## 4.4.2.4 Session initiation with RACS

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC_0004						
<b>Summary:</b>	User requests to watch broadcast TV channel using QoS						
<b>References:</b>	TS 182 027 [1], clause 8.3.1; TS 183 063 [2], clauses 5.1.3.1 and 8.1.2.1, TS 183 017 [9], clauses 5.1.1 and 5.2.1						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV HEAD END, T&A						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE is registered in Core IMS and received EPG from IPTV AS (see TD_IMS_IPTV_ADS_0001/2/3)</li> <li>• EPG has at least one broadcast channel</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End</li> <li>• UE is configured to request QoS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests to watch a broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that UE displays the selected broadcast TV channel</td> </tr> </tbody> </table>	Step		1	User requests to watch a broadcast TV channel	2	Verify that UE displays the selected broadcast TV channel
Step							
1	User requests to watch a broadcast TV channel						
2	Verify that UE displays the selected broadcast TV channel						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						



The SIP INFO messages are sent out with a delay after IGMP join message. If the channel is changed again within the delay, the INFO message is not sent out.

There is no strict sequence of the SIP and IGMP messages. The IGMP JOIN message may be sent before or after sending SIP ACK.

The diagram above shows a two phases method on Gq' reference point (see clause 5.1.1 of [10]). Step 5 request is for resource reservation, step 10 for resource commitment. Alternatively, steps 10 and 11 could be omitted if step 5 requests resource commitment (Flow-Status is different of DISABLED).



## 4.4.2.5 Channel Zapping with RACS

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC_0005						
<b>Summary:</b>	User changes to a HD channel while watching SD broadcast TV using QoS						
<b>References:</b>	TS 182 027 [1], clause 8.3.4; TS 183 063 [2], clauses 5.1.3.5 and 8.1.2; TS 183 017 [9], clauses 5.1.2 and 5.2.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV HEAD END, T&A						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE is registered in Core IMS and displaying a broadcast TV channel (see TD_IMS_IPTV_BC_0001)</li> <li>• The EPG has at least 2 broadcast channels</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End</li> <li>• UE is configured to request QoS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User changes to another broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that UE displays the other broadcast TV channel</td> </tr> </tbody> </table>	Step		1	User changes to another broadcast TV channel	2	Verify that UE displays the other broadcast TV channel
Step							
1	User changes to another broadcast TV channel						
2	Verify that UE displays the other broadcast TV channel						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					User changes to another broadcast TV channel
2			→			IGMP	UE sends IGMP LEAVE INFO to T&A via Dj
3			→			SIP	UE sends SIP re-INVITE to CORE via ISC
4			←			Diameter	CORE sends AAR to T&A via Gq'
5			→			Diameter	T&A sends AAA to CORE via Gq'
6				→		SIP	CORE sends SIP re-INVITE to AS via ISC
7				←		SIP	AS sends SIP OK to CORE via ISC
8			←			Diameter	CORE sends AAR to T&A via Gq'
9			→			Diameter	T&A sends AAA to CORE via Gq'
10		←				SIP	CORE sends SIP OK to UE via ISC
11			→			IGMP	UE sends IGMP JOIN to T&A via Dj
12		←					Verify that UE displays the other broadcast TV channel
13			→			SIP	UE sends SIP INFO to AS via ISC
14				→		SIP	CORE sends SIP INFO to AS via ISC

The diagram above shows a two phases method on Gq' reference point (see clause 5.1.1 of [10]). Step 4 request is for resource reservation, step 8 for resource commitment. Alternatively, steps 8 and 9 could be omitted if step 4 requests resource commitment (Flow-Status is different of DISABLED).

## 4.4.2.6 Session termination with RACS

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC_0006						
<b>Summary:</b>	User quits watching broadcast TV using QoS						
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clauses 5.1.4.2 and 7.2.1; TS 183 017 [9], clauses 5.1.3 and 5.2.3						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV HEAD END, T&A						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>User is registered in Core IMS using userIPTV_priv identity</li> <li>UE is displaying a broadcast TV channel (see TD_IMS_IPTV_BC_0001)</li> <li>EPG has at least one broadcast TV channel</li> <li>TV Head End broadcasting TV content in real-time using multicast</li> <li>UE supports content protocols and coding used by TV Head End</li> <li>UE is configured to request QoS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User quits watching the broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that the UE does not display the broadcast TV channel anymore</td> </tr> </tbody> </table>	Step		1	User quits watching the broadcast TV channel	2	Verify that the UE does not display the broadcast TV channel anymore
Step							
1	User quits watching the broadcast TV channel						
2	Verify that the UE does not display the broadcast TV channel anymore						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					User quits watching the broadcast TV channel
2			→			IGMP	UE sends IGMP LEAVE INFO to T&A via Dj
3		←					UE does not display the broadcast TV channel anymore
4			→			SIP	UE sends SIP BYE to CORE via Gm
5			←			Diameter	CORE sends STR to T&A via Gq'
6			→			Diameter	T&A sends STA to CORE via Gq'
7				→		SIP	CORE sends SIP BYE to AS via ISC
8				←		SIP	AS sends SIP 200 OK to CORE via ISC
9		←				SIP	CORE sends SIP 200 OK to UE via Gm

## 4.4.3 Broadcast TV with trick-play using Method 1

More information about Method 1 is given in clause 4.3.4.

## 4.4.3.1 Initiate trick-play on a live broadcast channel

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC1_0001 (S3A-0501)						
<b>Summary:</b>	User initiates trick mode while watching a broadcast TV channel						
<b>References:</b>	TS 182 027 [1], clause 8.3.5; TS 183 063 [2], clauses 5.1.3.3.1 and 8.1.2.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV HEAD END, T&A, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying a trick-play enabled broadcast TV channel (see TD_IMS_IPTV_BC_0001)</li> <li>• EPG has at least one trick play enabled broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS</li> <li>• CoDS is recording the trick play enabled broadcast channel</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests a pause on the broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that the UE freezes the image of the broadcast TV channel</td> </tr> </tbody> </table>	Step		1	User requests a pause on the broadcast TV channel	2	Verify that the UE freezes the image of the broadcast TV channel
Step							
1	User requests a pause on the broadcast TV channel						
2	Verify that the UE freezes the image of the broadcast TV channel						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests a pause on the broadcast TV channel
2				→			SIP	UE sends SIP RE-INVITE to CORE via Gm
3					→		SIP	CORE sends SIP RE-INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to CoDS via y2
6					←		SIP	CoDS sends SIP 200 OK to CORE via y2
7						→	SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9				←			SIP	CORE sends SIP 200 OK to UE via Gm
10				→			SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to CoDS via y2
14				→			IGMP	UE sends IGMP LEAVE to T&A via Dj
15	←							UE freezes the image of the broadcast TV channel

It is acceptable to generate SIP UPDATE instead of re INVITE requests. In that case SIP ACK requests should not be sent.

There is no strict sequence of SIP and IGMP messages. The IGMP LEAVE message may be sent before or after sending SIP ACK.

## 4.4.3.2 Play in trick-play mode

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC1_0002 (S3A-0601)						
<b>Summary:</b>	User requests the normal play mode on a broadcast TV channel in trick play mode						
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.1						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS, TV HEAD END, T&A						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying frozen trick-play enabled broadcast TV channel (see TD_IMS_IPTV_BC1_0001)</li> <li>• EPG has at least one trick play enabled broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS</li> <li>• CoDS is recording the trick play enabled broadcast channel</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests play on the paused broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that UE displays the recorded broadcast TV channel content</td> </tr> </tbody> </table>	Step		1	User requests play on the paused broadcast TV channel	2	Verify that UE displays the recorded broadcast TV channel content
Step							
1	User requests play on the paused broadcast TV channel						
2	Verify that UE displays the recorded broadcast TV channel content						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests play on the paused broadcast TV channel
2						→	RTSP	UE sends RTSP PLAY to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4		←						Verify that UE displays the recorded broadcast TV channel content

A RTSP PAUSE message may be sent between two consecutive RTSP PLAY messages.

## 4.4.3.3 Simple fast forward trick-play

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC1_0003 (S3A-0601)						
<b>Summary:</b>	User requests fast forward on a paused broadcast TV channel in trick play mode without reaching the end of recording						
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.1						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS, TV HEAD END, T&A						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying frozen trick-play enabled broadcast TV channel (see TD_IMS_IPTV_BC1_0001)</li> <li>• EPG has at least one trick play enabled broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS</li> <li>• CoDS is recording the trick play enabled broadcast channel</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests x2 fast forward on the paused broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that UE displays recorded broadcast TV channel in fast forward mode</td> </tr> </tbody> </table>	Step		1	User requests x2 fast forward on the paused broadcast TV channel	2	Verify that UE displays recorded broadcast TV channel in fast forward mode
Step							
1	User requests x2 fast forward on the paused broadcast TV channel						
2	Verify that UE displays recorded broadcast TV channel in fast forward mode						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests x2 fast forward on the paused broadcast TV channel
2						→	RTSP	UE sends RTSP PLAY (scale +2) to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4		←						UE displays recorded broadcast TV channel in fast forward mode.

A RTSP PAUSE message may be sent between two consecutive RTSP PLAY messages.

## 4.4.3.4 Fast backward trick-play to beginning of recorded content

Interoperability Test Description									
<b>Identifier:</b>	TD_IMS_IPTV_BC1_0004 (S3A-0701)								
<b>Summary:</b>	User requests fast backward on a paused broadcast TV channel in trick play mode until the beginning of the recording is reached								
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.1								
<b>Configuration:</b>	CF_IMS_IPTV								
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS, TV HEAD END, T&A								
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying paused recorded broadcast TV channel (see TD_IMS_IPTV_BC1_0001)</li> <li>• EPG has at least one trick play enabled broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS</li> <li>• CoDS is recording the trick play enabled broadcast TV channel</li> </ul>								
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests x2 fast backward on the paused broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that UE displays recorded broadcast TV channel in fast backward mode</td> </tr> <tr> <td>3</td> <td>Verify that UE stops display when beginning of recording is reached</td> </tr> </tbody> </table>	Step		1	User requests x2 fast backward on the paused broadcast TV channel	2	Verify that UE displays recorded broadcast TV channel in fast backward mode	3	Verify that UE stops display when beginning of recording is reached
Step									
1	User requests x2 fast backward on the paused broadcast TV channel								
2	Verify that UE displays recorded broadcast TV channel in fast backward mode								
3	Verify that UE stops display when beginning of recording is reached								
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table				
Check									
1	Message exchange follows the below table								

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests x2 fast backward on the paused broadcast TV channel
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc (optional)
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
4						→	RTSP	UE sends RTSP PLAY (scale -2) to CoDS via Xc
5						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
6	←							UE displays recorded broadcast TV channel in fast backward mode
7	←							UE stops display when beginning of recording is reached

## 4.4.3.5 Fast forward to move from trick-play to live broadcast mode

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_BC1_0005 (S3A-0801)	
<b>Summary:</b>	User requests fast forward until the end of recording is reached and moves from trick play to live broadcast TV channel	
<b>References:</b>	TS 182 027 [1], clause 8.3.6; TS 183 063 [2], clauses 5.1.3.3.2, 7.2.1 and 8.1.2.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS, TV HEAD END, T&A	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying paused recorded broadcast TV channel (see TD_IMS_IPTV_BC1_0001)</li> <li>• EPG has at least one trick play enabled broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS.</li> <li>• CoDS is recording the trick play enabled broadcast TV channel</li> <li>• UE is configured to change to live broadcast automatically after trick play ends</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests x2 fast forward on a paused broadcast TV channel
	2	Verify that UE displays recorded broadcast TV channel in fast forward mode
	3	Verify that UE displays live broadcast TV channel when end of recording is reached
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests x2 fast forward on a paused broadcast TV channel
2						→	RTSP	UE sends RTSP PLAY(scale +2) to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4								UE displays recorded broadcast TV channel in fast forward mode
5						←	RTSP	CoDS sends RTSP ANNOUNCE to UE via Xc
6						→	RTSP	UE sends RTSP 200 OK to CoDS via Xc
7						→	IGMP	UE sends IGMP JOIN to T&A via Dj
8						→	SIP	UE sends SIP REINVITE to CORE via Gm
9						→	SIP	CORE sends SIP REINVITE to AS via ISC
10						←	SIP	AS sends SIP BYE to CORE via ISC
11						→	SIP	CORE sends SIP BYE to CoDS via y2
12						←	SIP	CoDS sends SIP 200 OK to CORE via y2
13						→	SIP	CORE sends SIP 200 OK to AS via ISC
14						←	SIP	AS sends SIP 200 OK to CORE via ISC
15						←	SIP	CORE sends SIP 200 OK to UE via Gm
16						→	SIP	UE sends SIP ACK to CORE via Gm
17						→	SIP	CORE sends SIP ACK to AS via ISC
18		←						UE displays live broadcast TV channel when end of recording is reached

Upon receipt of the end-of-stream indication the CoDS sends in step 5 an RTSP ANNOUNCE to the UE with an indication that the end-of-stream has been reached. In case of BC sessions with trick-play, if the UE receives an RTSP ANNOUNCE request with an end-of-stream indication, the UE may initiate a session modification procedure in order to go back to a normal BC session in multicast mode (this is the case described above) or may alternatively take other actions (e.g. rewind, pause, terminate session, etc.).

There is a delay between the UE receiving the RTSP ANNOUNCE in step 5 and sending the SIP reINVITE in step 8.

It is acceptable to generate SIP UPDATE instead of SIP reINVITE requests. In that case SIP ACK requests should not be sent.

Before the RTSP PLAY message in step 2 a RTSP PAUSE message may be sent.

There is no strict sequence of the SIP and IGMP messages. The IGMP JOIN message may be sent before or after sending the SIP ACK request.

#### 4.4.4 Broadcast TV with trick-play using Method 2

More information about Method 2 is given in clause 4.3.4.



## 4.4.4.1 Initiate trick-play on a live broadcast channel

<b>Interoperability Test Description</b>		
<b>Identifier:</b>	TD_IMS_IPTV_BC2_0001 (S3A-0502)	
<b>Summary:</b>	User initiates trick mode while watching a broadcast TV channel	
<b>References:</b>	TS 182 027 [1], clause 8.3.5; TS 183 063 [2], clauses 5.1.3.3.1 and 8.1.2.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV HEAD END, T&A, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying a trick-play enabled broadcast TV channel (see TD_IMS_IPTV_BC_0001)</li> <li>• EPG has at least one broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS.</li> <li>• CoDS is recording the trick play enabled broadcast channel</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to pause on the broadcast TV channel
	2	Verify that the UE freezes the image of the broadcast TV channel
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to pause on the broadcast TV channel
2				→			SIP	UE sends SIP RE-INVITE to CORE via Gm
3					→		SIP	CORE sends SIP RE-INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to CoDS via y2
6					←		SIP	CoDS sends SIP 200 OK to CORE via y2
7						→	SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9			←				SIP	CORE sends SIP 200 OK to UE via Gm
10				→			SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to CoDS via y2
14						→	RTSP	UE sends RTSP DESCRIBE to CoDS via Xc
15					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
16						→	RTSP	UE sends RTSP SETUP to CoDS via Xc
17					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
18				→			SIP	UE sends SIP REINVITE to CORE via Gm
19					→		SIP	CORE sends SIP REINVITE to AS via ISC
20					←		SIP	AS sends SIP REINVITE to CORE via ISC
21						→	SIP	CORE sends SIP INVITE to CoDS via y2
22					←		SIP	CoDS sends SIP 200 OK to CORE via y2
23						→	SIP	CORE sends SIP 200 OK to AS via ISC
24					←		SIP	AS sends SIP 200 OK to CORE via ISC
25			←				SIP	CORE sends SIP 200 OK to UE via Gm
26				→			SIP	UE sends SIP ACK to CORE via Gm
27					→		SIP	CORE sends SIP ACK to AS via ISC
28					←		SIP	AS sends SIP ACK to CORE via ISC
29			→				IGMP	UE sends IGMP LEAVE to T&A via Dj
30						→	SIP	CORE sends SIP ACK to CoDS via y2
31		←						UE freezes the image of the broadcast TV channel

The RTSP DESCRIBE message in step 14 is sent in case the UE did not get content delivery description information (from the SSF or from the AS-IPTV/SS-MCF-IPTV during the SIP session initiation),

It is acceptable to generate SIP UPDATE instead of re-INVITE requests. In that case SIP ACK requests should not be sent.

There is no strict sequence of SIP and IGMP messages. The IGMP LEAVE message may be sent before or after sending SIP ACK.

## 4.4.4.2 Play in trick-play mode

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC2_0002 (S3A-0602)						
<b>Summary:</b>	User requests the normal play mode on a broadcast TV channel in trick play mode						
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS, TV HEAD END, T&A						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying frozen trick-play enabled broadcast TV channel (see TD_IMS_IPTV_BC2_0001)</li> <li>• EPG has at least one trick play enabled broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS</li> <li>• CoDS is recording the trick play enabled broadcast channel</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests to play the current paused broadcast TV channel in trick play mode</td> </tr> <tr> <td>2</td> <td>Verify that UE displays the recorded broadcast TV channel</td> </tr> </tbody> </table>	Step		1	User requests to play the current paused broadcast TV channel in trick play mode	2	Verify that UE displays the recorded broadcast TV channel
Step							
1	User requests to play the current paused broadcast TV channel in trick play mode						
2	Verify that UE displays the recorded broadcast TV channel						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to play the current paused broadcast TV channel in trick play mode
2						→	RTSP	UE sends RTSP PLAY (scale: +1) to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4		←						Verify that UE displays recorded broadcast TV channel

## 4.4.4.3 Simple fast forward trick-play

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_BC2_0003 (S3A-0602)						
<b>Summary:</b>	User requests fast forward on a paused broadcast TV channel in trick play mode without reaching the end of recording						
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS, TV HEAD END, T&A						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying frozen trick-play enabled broadcast TV channel (see TD_IMS_IPTV_BC1_0001)</li> <li>• EPG has at least one trick play enabled broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS</li> <li>• CoDS is recording the trick play enabled broadcast channel</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests x2 fast forward on the paused broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that UE displays recorded broadcast TV channel in fast forward mode</td> </tr> </tbody> </table>	Step	Description	1	User requests x2 fast forward on the paused broadcast TV channel	2	Verify that UE displays recorded broadcast TV channel in fast forward mode
Step	Description						
1	User requests x2 fast forward on the paused broadcast TV channel						
2	Verify that UE displays recorded broadcast TV channel in fast forward mode						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check	Description	1	Message exchange follows the below table		
Check	Description						
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests x2 fast forward on the paused broadcast TV channel
2						→	RTSP	UE sends RTSP PLAY(scale +2) to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4		←						UE displays recorded broadcast TV channel in fast forward mode

A RTSP PAUSE message may be sent between two consecutive RTSP PLAY messages.

## 4.4.4.4 Fast backward trick-play to beginning of recorded content

Interoperability Test Description									
<b>Identifier:</b>	TD_IMS_IPTV_BC2_0004 (S3A-0702)								
<b>Summary:</b>	User request a fast backward on a paused broadcast TV channel in trick play mode								
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.2								
<b>Configuration:</b>	CF_IMS_IPTV								
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS, TV HEAD END, T&A								
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying paused recorded broadcast TV channel (see TD_IMS_IPTV_BC2_0001)</li> <li>• EPG has at least one trick play enabled broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS.</li> <li>• CoDS is recording the trick play enabled broadcast TV channel</li> </ul>								
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests x2 fast backward on the paused broadcast TV channel</td> </tr> <tr> <td>2</td> <td>Verify that UE displays recorded broadcast TV channel in fast backward mode</td> </tr> <tr> <td>3</td> <td>Verify that UE stops display when beginning of recording is reached</td> </tr> </tbody> </table>	Step		1	User requests x2 fast backward on the paused broadcast TV channel	2	Verify that UE displays recorded broadcast TV channel in fast backward mode	3	Verify that UE stops display when beginning of recording is reached
Step									
1	User requests x2 fast backward on the paused broadcast TV channel								
2	Verify that UE displays recorded broadcast TV channel in fast backward mode								
3	Verify that UE stops display when beginning of recording is reached								
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table				
Check									
1	Message exchange follows the below table								

## 1. Diagram 1

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests x2 fast backward on the paused broadcast TV channel
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc (optional)
3			←				RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
4						→	RTSP	UE sends RTSP PLAY(scale -2) to CoDS via Xc
5			←				RTSP	CoDS sends RTSP 200 OK to UE via Xc
6								UE displays recorded broadcast TV channel in fast backward mode
7			←				RTSP	CoDS sends RTSP ANNOUNCE to UE via Xc (optional)
8						→	RTSP	UE sends RTSP 200 OK to CoDS via Xc (optional)
9		←						UE stops display when beginning of recording is reached

In step 9, the UE is displaying a still image and then may switch to another mode. Handling of the start-of-stream in the ANNOUNCE message is up to the UE implementation.

## 4.4.4.5 Fast forward to move from trick-play to live broadcast mode

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_BC2_0005 (S3A-0802)	
<b>Summary:</b>	User requests fast forward until the end of recording is reached and moves from trick play to live broadcast TV channel	
<b>References:</b>	TS 182 027 [1], clause 8.3.6; TS 183 063 [2], clauses 5.1.3.3.2, 7.2.2 and 8.1.2.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS, TV HEAD END, T&A	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• User is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is displaying paused recorded broadcast TV channel (see TD_IMS_IPTV_BC2_0001)</li> <li>• EPG has at least one trick play enabled broadcast TV channel</li> <li>• T&amp;A is configured with multicast rights for the UE</li> <li>• TV Head End broadcasting TV content in real-time using multicast</li> <li>• UE supports content protocols and coding used by TV Head End and CoDS</li> <li>• CoDS supports content protocols and coding used by TV Head End</li> <li>• User has trick-play rights in IPTV AS</li> <li>• CoDS is recording the trick play enabled broadcast TV channel</li> <li>• UE is configured to change to live broadcast automatically after trick play ends</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests x2 fast forward on a paused broadcast TV channel
	2	Verify that UE displays recorded broadcast TV channel in fast forward mode
	3	Verify that UE displays live broadcast TV channel when end of recording is reached
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	User	UE	T & A	CORE	AS	CoDS		
1		→						User requests x2 fast forward on a paused broadcast TV channel
2						→	RTSP	UE sends RTSP PLAY (scale +2) to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4								UE displays recorded broadcast TV channel in fast forward mode
5						←	RTSP	CoDS sends RTSP ANNOUNCE to UE via Xc
6						→	RTSP	UE sends RTSP 200 OK to CoDS via Xc
7						→	IGMP	UE sends IGMP JOIN to T&A via Dj
8								UE displays live broadcast TV channel when end of recording is reached
9						→	RTSP	UE sends RTSP TEARDOWN to CoDS via Xc
10						←	RTSP	UE sends RTSP 200 OK to CoDS via Xc
11						→	SIP	UE sends SIP REINVITE to CORE via Gm
12						→	SIP	CORE sends SIP REINVITE to AS via ISC
13						←	SIP	AS sends SIP BYE to CORE via ISC
14						→	SIP	CORE sends SIP BYE to CoDS via y2
15						←	SIP	CoDS sends SIP 200 OK to CORE via y2
16						→	SIP	CORE sends SIP 200 OK to AS via ISC
17						←	SIP	AS sends SIP 200 OK to CORE via ISC
18						←	SIP	CORE sends SIP 200 OK to UE via Gm
19						→	SIP	UE sends SIP ACK to CORE via Gm
20						→	SIP	CORE sends SIP ACK to AS via ISC

Upon receipt of the end-of-stream indication the CoDS sends in step 5 an RTSP ANNOUNCE to the UE with an indication that the end-of-stream has been reached. In case of BC sessions with trick-play, if the UE receives an RTSP ANNOUNCE request with an end-of-stream indication, the UE may initiate a session modification procedure in order to go back to a normal BC session in multicast mode (this is the case described above) or may alternatively take other actions (e.g. rewind, pause, terminate session, etc.).

There is a delay between the UE receiving the RTSP ANNOUNCE in step 4 and sending the RTSP TEARDOWN in step 8 as well as SIP reINVITE in step 10.

It is acceptable to generate SIP UPDATE instead of SIP reINVITE requests. In that case SIP ACK requests should not be sent.

Before the RTSP PLAY message in step 2 a RTSP PAUSE message may be sent.

There is no strict sequence of the SIP and IGMP messages. The IGMP JOIN message may be sent before or after sending the SIP ACK request.

## 4.4.5 Content on Demand (CoD) using Method 1

### 4.4.5.1 Start CoD

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0001 (S3A-1101)	
<b>Summary:</b>	User requests to watch Content on Demand	
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE has received EPG from IPTV AS (see TD_ IMS_IPTV_ADS_0001/2/3)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to watch a CoD
	2	Verify that UE displays the CoD
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table



Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to watch a CoD
2			→				SIP	UE sends SIP OPTION to CORE via Gm
3					→		SIP	CORE sends SIP OPTION to AS via ISC
4					→		SIP	AS sends SIP OPTION to CORE via ISC
5					→		SIP	CORE sends SIP OPTION to CoDS via y2
6					→		SIP	CoDS sends SIP 200 OK to CORE via y2
7					→		SIP	CORE sends SIP 200 OK to AS via ISC
8					→		SIP	AS sends SIP 200 OK to CORE via ISC
9		←					SIP	CORE sends SIP 200 OK to UE via Gm
10			→				SIP	UE sends SIP INVITE to CORE via Gm
11					→		SIP	CORE sends SIP INVITE to AS via ISC
12					→		SIP	AS sends SIP INVITE to CORE via ISC
13					→		SIP	CORE sends SIP INVITE to CoDS via y2
14					→		SIP	CoDS sends SIP 200 OK to CORE via y2
15					→		SIP	CORE sends SIP 200 OK to AS via ISC
16					→		SIP	AS sends SIP 200 OK to CORE via ISC
17		←					SIP	CORE sends SIP 200 OK to UE via Gm
18			→				SIP	UE sends SIP ACK to CORE via Gm
19					→		SIP	CORE sends SIP ACK to AS via ISC
20					→		SIP	AS sends SIP ACK to CORE via ISC
21					→		SIP	CORE sends SIP ACK to CoDS via y2
22					→		RTSP	UE sends RTSP PLAY to CoDS via Xc
23		←					RTSP	CoDS sends RTSP 200 OK to UE via Xc
24					→		SIP	CoDS sends SIP INFO to CORE via y2 (optional)
25					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
26					→		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
27					→		SIP	CORE sends SIP 200 OK to CoDS via y2 (optional)
28	←							UE displays the CoD

The SIP OPTIONS message should be used for retrieving network parameters for the SDP payload in case that these parameters are not included in the SSF.

When CoDS receives the very first RTSP PLAY message, the IPTV AS may send a SIP INFO message with CoDDeliveryStatus set to "Ongoing".

## 4.4.5.2 Pause CoD with trick-play

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0002 (S3A-1201)	
<b>Summary:</b>	User requests to pause a CoD using trick-play	
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD1_0001)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to pause CoD
	2	Verify that UE freezes the image of the CoD
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to pause CoD
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4		←						UE freezes the image of the CoD

## 4.4.5.3 Play CoD in trick-play mode

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0003 (S3A-1201)	
<b>Summary:</b>	User requests play a CoD using trick-play	
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying paused CoD (see TD_IMS_IPTV_CoD1_0002)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to play the paused CoD
	2	Verify that UE displays the CoD
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to play the paused CoD
2						→	RTSP	UE sends RTSP PLAY to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4	←							Verify that the UE displays the CoD

#### 4.4.5.4 Simple fast forward of CoD using trick-play

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0004 (S3A-1201)	
<b>Summary:</b>	User requests fast forward on a paused CoD in trick play mode without reaching the end of recording	
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying paused CoD (see TD_IMS_IPTV_CoD1_0002)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests x2 fast forward on the paused CoD
	2	Verify that UE displays images the CoD in fast forward mode
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests x2 fast forward on the paused CoD
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc (optional)
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
4						→	RTSP	UE sends RTSP PLAY(scale +2) to CoDS via Xc
5						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
6	←							UE displays images the CoD in fast forward mode

## 4.4.5.5 Simple fast backward on CoD using trick-play

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0005 (S3A-1201)						
<b>Summary:</b>	User requests fast backward on a paused CoD using trick play in trick play mode without reaching the beginning of the recording						
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.1						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying paused CoD (see TD_IMS_IPTV_CoD1_0002)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests x2 fast backward on the paused CoD</td> </tr> <tr> <td>2</td> <td>Verify that UE displays images the CoD in fast backward mode</td> </tr> </tbody> </table>	Step		1	User requests x2 fast backward on the paused CoD	2	Verify that UE displays images the CoD in fast backward mode
Step							
1	User requests x2 fast backward on the paused CoD						
2	Verify that UE displays images the CoD in fast backward mode						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests x2 fast backward on the paused CoD
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4						→	RTSP	UE sends RTSP PLAY (scale -2) to CoDS via Xc
5						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
6		←						UE displays images the CoD in fast backward mode

## 4.4.5.6 Jump to specific location in CoD content

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0006 (S3A-1201)	
<b>Summary:</b>	User jumps to specific point in CoD using trick-play	
<b>References:</b>	TS 182 027 [1]; TS 183 063 [2], clause 7.2.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD1_0001)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to jump to a specific location in the CoD
	2	Verify that UE displays the CoD from this specific point
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to jump to a specific location in the CoD
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4						→	RTSP	UE sends RTSP PLAY (range=z) to CoDS via Xc
5						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
6		←						Verify that UE displays the CoD from this specific point

## 4.4.5.7 Quit watching CoD

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0007 (S3A-1301)						
<b>Summary:</b>	User quits watching CoD						
<b>References:</b>	TS 182 027 [1], clause 8.4.3; TS 183 063 [2], clause 5.1.4.4.1						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD1_0001)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User quits watching the CoD</td> </tr> <tr> <td>2</td> <td>Verify that UE does not display the CoD anymore</td> </tr> </tbody> </table>	Step		1	User quits watching the CoD	2	Verify that UE does not display the CoD anymore
Step							
1	User quits watching the CoD						
2	Verify that UE does not display the CoD anymore						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User quits watching the CoD
2				→			SIP	UE sends SIP INFO to CORE via Gm (optional)
3					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
4					←		SIP	AS sends SIP 200 OK to CORE via ISC(optional)
5		←					SIP	CORE sends SIP 200 OK to UE via Gm (optional)
6				→			SIP	UE sends SIP BYE to CORE via Gm
7					→		SIP	CORE sends SIP BYE to AS via ISC
8					←		SIP	AS sends SIP BYE to CORE via ISC
9					→		SIP	CORE sends SIP BYE to CoDS via y2
10					←		SIP	CoDS sends SIP 200 OK to CORE via y2
11					→		SIP	CORE sends SIP 200 OK to AS via ISC
12					←		SIP	AS sends SIP 200 OK to CORE via ISC
13		←					SIP	CORE sends SIP 200 OK to UE via Gm
14	←							UE does not display the CoD anymore

When a user requests to stop viewing a CoD with the intention of resuming it later, the UE may send a SIP INFO (with CoDOffset) request to the SCF.

## 4.4.5.8 Resume CoD

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0008 (S3A-1401)	
<b>Summary:</b>	User resumes a CoD from the last watching point	
<b>References:</b>	TS 182 027 [1], clause 8.3.3; TS 183 063 [2], clauses 5.1.3.4 and 8.1.2.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• User has stopped watching a CoD prior to its end (see TD_IMS_IPTV_CoD1_0007)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to resume a CoD
	2	Verify that UE displays the CoD from last watching point
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1								User requests to resume a CoD
2							SIP	UE sends SIP OPTION to CORE via Gm
3							SIP	CORE sends SIP OPTION to AS via ISC
4							SIP	AS sends SIP OPTION to CORE via ISC
5							SIP	CORE sends SIP OPTION to CoDS via y2
6							SIP	CoDS sends SIP 200 OK to CORE via y2
7							SIP	CORE sends SIP 200 OK to AS via ISC
8							SIP	AS sends SIP 200 OK to CORE via ISC
9							SIP	CORE sends SIP 200 OK to UE via Gm
10							SIP	UE sends SIP INVITE to CORE via Gm
11							SIP	CORE sends SIP INVITE to AS via ISC
12							SIP	AS sends SIP INVITE to CORE via ISC
13							SIP	CORE sends SIP INVITE to CoDS via y2
14							SIP	CoDS sends SIP 200 OK to CORE via y2
15							SIP	CORE sends SIP 200 OK to AS via ISC
16							SIP	AS sends SIP 200 OK to CORE via ISC
17							SIP	CORE sends SIP 200 OK to UE via Gm
18							SIP	UE sends SIP ACK to CORE via Gm
19							SIP	CORE sends SIP ACK to AS via ISC
20							SIP	AS sends SIP ACK to CORE via ISC
21							SIP	CORE sends SIP ACK to CoDS via y2
22							RTSP	UE sends RTSP PLAY to CoDS via Xc
23							RTSP	CoDS sends RTSP 200 OK to UE via Xc
24							SIP	CoDS sends SIP INFO to CORE via y2
25							SIP	CORE sends SIP INFO to AS via ISC
26							SIP	AS sends SIP 200 OK to CORE via ISC
27							SIP	CORE sends SIP 200 OK to CoDS via y2
28								UE displays the CoD from last watching point

The SIP OPTION message should be used for retrieving the network parameters for SDP when the parameters are not included in the SSF.

The RTSP PLAY message shall carry the range parameter. The range parameter value may be retrieved from the SDP h-offset attribute in SIP procedure. Or, the range parameter value may be retrieved from SSF as the service action data value of CoDOffset which indicates the last stop point.

#### 4.4.5.9 CoD termination by IPTV AS

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0009 (-)						
<b>Summary:</b>	IPTV AS stops user from watching CoD						
<b>References:</b>	TS 182 027 [1], clause 8.4.3; TS 183 063 [2], clause 5.1.4.4.1						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD1_0001)</li> <li>• CoDS configured with CoD content</li> <li>• IPTV AS provides an interface that allows stopping of CoD provisioning</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>IPTV AS is requested to stop the CoD being watched by user</td> </tr> <tr> <td>2</td> <td>Verify that UE stops displaying the CoD</td> </tr> </tbody> </table>	Step		1	IPTV AS is requested to stop the CoD being watched by user	2	Verify that UE stops displaying the CoD
Step							
1	IPTV AS is requested to stop the CoD being watched by user						
2	Verify that UE stops displaying the CoD						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1								IPTV AS is requested to stop the CoD being watched by user
2					←		SIP	AS sends SIP BYE to CORE via ISC (towards the CoDS)
3						→	SIP	CORE sends SIP BYE to CoDS via y2
4					←		SIP	CoDS sends SIP 200 OK to AS via y2
5						→	SIP	CORE sends SIP 200 OK to AS via ISC
6					←		SIP	AS sends SIP BYE to CORE via ISC (towards the UE)
7		←					SIP	CORE sends SIP BYE to UE via Gm
8			→				SIP	UE sends SIP 200 OK to CORE via Gm
9						→	SIP	CORE sends SIP 200 OK to AS via ISC
10	←							UE stops displaying the CoD



## 4.4.5.10 End of CoD

Interoperability Test Description					
<b>Identifier:</b>	TD_IMS_IPTV_CoD1_0010 (-)				
<b>Summary:</b>	User watches a CoD until its end				
<b>References:</b>	TS 182 027 [1], clause 8.4.3; TS 183 063 [2], clause 5.1.4.4.1				
<b>Configuration:</b>	CF_IMS_IPTV				
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS				
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD1_0001)</li> <li>• CoDS configured with (short) CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>				
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Verify that UE stops display at end of CoD</td> </tr> </tbody> </table>	Step		1	Verify that UE stops display at end of CoD
Step					
1	Verify that UE stops display at end of CoD				
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table
Check					
1	Message exchange follows the below table				

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
(1)								UE displays CoD
2							RTSP	CoDS sends RTSP ANNOUNCE (end-of-stream) to UE via Xc (optional)
3							SIP	CoDS sends SIP INFO to CORE via ISC (optional, CoDDeliveryStatus = "Completed")
4							RTSP	UE sends RTSP 200 OK to CoDS via Xc (optional)
5							SIP	CORE sends SIP INFO to AS via ISC (optional CoDDeliveryStatus = "Completed")
6							SIP	AS sends SIP 200 OK to CORE via ISC (optional)
7							SIP	CORE sends SIP 200 OK to CoDS via y2
16								UE stops display at end of CoD

## 4.4.6 Video on Demand (CoD) using Method 2

### 4.4.6.1 Start CoD

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_0001 (S3A-1102)	
<b>Summary:</b>	User watches Video on Demand	
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE has received EPG from IPTV AS (see TD_ IMS_IPTV_ADS_0001/2/3)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to watch a CoD
	2	Verify that UE displays the CoD
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Three message flows are accepted for this TD.

1) With SIP re-INVITE messages for session modification:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to watch a CoD
2				→			SIP	UE sends SIP INVITE to CORE via Gm
3					→		SIP	CORE sends SIP INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to CoDS via y2
6					←		SIP	CoDS sends SIP 200 OK to CORE via y2
7						→	SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9		←					SIP	CORE sends SIP 200 OK to UE via Gm
10				→			SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to CoDS via y2
14						→	RTSP	UE sends RTSP DESCRIBE to CoDS via Xc (optional, only to get missing SDP parameters)
15					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
16						→	RTSP	UE sends RTSP SETUP to CoDS via Xc
17					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
18						→	SIP	UE sends SIP reINVITE to CORE via Gm
19					→		SIP	CORE sends SIP reINVITE to AS via ISC
20					←		SIP	AS sends SIP reINVITE to CORE via ISC
21						→	SIP	CORE sends SIP reINVITE to CoDS via y2
22					←		SIP	CoDS sends SIP 200 OK to CORE via y2
23						→	SIP	CORE sends SIP 200 OK to AS via ISC
24					←		SIP	AS sends SIP 200 OK to CORE via ISC
25		←					SIP	CORE sends SIP 200 OK to UE via Gm
26						→	SIP	UE sends SIP ACK to CORE via Gm
27						→	SIP	CORE sends SIP ACK to AS via ISC
28					←		SIP	AS sends SIP ACK to CORE via ISC
29						→	SIP	CORE sends SIP ACK to CoDS via y2
30						→	RTSP	UE sends RTSP PLAY to CoDS via Xc
31					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
32						←	SIP	CoDS sends SIP INFO to CORE via y2 (optional with user related IPTV service action data)
33						→	SIP	CORE sends SIP INFO to AS via ISC (optional)
34					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
35						→	SIP	CORE sends SIP 200 OK to CoDS via y2 (optional)
36	←							UE displays the CoD

2) With UPDATE SIP messages for session modification:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to watch a CoD
2				→			SIP	UE sends SIP INVITE to CORE via Gm
3					→		SIP	CORE sends SIP INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to CoDS via y2
6					←		SIP	CoDS sends SIP 200 OK to CORE via y2
7						→	SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9		←					SIP	CORE sends SIP 200 OK to UE via Gm
10				→			SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to CoDS via y2
14						→	RTSP	UE sends RTSP DESCRIBE to CoDS via Xc (optional, only to get missing SDP parameters)
15					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
16						→	RTSP	UE sends RTSP SETUP to CoDS via Xc
17					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
18				→			SIP	UE sends SIP UPDATE to CORE via Gm
19					→		SIP	CORE sends SIP UPDATE to AS via ISC
20					←		SIP	AS sends SIP UPDATE to CORE via ISC
21						→	SIP	CORE sends SIP UPDATE to CoDS via y2
22					←		SIP	CoDS sends SIP 200 OK to CORE via y2
23					→		SIP	CORE sends SIP 200 OK to AS via ISC
24					←		SIP	AS sends SIP 200 OK to CORE via ISC
25		←					SIP	CORE sends SIP 200 OK to UE via Gm
26						→	RTSP	UE sends RTSP PLAY to CoDS via Xc
27					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
28							SIP	CoDS sends SIP INFO to CORE via y2 (optional, with user related IPTV service action data)
29					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
30					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
31						→	SIP	CORE sends SIP 200 OK to CoDS via y2 (optional)
32	←							UE displays the CoD

3) With RTSP Channel establishing without session modification:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1								User requests to watch a CoD
2							SIP	UE sends SIP INVITE to CORE via Gm
3							SIP	CORE sends SIP INVITE to AS via ISC
4							SIP	AS sends SIP INVITE to CORE via ISC
5							SIP	CORE sends SIP INVITE to CoDS via y2
6							SIP	CoDS sends SIP 200 OK to CORE via y2
7							SIP	CORE sends SIP 200 OK to AS via ISC
8							SIP	AS sends SIP 200 OK to CORE via ISC
9							SIP	CORE sends SIP 200 OK to UE via Gm
10							SIP	UE sends SIP ACK to CORE via Gm
11							SIP	CORE sends SIP ACK to AS via ISC
12							SIP	AS sends SIP ACK to CORE via ISC
13							SIP	CORE sends SIP ACK to CoDS via y2
14							RTSP	UE sends RTSP SETUP to CoDS via Xc
15							RTSP	CoDS sends RTSP 200 OK to UE via Xc
16							RTSP	UE sends RTSP PLAY to CoDS via Xc
17							RTSP	CoDS sends RTSP 200 OK to UE via Xc
18							SIP	CoDS sends SIP INFO to CORE via y2 (optional with user related IPTV service action data)
19							SIP	CORE sends SIP INFO to AS via ISC (optional)
20							SIP	AS sends SIP 200 OK to CORE via ISC (optional)
21							SIP	CORE sends SIP 200 OK to CoDS via y2 (optional)
22								UE displays the CoD

#### 4.4.6.2 Pause CoD with trick-play

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_0002 (S3A-1201)	
<b>Summary:</b>	User pauses a CoD using trick-play	
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD2_0001)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to pause CoD
	2	Verify that UE freezes the image of the CoD
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to pause CoD
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4		←						UE freezes the image of the CoD

#### 4.4.6.3 Play CoD with trick-play

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_0003 (S3A-1201)	
<b>Summary:</b>	User plays a CoD using trick-play	
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is in pause mode watching a CoD (see TD_IMS_IPTV_CoD2_0002)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to play the paused CoD
	2	Verify that UE displays the CoD
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to play the paused CoD
2						→	RTSP	UE sends RTSP PLAY to CoDS via Xc
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
4		←						Verify that the UE displays the CoD

## 4.4.6.4 Fast forward CoD using trick-play

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_0004 (S3A-1202)						
<b>Summary:</b>	User fast forwards CoD using trick play						
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD2_0003)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests to x2 fast forward CoD</td> </tr> <tr> <td>2</td> <td>Verify that UE displays images the CoD in fast forward mode</td> </tr> </tbody> </table>	Step		1	User requests to x2 fast forward CoD	2	Verify that UE displays images the CoD in fast forward mode
Step							
1	User requests to x2 fast forward CoD						
2	Verify that UE displays images the CoD in fast forward mode						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to fast forward CoD
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc (optional)
3			←				RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
4						→	RTSP	UE sends RTSP PLAY(scale +2) to CoDS via Xc
5			←				RTSP	CoDS sends RTSP 200 OK to UE via Xc
6		←						UE displays images the CoD in fast forward mode

The UE may send a RTSP PAUSE before sending RTSP PLAY.

## 4.4.6.5 Fast backward CoD using trick-play

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_0005 (S3A-1202)						
<b>Summary:</b>	User fast backwards CoD using trick play						
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD2_0003)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests to x2 fast backward CoD</td> </tr> <tr> <td>2</td> <td>Verify that UE displays images the CoD in fast backward mode</td> </tr> </tbody> </table>	Step		1	User requests to x2 fast backward CoD	2	Verify that UE displays images the CoD in fast backward mode
Step							
1	User requests to x2 fast backward CoD						
2	Verify that UE displays images the CoD in fast backward mode						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to fast backward CoD
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc (optional)
3			←				RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
4						→	RTSP	UE sends RTSP PLAY (scale -2) to CoDS via Xc
5			←				RTSP	CoDS sends RTSP 200 OK to UE via Xc
6		←						Verify that UE displays images the CoD in fast backward mode

The UE may send a RTSP PAUSE before sending RTSP PLAY.



## 4.4.6.6 Jump to specific location in CoD content

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_0006 (S3A-1202)						
<b>Summary:</b>	User jumps in CoD to specific point using trick-play						
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD2_0002)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User requests to jump to a specific location in the CoD</td> </tr> <tr> <td>2</td> <td>Verify that UE displays the CoD from this specific point</td> </tr> </tbody> </table>	Step		1	User requests to jump to a specific location in the CoD	2	Verify that UE displays the CoD from this specific point
Step							
1	User requests to jump to a specific location in the CoD						
2	Verify that UE displays the CoD from this specific point						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to jump to a specific location in the CoD
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc (optional)
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
4						→	RTSP	UE sends RTSP PLAY (range=z) to CoDS via Xc
5						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
6		←						Verify that UE displays the CoD from this specific point

The UE may send a RTSP PAUSE before sending RTSP PLAY.

## 4.4.6.7 Terminate CoD

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_0007 (S3A-1302)	
<b>Summary:</b>	User quits watching CoD	
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD2_0003)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User quits watching the CoD
	2	Verify that the UE does not display the CoD anymore
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Two message flows are accepted for this TD.

- 1) With SIP messages exchange initiated by UE:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User quits watching the CoD
2				→			SIP	UE sends SIP INFO to CORE via Gm
3					→		SIP	CORE sends SIP INFO to AS via ISC
4					←		SIP	AS sends SIP 200 OK to CORE via ISC
5		←					SIP	CORE sends SIP 200 OK to UE via Gm
6						→	RTSP	UE sends RTSP TEARDOWN to CoDS via Xc
7		←					RTSP	CoDS sends RTSP 200 OK to UE via Xc
8				→			SIP	UE sends SIP BYE to CORE via Gm
9					→		SIP	CORE sends SIP BYE to AS via ISC
10					←		SIP	AS sends SIP BYE to CORE via ISC
11					→		SIP	CORE sends SIP BYE to CoDS via y2
12					←		SIP	CoDS sends SIP 200 OK to CORE via y2
13					→		SIP	CORE sends SIP 200 OK to AS via ISC
14					←		SIP	AS sends SIP 200 OK to CORE via ISC
15		←					SIP	CORE sends SIP 200 OK to UE via Gm
16	←							UE does not display the CoD anymore

## 2) With SIP messages exchange initiated by CoDS:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User quits watching the CoD
2						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc (optional)
3						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
4						→	RTSP	UE sends RTSP TEARDOWN to MVS via Xc
5						←	SIP	CoDS sends SIP INFO (with CoDOffset) to CORE via y2 (optional)
6						→	SIP	CORE sends SIP INFO to AS via ISC
7						←	SIP	AS sends SIP 200 OK to CORE via ISC
8						→	SIP	CORE sends SIP 200 OK to CoDS via y2
9						←	RTSP	CoDS sends RTSP 200 OK to UE via Xc
10						→	SIP	UE sends SIP BYE to CORE via Gm
11						→	SIP	CORE sends SIP BYE to AS via ISC
12						←	SIP	AS sends SIP BYE to CORE via ISC
13						→	SIP	CORE sends SIP BYE to CoDS via y2
14						←	SIP	CoDS sends SIP 200 OK to CORE via y2
15						→	SIP	CORE sends SIP 200 OK to AS via ISC
16						←	SIP	AS sends SIP 200 OK to CORE via ISC
17						←	SIP	CORE sends SIP 200 OK to UE via Gm
18		←						UE does not display the CoD anymore

## 4.4.6.8 Resume CoD

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_0008 (S3A-1402)	
<b>Summary:</b>	User resumes a CoD from the last watching point	
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• User has stopped watching a program prior to its end (see TD_IMS_IPTV_CoD2_0006)</li> <li>• CoDS configured with CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to resume a CoD
	2	Verify that UE displays the CoD from last watching point
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Three message flows are accepted for this TD.

## 1) Using SIP re-INVITE messages for session modification:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to resume a CoD
2				→			SIP	UE sends SIP INVITE to CORE via Gm
3					→		SIP	CORE sends SIP INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to CoDS via y2
6					←		SIP	CoDS sends SIP 200 OK to CORE via y2
7						→	SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9		←					SIP	CORE sends SIP 200 OK to UE via Gm
10				→			SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to CoDS via y2
14						→	RTSP	UE sends RTSP DESCRIBE to CoDS via Xc (optional, only to get missing SDP parameters)
15					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
16						→	RTSP	UE sends RTSP SETUP to CoDS via Xc
17					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
18				→			SIP	UE sends SIP reINVITE to CORE via Gm
19					→		SIP	CORE sends SIP reINVITE to AS via ISC
20					←		SIP	AS sends SIP reINVITE to CORE via ISC
21						→	SIP	CORE sends SIP reINVITE to CoDS via y2
22					←		SIP	CoDS sends SIP 200 OK to CORE via y2
23						→	SIP	CORE sends SIP 200 OK to AS via ISC
24					←		SIP	AS sends SIP 200 OK to CORE via ISC
25		←					SIP	CORE sends SIP 200 OK to UE via Gm
26				→			SIP	UE sends SIP ACK to CORE via Gm
27						→	SIP	CORE sends SIP ACK to AS via ISC
28					←		SIP	AS sends SIP ACK to CORE via ISC
29						→	SIP	CORE sends SIP ACK to CoDS via y2
30						→	RTSP	UE sends RTSP PLAY (with range parameter) to CoDS via Xc
31					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
32					←		SIP	CoDS sends SIP INFO to CORE via y2 (optional)
33					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
34					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
35						→	SIP	CORE sends SIP 200 OK to CoDS via y2 (optional)
36	←							UE displays the CoD from last watching point

Note that the range parameter value in step 30 may be retrieved from the SDP h-offset attribute in SIP procedure. Or, the range parameter value may be retrieved from SSF as the service action data value of CoDOffset which indicates the last stop point.

## 2) Using SIP UPDATE messages for session modification:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to resume a CoD
2				→			SIP	UE sends SIP INVITE to CORE via Gm
3					→		SIP	CORE sends SIP INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to CoDS via y2
6					←		SIP	CoDS sends SIP 200 OK to CORE via y2
7						→	SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9		←					SIP	CORE sends SIP 200 OK to UE via Gm
10				→			SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to CoDS via y2
14						→	RTSP	UE sends RTSP DESCRIBE to CoDS via Xc (optional, only to get missing SDP parameters)
15					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
16						→	RTSP	UE sends RTSP SETUP to CoDS via Xc
17					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
18				→			SIP	UE sends SIP UPDATE to CORE via Gm
19					→		SIP	CORE sends SIP UPDATE to AS via ISC
20					←		SIP	AS sends SIP UPDATE to CORE via ISC
21						→	SIP	CORE sends SIP UPDATE to CoDS via y2
22					←		SIP	CoDS sends SIP 200 OK to CORE via y2
23						→	SIP	CORE sends SIP 200 OK to AS via ISC
24					←		SIP	AS sends SIP 200 OK to CORE via ISC
25		←					SIP	CORE sends SIP 200 OK to UE via Gm
26						→	RTSP	UE sends RTSP PLAY (range parameter) to CoDS via Xc
27					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
28					←		SIP	CoDS sends SIP INFO to CORE via y2 (optional)
29					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
30					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
31						→	SIP	CORE sends SIP 200 OK to CoDS via y2 (optional)
32	←							UE displays the CoD from last watching point

Note that the range parameter value in step 26 may be retrieved from the SDP h-offset attribute in SIP procedure. Or, the range parameter value may be retrieved from SSF as the service action data value of CoDOffset which indicates the last stop point.

## 3) Using RTSP channel establishment without session modification:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to resume a CoD
2				→			SIP	UE sends SIP INVITE to CORE via Gm
3					→		SIP	CORE sends SIP INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to CoDS via y2
6					←		SIP	CoDS sends SIP 200 OK to CORE via y2
7						→	SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9		←					SIP	CORE sends SIP 200 OK to UE via Gm
10				→			SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to CoDS via y2
14						→	RTSP	UE sends RTSP SETUP to CoDS via Xc
15					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
16						→	RTSP	UE sends RTSP PLAY(with range parameter) to CoDS via Xc
17					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
18					←		SIP	CoDS sends SIP INFO to CORE via y2 (optional)
19					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
20					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
21						→	SIP	CORE sends SIP 200 OK to CoDS via y2 (optional)
22		←						UE displays the CoD from last watching point

The range parameter value in step 16 may be retrieved from the SDP h-offset attribute in SIP procedure. Or, the range parameter value may be retrieved from SSF as the service action data value of CoDOffset which indicates the last stop point.

## 4.4.6.9 CoD termination by IPTV AS

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_0009 (S3A-1402)						
<b>Summary:</b>	AS IPTV stops user from watching CoD						
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD2_0001)</li> <li>• CoDS configured with CoD content</li> <li>• IPTV AS provides an interface that allows stopping of CoD provisioning</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>IPTV AS is requested to stop ongoing CoD</td> </tr> <tr> <td>2</td> <td>Verify that UE stops displaying the CoD</td> </tr> </tbody> </table>	Step		1	IPTV AS is requested to stop ongoing CoD	2	Verify that UE stops displaying the CoD
Step							
1	IPTV AS is requested to stop ongoing CoD						
2	Verify that UE stops displaying the CoD						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1								IPTV AS is requested to stop ongoing CoD
2							SIP	AS sends SIP BYE to CORE via ISC
3							SIP	CORE sends SIP BYE to UE via Gm
4							RTSP	UE sends RTSP PAUSE to CoDS via Xc (optional)
5							RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
6							RTSP	UE sends RTSP TEARDOWN to CoDS via Xc
7							SIP	CoDS sends SIP INFO to CORE via y2 (optional with CoDOffset)
8							SIP	CORE sends SIP INFO to AS via ISC (optional)
9							SIP	AS sends SIP 200 OK to CORE via ISC (optional)
10							SIP	CORE sends SIP 200 OK to CoDS via y2 (optional)
11							RTSP	CoDS sends RTSP 200 OK to UE via Xc
12							SIP	UE sends SIP 200 OK to CORE via Gm
13							SIP	CORE sends SIP 200 OK to AS via ISC
14							SIP	AS sends SIP BYE to CORE via ISC
15							SIP	CORE sends SIP BYE to CoDS via y2
16							SIP	CoDS sends SIP 200 OK to CORE via y2
17							SIP	CORE sends SIP 200 OK to AS via ISC
18								UE stops displaying the CoD



## 4.4.6.10 CoD termination at the end of stream

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CoD2_00010 (S3A-1701)	
<b>Summary:</b>	User watches a CoD until its end	
<b>References:</b>	TS 182 027 [1], clause 8.4.1; TS 183 063 [2], clause 5.1.4.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, CoDS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• EPG has at least one CoD</li> <li>• UE is displaying a CoD (see TD_IMS_IPTV_CoD2_0001)</li> <li>• CoDS configured with (short) CoD content</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• UE supports content protocols and coding used by CoDS</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	Verify that the UE stops at end of CoD
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Two message flows are accepted for this TD.

- 1) Using SIP INFO and RTSP ANNOUNCE messages:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
(1)								UE displays CoD
2							RTSP	CoDS sends RTSP ANNOUNCE (end-of-stream) to UE via Xc
3							SIP	CoDS sends SIP INFO to CORE via ISC (optional, CoDDeliveryStatus = "Completed")
4							RTSP	UE sends RTSP 200 OK to CoDS via Xc (optional)
5							SIP	CORE sends SIP INFO to AS via ISC (optional CoDDeliveryStatus = "Completed")
6							SIP	AS sends SIP 200 OK to CORE via ISC (optional)
7							SIP	CORE sends SIP 200 OK to CoDS via y2
8							SIP	UE sends SIP INFO to CORE via Gm (optional)
9							SIP	CORE sends SIP INFO to AS via ISC (optional)
10							SIP	AS sends SIP 200 OK to CORE via ISC (optional)
11							SIP	CORE sends SIP 200 OK to UE via Gm (optional)
12								UE stops CoD

2) With SIP INFO messages on receiving RTSP TEARDOWN:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
(1)	←							UE displays CoD
2		←					RTSP	CoDS sends RTSP ANNOUNCE (end-of-stream) to UE via Xc
3						→	RTSP	UE sends RTSP 200 OK to CoDS via Xc
4						→	RTSP	UE sends RTSP PAUSE to CoDS via Xc (optional)
5		←					RTSP	CoDS sends RTSP 200 OK to UE via Xc (optional)
7				←			SIP	CoDS sends SIP INFO to CORE via ISC (optional, CoDDeliveryStatus = "Completed")
8				→			SIP	CORE sends SIP INFO to AS via ISC (optional CoDDeliveryStatus = "Completed")
9				←			SIP	AS sends SIP 200 OK to CORE via ISC (optional)
10						→	SIP	CORE sends SIP 200 OK to CoDS via y2
11	←							UE stops CoD

#### 4.4.7 NPVR using Method 1

##### 4.4.7.1 Impulsive recording request

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_nP1_0001 (S3A-1901)	
<b>Summary:</b>	User requests an impulsive recording of a broadcast TV channel	
<b>References:</b>	TS 182 027 [1], clause 8.5; TS 183 063 [2]	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV Head End, T&A, PVRS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, PVRS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE supports nPVR</li> <li>• EPG has at least one nPVR enabled broadcast TV channel</li> <li>• UE is displaying broadcast TV channel (see TD_IMS_IPTV_BC_0001)</li> <li>• User has nPVR rights in IPTV AS</li> <li>• IMS CORE configured to forward nPVR related SIP requests to AS IPTV</li> <li>• UE, PVRS and TV Head End support the same content protocols and coding</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests an impulsive recording of a broadcast TV channel
	2	Verify that UE confirms recording
	3	User requests EPG after the end of the recorded program
	4	Verify that UE displays EPG with the new entry
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	P V R S		
1		→						User requests an impulsive recording of a broadcast TV channel
2			→				SIP	UE sends SIP MESSAGE (bookmark) to CORE via Gm
3					→		SIP	CORE sends SIP MESSAGE (bookmark) to AS via ISC
4					←		SIP	AS sends SIP 200 OK to CORE via ISC
5		←					SIP	CORE sends SIP 200 OK to UE via Gm
6		←						UE confirms parking
i				←			SIP	AS sends SIP to CORE via ISC immediately (not described in R2)
i					→		SIP	CORE sends SIP to PVRS via y2 (not described in R2)
i				←			IGMP Join	PVRS starts recording TV Channel program (not described in R2)
i				←			IGMP Leave	PVRS stops recording TV Channel program at the end of the program (not described in R2)
7				←			SIP	AS sends SIP MESSAGE to CORE via ISC (optional may exist prior to IGMP join)
8		←					SIP	CORE sends SIP MESSAGE to UE via Gm (optional may exist prior to IGMP join)
9			→				SIP	UE sends SIP 200 OK to CORE via Gm (optional may exist prior to IGMP join)
10					→		SIP	CORE sends SIP 200 OK to AS via ISC (optional may exist prior to IGMP join)
11		→						User requests EPG after the end of the recorded program
12			→				HTTP	UE sends HTTP GET to AS via Xa (1 to n times)
13		←					HTTP	AS sends HTTP 200 OK to UE via Xa (1 to n times)
14		←						UE displays EPG with the new entry

Steps tagged "i" do not follow a given specification. They are here for information and show the simple message exchange that could happen between the NPVR, TA, CORE and AS nodes in this case.

Steps 11 and 12 allows UE to get TV content captured in steps "i" as described in clause 8.5.2 of [1].

## 4.4.7.2 Scheduled recording request

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_nP1_0002 (S3A-2001)	
<b>Summary:</b>	User requests a scheduled recording of a broadcast TV channel	
<b>References:</b>	TS 182 027 [1], clause 8.5; TS 183 063 [2]	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV Head End, T&A, PVRS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE is registered in Core IMS and received EPG from IPTV AS (see TD_IMS_IPTV_ADS_0001/2/3)</li> <li>• UE, PVRS, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE supports nPVR</li> <li>• EPG has at least one nPVR enabled broadcast TV channel</li> <li>• UE is not displaying broadcast TV channel</li> <li>• User has nPVR rights in IPTV AS</li> <li>• IMS CORE configured to forward nPVR related SIP requests to AS IPTV</li> <li>• UE, PVRS and TV Head End support the same content protocols and coding</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests a scheduled recording of a broadcast TV channel
	2	Verify that UE confirms parking
	3	User requests EPG after the end of the recorded program
	4	Verify that UE displays EPG with the new entry
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	P V R S		
1		→						User requests a scheduled recording of a broadcast TV channel
2				→			SIP	UE sends SIP MESSAGE to CORE via Gm
3					→		SIP	CORE sends SIP MESSAGE to AS via ISC
4					←		SIP	AS sends SIP 200 OK to CORE via ISC
5						←	SIP	CORE sends SIP 200 OK to UE via Gm
6		←						UE confirms parking
i					←		SIP	AS sends SIP to CORE via ISC (not described in R2)
i						→	SIP	CORE sends SIP to PVRS via y2 (not described in R2)
i						←	IGMP Join	PVRS starts recording TV Channel program, at "start-time" (not described in R2)
i						←	IGMP Leave	PVRS stops recording TV Channel program at "end-time" (not described in R2)
7					←		SIP	AS sends SIP MESSAGE to CORE via ISC (optional may exist prior to IGMP join)
8						←	SIP	CORE sends SIP MESSAGE to UE via Gm (optional may exist prior to IGMP join)
9						→	SIP	UE sends SIP 200 OK to CORE via Gm (optional may exist prior to IGMP join)
10						→	SIP	CORE sends SIP 200 OK to AS via ISC (optional may exist prior to IGMP join)
11		→						User requests EPG after the end of the recorded program
12						→	HTTP	UE sends HTTP GET to AS via Xa (1 to n times)
13						←	HTTP	AS sends HTTP 200 OK to UE via Xa (1 to n times)
14		←						UE displays EPG with the new entry

Steps tagged "i" do not follow a given specification. They are here for information and show the simple message exchange that could happen between the NPVR, TA, CORE and AS nodes in this case.

## 4.4.7.3 Watching a recorded nPVR content

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_nP1_0003 (S3A-2201)	
<b>Summary:</b>	User watches a recorded content	
<b>References:</b>	TS 182 027 [1], clause 8.5; TS 183 063 [2]	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, PVRs	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, PVRs, Core IMS and IPTV AS are configured for method 1</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE supports nPVR</li> <li>• EPG has at least one nPVR enabled broadcast TV channel</li> <li>• nPVR content is available in PVRs based on either an impulsive or scheduled request to capture broadcast TV channel (see TD_IMS_IPTV_nP1_0001/2)</li> <li>• User has nPVR rights in IPTV AS</li> <li>• IMS CORE configured to forward nPVR related SIP requests to AS IPTV</li> <li>• UE, PVRs and TV Head End support the same content protocols and coding</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to watch recorded content
	2	Verify that UE displays recorded content
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	P V R S		
1		→						User requests to watch recorded content
2				→			SIP	UE sends SIP OPTION to CORE via Gm (to retrieve parameters to build SDP - optional)
3					→		SIP	CORE sends SIP OPTION to AS via ISC (optional)
4					←		SIP	AS sends SIP OPTION to CORE via ISC (optional)
5						→	SIP	CORE sends SIP OPTION to PVRS via y2 (optional)
6					←		SIP	PVRS sends SIP 200 OK to CORE via y2 (optional)
7					→		SIP	CORE sends SIP 200 OK to AS via ISC (optional)
8					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
9			←				SIP	CORE sends SIP 200 OK to UE via Gm (optional)
10				→			SIP	UE sends SIP INVITE to CORE via Gm
11					→		SIP	CORE sends SIP INVITE to AS via ISC
12					←		SIP	AS sends SIP INVITE to CORE via ISC
13						→	SIP	CORE sends SIP INVITE to PVRS via y2
14					←		SIP	PVRS sends SIP 200 OK to CORE via y2
15					→		SIP	CORE sends SIP 200 OK to AS via ISC
16					←		SIP	AS sends SIP 200 OK to CORE via ISC
17			←				SIP	CORE sends SIP 200 OK to UE via Gm
18				→			SIP	UE sends SIP ACK to CORE via Gm
19					→		SIP	CORE sends SIP ACK to AS via ISC
20					←		SIP	AS sends SIP ACK to CORE via ISC
21						→	SIP	CORE sends SIP ACK to PVRS via y2
22						→	RTSP	UE sends RTSP PLAY to PVRS via Xc
23					←		RTSP	PVRS sends RTSP 200 OK to UE via Xc
24					←		SIP	PVRS sends SIP INFO to CORE via y2 (optional)
25					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
26					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
27						→	SIP	CORE sends SIP 200 OK to PVRS via y2 (optional)
28	←							UE displays the recorded content

## 4.4.8 NPVR - Method 2

## 4.4.8.1 Impulsive recording request

<b>Interoperability Test Description</b>		
<b>Identifier:</b>	TD_IMS_IPTV_nP2_0001 (S3A-1902)	
<b>Summary:</b>	User requests to park and pickup a broadcast TV channel	
<b>References:</b>	TS 182 027 [1], clause 8.5; TS 183 063 [2]	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV Head End, T&A, PVRs	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, PVRs, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE supports nPVR</li> <li>• EPG has at least one nPVR enabled broadcast TV channel</li> <li>• UE is displaying broadcast TV channel (see TD_IMS_IPTV_BC_0001)</li> <li>• User has nPVR rights in IPTV AS</li> <li>• IMS CORE configured to forward nPVR related SIP requests to AS IPTV</li> <li>• UE, PVRs and TV Head End support the same content protocols and coding</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests an impulsive recording of a broadcast TV channel
	2	Verify that UE confirms recording
	3	User requests EPG after the end of the recorded program
	4	Verify that UE displays EPG with new entry
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table



The message flow is divided into two phases. The first one corresponding to the park request is given below:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	P V R S		
1		→						User requests an impulsive recording of a broadcast TV Channel
2			→				SIP	UE sends SIP MESSAGE to CORE via Gm
3					→		SIP	CORE sends SIP MESSAGE to AS via ISC
4					←		SIP	AS sends SIP 200 OK to CORE via ISC
5		←					SIP	CORE sends SIP 200 OK to UE via Gm
6		←						UE confirms parking
i					←		SIP	AS sends SIP to CORE via ISC immediately (not described in R2)
i						→	SIP	CORE sends SIP to PVRS via y2 (not described in R2)
i				←			IGMP Join	PVRS starts recording TV Channel program (not described in R2)
i				←			IGMP Leave	PVRS stops recording TV Channel program at the end of the program (not described in R2)
7					←		SIP	AS sends SIP MESSAGE to CORE via ISC (optional may exist prior to IGMP join)
8		←					SIP	CORE sends SIP MESSAGE to UE via Gm (optional may exist prior to IGMP join)
9			→				SIP	UE sends SIP 200 OK to CORE via Gm (optional may exist prior to IGMP join)
10					→		SIP	CORE sends SIP 200 OK to AS via ISC (optional may exist prior to IGMP join)
11		→						User requests EPG after the end time of program
12			→				HTTP	UE sends HTTP GET to AS via Xa (1 to n times)
13					←		HTTP	AS sends HTTP 200 OK to UE via Xa (1 to n times)
14		←						UE displays EPG with new entry

Steps tagged "i" do not follow a given specification. They are here for information and show the simple message exchange that could happen between the NPVR, TA, CORE and AS nodes in this case.

## 4.4.8.2 Scheduled recording request

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_nP2_0002 (S3A-2102)	
<b>Summary:</b>	User requests the scheduled recording of a broadcast TV channel	
<b>References:</b>	TS 182 027 [1], clause 8.5; TS 183 063 [2]	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, TV Head End, T&A, PVRS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE is registered in Core IMS and received EPG from IPTV AS (see TD_IMS_IPTV_ADS_0001/2/3)</li> <li>• UE, PVRS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE supports nPVR</li> <li>• EPG has at least one nPVR enabled broadcast TV channel</li> <li>• UE is not displaying broadcast TV channel</li> <li>• User has nPVR rights in IPTV AS</li> <li>• IMS CORE configured to forward nPVR related SIP requests to AS IPTV</li> <li>• UE, PVRS and TV Head End support the same content protocols and coding</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests the scheduled recording of a broadcast TV channel
	2	Verify that UE confirms recording
	3	User requests EPG after the end of the recorded program
	4	Verify that UE displays EPG with new entry
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	P V R S		
1		→						User requests the scheduled recording of a broadcast TV channel
2				→			SIP	UE sends SIP MESSAGE to CORE via Gm
3					→		SIP	CORE sends SIP MESSAGE to AS via ISC
4					←		SIP	AS sends SIP 200 OK to CORE via ISC
5		←					SIP	CORE sends SIP 200 OK to UE via Gm
6		←						UE confirms recording
i					←		SIP	AS sends SIP to CORE via ISC (not described in R2)
i					→		SIP	CORE sends SIP to PVRS via y2 (not described in R2)
i				←			IGMP Join	PVRS starts recording TV Channel program, at "start-time" (not described in R2)
i				←			IGMP Leave	PVRS stops recording TV Channel program at "end-time" (not described in R2)
7					←		SIP	AS sends SIP MESSAGE to CORE via ISC (optional may exist prior to IGMP join)
8		←					SIP	CORE sends SIP MESSAGE to UE via Gm (optional may exist prior to IGMP join)
9				→			SIP	UE sends SIP 200 OK to CORE via Gm (optional may exist prior to IGMP join)
10					→		SIP	CORE sends SIP 200 OK to AS via ISC (optional may exist prior to IGMP join)
11		→						User requests EPG after the end of the recorded program
12				→			HTTP	UE sends HTTP GET to AS via Xa (1 to n times)
13					←		HTTP	AS sends HTTP 200 OK to UE via Xa (1 to n times)
14		←						UE displays EPG with new entry

The AS-IPTV may send additional MESSAGES to the UE to inform something, such as the current recording status.

## 4.4.8.3 Watching a recorded content

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_nP2_0003 (S3A-2202)	
<b>Summary:</b>	User watches a recorded nPVR content	
<b>References:</b>	TS 182 027 [1], clause 8.5; TS 183 063 [2]	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, PVRS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE, PVRS, Core IMS and IPTV AS are configured for method 2</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE supports nPVR</li> <li>• EPG has at least one nPVR enabled broadcast TV channel</li> <li>• nPVR content is available in PVRS based on either an impulsive or offline request to capture broadcast TV channel (see TD_IMS_IPTV_nP2_0001/2)</li> <li>• User has nPVR rights in IPTV AS</li> <li>• IMS CORE configured to forward nPVR related SIP requests to AS IPTV</li> <li>• UE, PVRS and TV Head End support the same content protocols and coding</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to watch the captured nPVR content
	2	Verify that UE displays the captured nPVR content
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

There are 3 accepted different possibilities for playing the recorded content.

1) With reInvite SIP messages for establishing the content delivery channel:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	P V R S		
1		→						User requests to watch the recorded nPVR content
2				→			SIP	UE sends SIP INVITE to CORE via Gm
3					→		SIP	CORE sends SIP INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to PVRS via y2
6					←		SIP	PVRS sends SIP 200 OK to CORE via y2
7					→		SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9		←					SIP	CORE sends SIP 200 OK to UE via Gm
10				→			SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to PVRS via y2
14						→	RTSP	UE sends RTSP DESCRIBE to PVRS via Xc (optional, only to get missing SDP parameters)
15					←		RTSP	PVRS sends RTSP 200 OK to UE via Xc (optional)
16						→	RTSP	UE sends RTSP SETUP to PVRS via Xc
17					←		RTSP	PVRS sends RTSP 200 OK to UE via Xc
18						→	SIP	UE sends SIP reINVITE to CORE via Gm
19					→		SIP	CORE sends SIP reINVITE to AS via ISC
20					←		SIP	AS sends SIP reINVITE to CORE via ISC
21						→	SIP	CORE sends SIP reINVITE to PVRS via y2
22					←		SIP	PVRS sends SIP 200 OK to CORE via y2
23					→		SIP	CORE sends SIP 200 OK to AS via ISC
24					←		SIP	AS sends SIP 200 OK to CORE via ISC
25		←					SIP	CORE sends SIP 200 OK to UE via Gm
26				→			SIP	UE sends SIP ACK to CORE via Gm
27					→		SIP	CORE sends SIP ACK to AS via ISC
28					←		SIP	AS sends SIP ACK to CORE via ISC
29						→	SIP	CORE sends SIP ACK to PVRS via y2
30						→	RTSP	UE sends RTSP PLAY to PVRS via Xc
31		←					RTSP	PVRS sends RTSP 200 OK to UE via Xc
32					←		SIP	PVRS sends SIP INFO to CORE via y2 (optional)
33					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
34					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
35						→	SIP	CORE sends SIP 200 OK to PVRS via y2 (optional)
36	←							UE displays the recorded nPVR content

2) With UPDATE SIP messages for establishing the content delivery channel:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	P V R S		
1		→						User requests to watch the recorded nPVR content
2			→				SIP	UE sends SIP INVITE to CORE via Gm
3					→		SIP	CORE sends SIP INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to PVRS via y2
6					←		SIP	PVRS sends SIP 200 OK to CORE via y2
7						→	SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9		←					SIP	CORE sends SIP 200 OK to UE via Gm
10			→				SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to PVRS via y2
14						→	RTSP	UE sends RTSP DESCRIBE to PVRS via Xc (optional, only to get missing SDP parameters)
15					←		RTSP	PVRS sends RTSP 200 OK to UE via Xc (optional)
16						→	RTSP	UE sends RTSP SETUP to PVRS via Xc
17					←		RTSP	PVRS sends RTSP 200 OK to UE via Xc
18			→				SIP	UE sends SIP UPDATE to CORE via Gm
19					→		SIP	CORE sends SIP UPDATE to AS via ISC
20					←		SIP	AS sends SIP UPDATE to CORE via ISC
21						→	SIP	CORE sends SIP UPDATE to PVRS via y2
22					←		SIP	PVRS sends SIP 200 OK to CORE via y2
23						→	SIP	CORE sends SIP 200 OK to AS via ISC
24					←		SIP	AS sends SIP 200 OK to CORE via ISC
25		←					SIP	CORE sends SIP 200 OK to UE via Gm
26						→	RTSP	UE sends RTSP PLAY to PVRS via Xc
27					←		RTSP	PVRS sends RTSP 200 OK to UE via Xc
28					←		SIP	PVRS sends SIP INFO to CORE via y2 (optional)
29					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
30					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
31						→	SIP	CORE sends SIP 200 OK to PVRS via y2 (optional)
32		←						UE is displaying the recorded nPVR content

3) With RTSP Channel establishing without session modification:

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	P V R S		
1		→						User requests to watch the recorded nPVR content
2			→				SIP	UE sends SIP INVITE to CORE via Gm
3					→		SIP	CORE sends SIP INVITE to AS via ISC
4					←		SIP	AS sends SIP INVITE to CORE via ISC
5						→	SIP	CORE sends SIP INVITE to PVRS via y2
6					←		SIP	PVRS sends SIP 200 OK to CORE via y2
7						→	SIP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP	AS sends SIP 200 OK to CORE via ISC
9		←					SIP	CORE sends SIP 200 OK to UE via Gm
10			→				SIP	UE sends SIP ACK to CORE via Gm
11					→		SIP	CORE sends SIP ACK to AS via ISC
12					←		SIP	AS sends SIP ACK to CORE via ISC
13						→	SIP	CORE sends SIP ACK to PVRS via y2
14						→	RTSP	UE sends RTSP SETUP to PVRS via Xc
15					←		RTSP	PVRS sends RTSP 200 OK to UE via Xc
16						→	RTSP	UE sends RTSP PLAY to PVRS via Xc
17					←		RTSP	PVRS sends RTSP 200 OK to UE via Xc
18					←		SIP	PVRS sends SIP INFO to CORE via y2 (optional)
19					→		SIP	CORE sends SIP INFO to AS via ISC (optional)
20					←		SIP	AS sends SIP 200 OK to CORE via ISC (optional)
21						→	SIP	CORE sends SIP 200 OK to PVRS via y2 (optional)
22		←						UE is displaying the recorded nPVR content

#### 4.4.9 User General Content (UGC)

UGC (User-generated Content) refers to various kinds of media content, that are produced by end-users (TS 181 016 [12], clause A.9.13).

They are two kinds of UGC procedures:

- The creation of UGC content: the user is allowed to declare and upload/upstream his own content to the network.
- The watching of UGC content: the user is allowed to select and watch a UGC content.

Note that SIP messages as 100 TRYING are not included in sequence diagrams below.

## 4.4.9.1 UGC declaration procedures

Interoperability Test Description							
<b>Identifier:</b>	TD_ IMS_ IPTV_ UGC_ 0001						
<b>Summary:</b>	UE declares a new UGC content						
<b>References:</b>	TS 182 027 [1], clause 8.9.2; TS 183 063 [2], clauses 5.1.8.1 and 5.3.5.1						
<b>Configuration:</b>	CF_ IMS_ IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE profile is configured to accept UGC procedures</li> <li>• UE UGC profile is operational (TS 182 027 [1], clause 7.3.1.18/19)</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE has received EPG from IPTV AS (see TD_ IMS_ IPTV_ ADS_ 0001/2/3)</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>UE sends a UGC content declaration request</td> </tr> <tr> <td>2</td> <td>Verify that UE receives the response from AS</td> </tr> </tbody> </table>	Step		1	UE sends a UGC content declaration request	2	Verify that UE receives the response from AS
Step							
1	UE sends a UGC content declaration request						
2	Verify that UE receives the response from AS						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1	→						User sends a UGC declaration
2		→				SIP/SDP	UE sends SIP MESSAGE request including the transaction-id and a SDP offer to CORE via Gm
3				→		SIP/SDP	CORE sends SIP MESSAGE request to AS via ISC
4				←		SIP	AS sends SIP 200 OK response without body to CORE via ISC
5		←				SIP	CORE sends SIP 200 OK response without body to UE via Gm
6				←		SIP/SDP	AS sends SIP MESSAGE request including the UGC contentID and the SDP answer to CORE via ISC
7		←				SIP/SDP	CORE sends SIP MESSAGE request to UE via Gm
8		→				SIP	UE sends SIP 200 OK response without body to CORE via Gm
9				→		SIP	CORE sends SIP 200 OK response to AS via ISC
10	←						Verify that UE receives the ContentID identifying the UGC content

Refer to test description TD\_ IMS\_ IPTV\_ CoD2\_ 0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.



## 4.4.9.2 UGC creation procedures

Refer to TS 183 063 [2], clause 5.3.2.1 for the procedure to handling for missing parameters before session initiation.

Interoperability Test Description		
<b>Identifier:</b>	TD_ IMS_ IPTV_ UGC_ 0002	
<b>Summary:</b>	UE creates a UGC content	
<b>References:</b>	TS 182 027 [1], clause 8.9.2; TS 183 063 [2], clauses 5.1.8.3.1, 5.3.5.3 and 5.4.4.1	
<b>Configuration:</b>	CF_ IMS_ IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE supports UGC</li> <li>• IMS CORE configured to forward UGC related SIP requests to AS IPTV</li> <li>• UE profile is configured to accept UGC procedures</li> <li>• UE UGC profile is operational (TS 182 027 [1], clauses 7.3.1.18/19)</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE has received EPG from IPTV AS (see TD_ IMS_ IPTV_ ADS_ 0001/2/3)</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	UE sends a UGC declaration request
	2	Verify that SCF publishes the new created UGC content
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C O D S		
1		→						User sends an UGC declaration
2				→			SIP/SDP	UE sends SIP MESSAGE request including the transaction-id and a SDP offer to CORE via Gm
3					→		SIP/SDP	CORE sends SIP MESSAGE request to AS via ISC
4					←		SIP	AS sends SIP 200 OK response without body to CORE via ISC
5		←					SIP	CORE sends SIP 200 OK response without body to UE via Gm
6				←			SIP/SDP	AS sends SIP MESSAGE request including UGC contentID and the SDP answer to CORE via ISC
7		←					SIP/SDP	CORE sends SIP MESSAGE request to UE via Gm
8				→			SIP	UE sends SIP 200 OK response without body to CORE via Gm
9					→		SIP	CORE sends SIP 200 OK response to AS via ISC
10		→						User sends the UGC Description Request
11				→			SIP/SDP	UE sends SIP MESSAGE request including the UGC contentID and UGC description information to CORE via Gm
12					→		SIP/SDP	CORE sends SIP MESSAGE request to AS via ISC
13					←		SIP	AS sends SIP 200 OK response without body to CORE via ISC
14				←			SIP	CORE sends SIP 200 OK response without body to UE via Gm
15		→						User sends UGC initiates UGC session creation
16				→			SIP/SDP	UE sends SIP INVITE including UGC contentID and SDP offer to CORE via Gm
17					→		SIP/SDP	CORE sends SIP INVITE to AS via ISC
18					←		SIP/SDP	AS sends SIP INVITE including UGC contentID and SDP offer to CORE via ISC
19					→		SIP/SDP	CORE sends SIP INVITE to CoDS via y2
20					←		SIP/SDP	CoDS sends SIP 200 OK response including SDP response to CORE via y2
21					→		SIP/SDP	CORE sends SIP 200 OK response to AS via ISC
22					←		SIP/SDP	AS sends SIP 200 OK response to CORE via ISC
23				←			SIP/SDP	CORE sends SIP 200 OK response to UE via Gm
24				→			SIP/SDP	UE sends SIP ACK to CORE via Gm
25					→		SIP/SDP	CORE sends SIP ACK to AS via ISC
26					←		SIP/SDP	AS sends SIP ACK to CORE using ISC
27					→		SIP/SDP	CORE sends SIP ACK to CoDS via y2
28					→		RTSP	UE sends a RTSP RECORD to CoDS via Xc
29					←		RTSP	CoDS sends SIP 200 OK response to UE via Xc
30		→						UE sends UGC Publication information
31					→		SIP	CORE sends SIP MESSAGE request body to AS via ISC
32					←		SIP	AS sends SIP 200 OK response without body to CORE via ISC
33				←			SIP	CORE sends SIP 200 OK response without body to UE via Gm
34		→						User requests EPG after the publishing procedure
35				→			HTTP	UE sends HTTP GET to AS via Xa
36					←		HTTP	AS sends HTTP 200 OK to UE via Xa
37		→						User requests EPG
38		←						Verify that UE displays EPG with the new UGC content

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.9.3 UGC watching procedures

As specified in TS 182 027 [1], clause 8.9.3, the UE may select UGC content on several methods:

- Selection through SSF, see TS 182 027 [1], clause 8.2 Step 4.
- Pre-selection.

Other methods are out of scope.

##### 4.4.9.3.1 UGC watching procedures: Pre-selection (using Method 2)

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_UGC_0004	
<b>Summary:</b>	User requests to watch a UGC content – pre selection (using method 2)	
<b>References:</b>	TS 182 027 [1], clause 8.9.3; TS 183 063 [2], clauses 5.1.8.4, 5.3.5.4, 5.4.4.2 and clause A.3.1A	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE profile is configured to accept UGC procedures</li> <li>• UE UGC profile is operational (TS 182 027 [1], clauses 7.3.1.18/19)</li> <li>• UE, Core IMS, CoDS and IPTV AS are configured for method 2</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• CoDS configured with UGC contents</li> <li>• EPG has at least one UGC content</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE has received EPG from IPTV AS (see TD_ IMS_IPTV_ADS_0001/2/3)</li> <li>• Users has selected the UGC content to watch</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	Users selects the UGC content to watch
	2	Verify that UE displays the selected UGC content
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						Users selects the UGC content to watch
2			→				SIP/SDP	UE sends SIP MESSAGE request including the UGC contentID to CORE via Gm
3					→		SIP/SDP	CORE sends SIP MESSAGE request to AS via ISC
4					←		SIP	AS sends SIP 200 OK response without body to CORE via ISC
5					←		SIP	CORE sends SIP 200 OK response without body to UE via Gm
6		→						SCF initiates UGC session
7					←		SIP	AS sends SIP INVITE without SDP to CORE via ISC
8					←		SIP	CORE sends SIP INVITE without SDP to UE via Gm
9			→				SIP/SDP	UE sends SIP 200 OK response including SDP offer to CORE via Gm
10					→		SIP/SDP	CORE sends SIP 200 OK response to AS via ISC
11					←		SIP/SDP	AS sends INVITE with contentID and SDP offer to CORE via ISC
12					→		SIP/SDP	CORE sends INVITE to CoDS via y2
13					←		SIP/SDP	CoDS sends SIP 200 OK response with SDP answer to CORE via y2
14					→		SIP/SDP	CORE sends SIP 200 OK response to AS using ISC
15					←		SIP/SDP	AS sends SIP ACK to CORE via Gm
16					→		SIP/SDP	CORE sends SIP ACK to CoDS via y2
17					←		SIP/SDP	AS sends SIP ACK with SDP answer to CORE via ISC
18					←		SIP/SDP	CORE sends SIP ACK to UE via Gm
19					→		RTSP	UE sends RTSP DESCRIBE to CoDS via Xc (optional, only to get missing parameters)
20					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
21					→		RTSP	UE sends RTSP SETUP to CoDS via Xc
22					←		RTSP	CoDS sends RTSP 200 OK to UE via Xc
23					→		RTSP	UE sends RTSP PLAY to CoDS via Xc
24					→		RTSP	CoDS sends RTSP 200 OK to UE via Xc
25		←						Verify that UE displays the requested UGC content

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

## 4.4.9.3.2 UGC watching procedures: selection through the SSF (using Method 1)

<b>Interoperability Test Description</b>		
<b>Identifier:</b>	TD_IMS_IPTV_UGC_0003	
<b>Summary:</b>	User requests to watch a UGC content – selection through SSF (using method 1)	
<b>References:</b>	TS 182 027 [1], clause 8.9.3; TS 183 063 [2], clauses 5.1.8.4, 5.3.5.4 and 5.4.4.2	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE profile is configured to accept UGC procedures</li> <li>• UE UGC profile is operational (TS 182 027 [1], clauses 7.3.1.18/19)</li> <li>• IMS CORE configured to forward CoD related SIP requests to AS IPTV</li> <li>• CoDS configured with UGC contents</li> <li>• EPG has at least one UGC content</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE has received EPG from IPTV AS (see TD_IMS_IPTV_ADS_0001/2/3)</li> <li>• Users has selected the UGC content to watch</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	Users selects the UGC content to watch
	2	Verify that UE displays the selected UGC content
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						Users selects the UGC content to watch
2			→				SIP	UE sends SIP MESSAGE request including the UGC contentID to CORE via Gm
3					→		SIP	CORE sends SIP MESSAGE request to AS via ISC
4					←		SIP	AS sends SIP 200 OK response without body to CORE via ISC
5		←					SIP	CORE sends SIP 200 OK response without body to UE via Gm
6		→						User initiates UGC session
7			→				SIP/SDP	UE sends SIP INVITE with contentID and SDP offer to CORE via Gm
8					→		SIP/SDP	CORE sends SIP INVITE with contentID to AS via ISC
9					←		SIP/SDP	AS sends SIP INVITE with contentID to CORE via ISC
10						→	SIP/SDP	CORE sends SIP INVITE with contentID to CoDS via y2
11					←		SIP/SDP	CoDS sends SIP 200 OK response including RTSP session ID and SDP answer to CORE via y2
12					→		SIP/SDP	CORE sends SIP 200OK to AS via ISC
13					←		SIP/SDP	AS sends SIP 200OK to CORE via ISC
14		←					SIP/SDP	CORE sends SIP 200OK to UE via Gm
15			→				SIP/SDP	UE sends SIP ACK to CORE via Gm
16					→		SIP/SDP	CORE sends SIP ACK to AS via ISC
17					←		SIP/SDP	AS sends SIP ACK to CORE via ISC
18						→	SIP/SDP	CORE sends SIP ACK to CoDS via y2
19						→	RTSP	UE sends RTSP PLAY to CoDS via Xc
20							RTSP	CoDS sends RTSP 200 OK to UE via Xc
21		←						Verify that UE displays the requested UGC content

Refer to test description TD\_IMS\_IPTV\_CoD1\_0010 (4.4.5.10) for termination at the end of stream.

#### 4.4.10 Sending Notification

Note that SIP messages as 100 TRYING are not included in sequence diagrams below.

#### 4.4.10.1 Notification in Signalling path

This test description logic will be used also by Content Recommendation (4.4.19) using specific parameters as NotificationReason (see TS 183 063 [2], clause 5.3.6.1).

Interoperability Test Description									
<b>Identifier:</b>	TD_IMS_IPTV_Not_0001								
<b>Summary:</b>	SCF generates and sends a message request for the transport of notification								
<b>References:</b>	TS 182 027 [1], clause 9.4; TS 183 063 [2], clauses 5.1.9.1 and 5.3.6.1								
<b>Configuration:</b>	CF_IMS_IPTV								
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS								
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>UE has initiated trick-play on a live broadcast channel (see TD_IMS_IPTV_BC1_0001)</li> </ul>								
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User is watching BC channel</td> </tr> <tr> <td>2</td> <td>SCF receives a trick play reports from MF</td> </tr> <tr> <td>3</td> <td>Verify that UE presents the received notification to the user</td> </tr> </tbody> </table>	Step		1	User is watching BC channel	2	SCF receives a trick play reports from MF	3	Verify that UE presents the received notification to the user
Step									
1	User is watching BC channel								
2	SCF receives a trick play reports from MF								
3	Verify that UE presents the received notification to the user								
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table				
Check									
1	Message exchange follows the below table								

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C O D S		
1								SCF receives a trick play reports from MF
2					←		SIP	AS sends SIP MESSAGE to CORE via ISC
3			←				SIP	CORE sends SIP MESSAGE to UE via Gm
4				→			SIP	UE sends SIP 200 OK response to CORE via Gm
5					→		SIP	CORE sends SIP 200 OK response to AS via ISC
6	←							Verify that UE presents the received notification to the user

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.11 Instant Messaging

The UE shall support OMA Instant Messaging according to [13] and [14].

Note that SIP messages as 100 TRYING are not included in sequence diagrams below.

## 4.4.11.1 Instant Messaging Sending

Interoperability Test Description									
<b>Identifier:</b>	TD_IMS_IPTV_IM_0001								
<b>Summary:</b>	User sends an instant message through OMA Instant Messaging								
<b>References:</b>	TS 182 027 [1], clause 9.3.1; TS 183 063 [2], clauses 5.1.17.1 and 5.3.16.1								
<b>Configuration:</b>	CF_IMS_IPTV								
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS								
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE supports OMA Instant Messaging</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> </ul>								
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User registers to OMA Instant Messaging service</td> </tr> <tr> <td>2</td> <td>User sends "Available soon?" IM</td> </tr> <tr> <td>3</td> <td>Verify that UE receives SIP 200 OK</td> </tr> </tbody> </table>	Step		1	User registers to OMA Instant Messaging service	2	User sends "Available soon?" IM	3	Verify that UE receives SIP 200 OK
Step									
1	User registers to OMA Instant Messaging service								
2	User sends "Available soon?" IM								
3	Verify that UE receives SIP 200 OK								
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table				
Check									
1	Message exchange follows the below table								

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					User registers to OMA Instant Messaging service
2		→					UE sends SIP REGISTER request including OMA feature tag [14] to CORE via Gm
3					→		CORE sends SIP REGISTER request to AS via ISC
4					←		AS sends SIP 200 OK response to CORE via ISC
5		←					CORE sends SIP 200 OK response to UE via Gm
6		→					UE sends "Available soon?" IM
7		→				SIP	UE sends SIP MESSAGE with specified header to CORE via Gm
8					→	SIP	CORE sends SIP MESSAGE with specified header to AS via ISC
9					←	SIP	AS sends SIP 200 OK response to CORE via ISC
10		←				SIP	CORE sends SIP 200 OK response to UE via Gm
11		←					UE receives SIP 200 OK

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.



## 4.4.11.2 Instant Messaging Receiving

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_IM_0002						
<b>Summary:</b>	User receives an instant message through OMA Instant Messaging						
<b>References:</b>	TS 182 027 [1], clause 9.3.1; TS 183 063 [2], clauses 5.1.17.1 and 5.3.16.1						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE supports OMA Instant Messaging</li> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is registered to OMA IM service (see TD_IMS_IPTV_IM_0001)</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>An Instant Message is required to be sent to UE</td> </tr> <tr> <td>2</td> <td>Verify that UE displays the received IM</td> </tr> </tbody> </table>	Step		1	An Instant Message is required to be sent to UE	2	Verify that UE displays the received IM
Step							
1	An Instant Message is required to be sent to UE						
2	Verify that UE displays the received IM						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1						←	An Instant Message is required to be sent to UE
2						←	AS sends SIP MESSAGE to CORE via ISC
3						←	CORE sends SIP MESSAGE to UE via Gm
4						→	UE sends 200 OK to CORE via Gm
5						→	CORE sends 200 OK to AS via ISC
6						←	Verify that UE displays the received IM

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

## 4.4.12 PushCoD

Note that SIP messages as 100 TRYING are not included in sequence diagrams below.

## 4.4.12.1 UE-initiated Content download for unicast download

Refer to TS 183 063 [2], clause 5.3.2.1 for the procedure to handling for missing parameters before session initiation.

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_pCoD_0001	
<b>Summary:</b>	User request to download a CoD content	
<b>References:</b>	TS 182 027 [1], clauses 8.17.1 and 8.18.2; TS 183 063 [2], clauses 5.1.18.1, 5.4.1.2 and 6.5.1.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>Refer to test description TD_IMS_IPTV_CoD1_0001</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User requests to download a CoD content
	2	Verify that UE has downloaded the expected content
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C o D S		
1		→						User requests to download a CoD
2				→			SIP/SDP	UE sends SIP INVITE including the contentID and the download content URI and a SDP offer to CORE via Gm
3					→		SIP/SDP	CORE sends SIP INVITE to AS via ISC
4					←		SIP/SDP	AS sends SIP INVITE to CORE via ISC
5						→	SIP/SDP	CORE sends SIP INVITE to CoDS via y2
6					←		SIP/SDP	CoDS sends SIP 200 OK response to CORE via y2
7					→		SIP/SDP	CORE sends SIP 200 OK response to AS via ISC
8					←		SIP/SDP	AS sends SIP 200 OK response to CORE via ISC
9				←			SIP/SDP	CORE sends SIP 200 OK response to UE via Gm
10				→			SIP/SDP	UE sends SIP ACK to CORE via Gm
11					→		SIP/SDP	CORE sends SIP ACK to AS via ISC
12					←		SIP/SDP	AS sends SIP ACK to CORE via ISC
13					→		SIP/SDP	CORE sends SIP ACK to CoDS via y2
14					→		HTTP	UE sends HTTP GET request with header "Connection" set to "Keep Alive" via Xd
15				←			HTTP	CoDS sends HTTP response via Xd
16		←						Verify that UE has downloaded the expected content

Note that this test description will be reused in clause 4.4.9.10 because of the test logic is identical, only SDP offer parameters shall be changed as the type of content element: it shall be set to "streaming" (see TS 183 063 [2], clause 5.1.18.1 bullet 6).

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.12.2 UE-initiated Content download for unicast progressive download

Refer to test description 4.4.9.8 for the logic of the test description. Modifying SDP offer parameters (as the type of content element set to "progressive") permits to cover all test descriptions.

#### 4.4.13 Targeted Ad Insertion (TAI) - SCTE

These test descriptions cover delivery of personalised advertising to subscribers. The clauses below depict the general procedure for targeted Ad insertion (see TS 182 027 [1], clause 8.14).

Note that SIP messages as 100 TRYING are not included in sequence diagrams below.

##### 4.4.13.1 TAI by notification at UE side

In this test description, we assume that UE initiates a separate session to MF that includes the target Ad content (see TS 182 027 [1], clause 8.14.2.1 step 6).

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_TAI2_0001	
<b>Summary:</b>	User receives an advertising message	
<b>References:</b>	TS 182 027 [1], clauses 8.14.2.1 and E.2; TS 183 063 [2], clauses 5.1.15.1 and 5.3.14	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE subscription is configured to accept Advertising service</li> <li>• The UE is watching CoD content (see TD_IMS_IPTV_CoD1_0001)</li> <li>• SCF is connected to at least one Ad Server (see clause E.2.4.2.1)</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	SCF sends Ad message to UE
	2	Verify that UE displays the Advertising message without interruption of watching CoD
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C O D S		
1								SCF sends Advertising message to UE
2							SIP	AS sends SIP MESSAGE request to CORE via ISC
3							SIP	CORE sends SIP MESSAGE request to UE via Gm
4							SIP	UE sends 200 OK to CORE via Gm
5							SIP	CORE sends 200 OK to AS via ISC
6								UE initiates a session for content insertion
7							SIP/SDP	UE sends SIP INVITE to CORE via Gm
8							SIP/SDP	CORE sends SIP INVITE to AS via ISC
9							SIP/SDP	AS sends SIP INVITE to CORE via ISC
10							SIP/SDP	CORE sends SIP INVITE to CoDS via y2
11							SIP	CoDS sends SIP 200 OK response to CORE via y2
12							SIP	CORE sends SIP 200 OK response to AS via ISC
13							SIP	AS sends SIP 200 OK response to CORE via ISC
14							SIP	CORE sends SIP 200 OK response to UE via Gm
15							SIP	UE sends SIP ACK to CORE via Gm
16							SIP	CORE sends SIP ACK to AS via ISC
17							SIP	AS sends SIP ACK to CORE via ISC
18							SIP	CORE sends ACK to CoDS via y2
19							RTSP	UE sends RTSP PLAY to CoDS via Xc
20							RTSP	CoDS sends RTSP 200 OK to UE via Xc
21								UE displays the Advertising message without interruption of watching CoD

Refer to test description TD\_IMS\_IPTV\_CoD1\_0010 (4.4.5.10) for normal session termination at the end of stream.

#### 4.4.13.2 TAI by content insertion at UE side

In this test description, we assume that UE initiates a separate session to MF that includes the target Ad content (see TS 182 027 [1], clause 8.14.2.1 step 6).

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_TAI2_0002	
<b>Summary:</b>	User receives an advertising message	
<b>References:</b>	TS 182 027 [1], clauses 8.14.2.1 and E.2; TS 183 063 [2], clauses 5.1.15.2 and 5.3.14	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE subscription is configured to accept Advertising service</li> <li>• The UE is watching CoD content (see TD_IMS_IPTV_CoD1_0001)</li> <li>• SCF is connected to at least one Ad Server (see clause E.2.4.2.1)</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	SCF sends Ad message to UE
	2	Verify that UE displays the Advertising message without interruption of watching CoD
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C O D S		
1								SCF sends Advertising message to UE
2							SIP	AS sends SIP INFO request including "ContentInsertionReason" element set to "Advertising" to CORE via ISC
3							SIP	CORE sends SIP INFO request to UE via Gm
4							SIP	UE sends 200 OK to CORE via Gm
5							SIP	CORE sends 200 OK to AS via ISC
6								UE initiates a session for content insertion
7							SIP/SDP	UE sends SIP INVITE to CORE via Gm
8							SIP/SDP	CORE sends SIP INVITE to AS via ISC
9							SIP/SDP	AS sends SIP INVITE to CORE via ISC
10							SIP/SDP	CORE sends SIP INVITE to CoDS via y2
11							SIP	CoDS sends SIP 200 OK response to CORE via y2
12							SIP	CORE sends SIP 200 OK response to AS via ISC
13							SIP	AS sends SIP 200 OK response to CORE via ISC
14							SIP	CORE sends SIP 200 OK response to UE via Gm
15							SIP	UE sends SIP ACK to CORE via Gm
16							SIP	CORE sends SIP ACK to AS via ISC
17							SIP	AS sends SIP ACK to CORE via ISC
18							SIP	CORE sends ACK to CoDS via y2
19							RTSP	UE sends RTSP PLAY to CoDS via Xc
20							RTSP	CoDS sends RTSP 200 OK to UE via Xc
21								UE displays the Advertising message without interruption of watching CoD

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.13.3 TAI by content insertion at MF side

Refer to test description above (see TS 183 063 [2], clause 5.1.15.2).

#### 4.4.14 Emergency Information

We assume that the user is located in its home network. If not, UE is required to perform an IMS emergency registration.

Note that SIP messages as 100 TRYING are not included in sequence diagrams below.

## 4.4.14.1 Emergency Information by Notification

Refer to test description TD\_IMS\_IPTV\_CoD1\_0001, Start CoD to achieve pre-conditions.

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_EMI_0001						
<b>Summary:</b>	UE receives an emergency alert						
<b>References:</b>	TS 182 027 [1], clauses 15 bullets 1 and 8.11.1.1						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is registered in home network</li> <li>• UE is watching CoD as described by TD_IMS_IPTV_CoD1_0001</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>An emergency event is triggered on SCF</td> </tr> <tr> <td>2</td> <td>Verify that TV watching is interrupted and the user is alerted</td> </tr> </tbody> </table>	Step		1	An emergency event is triggered on SCF	2	Verify that TV watching is interrupted and the user is alerted
Step							
1	An emergency event is triggered on SCF						
2	Verify that TV watching is interrupted and the user is alerted						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S			
1								An emergency event is triggered on SCF
2					←		SIP	AS sends SIP MESSAGE including header field Priority set to "emergency" to CORE via ISC
3		←					SIP	CORE sends SIP MESSAGE to UE via Gm
4			→				SIP	UE sends 200 OK to CORE via Gm
5					→		SIP	CORE sends 200 OK to AS via ISC
6	←							TV watching is interrupted and the user is alerted

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.14.2 Emergency Information by Content Insertion

Refer to test description TD\_IMS\_IPTV\_BC\_0001, Session initiation without RACS for broadcast TV to achieve pre-conditions.

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_EMI_0002						
<b>Summary:</b>							
<b>References:</b>	TS 182 027 [1], clauses 15 bullet 2 and 8.11.1.2; TS 183 063 [2], clause 5.3.12.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS, CoDS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE is registered in Core IMS using userIPTV_priv identity</li> <li>• UE is registered in home network</li> <li>• UE is watching broadcast TV as described by TD_IMS_IPTV_BC_0001</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>An emergency event is triggered on SCF to MF</td> </tr> <tr> <td>2</td> <td>Verify that TV watching is interrupted and the user is alerted</td> </tr> </tbody> </table>	Step		1	An emergency event is triggered on SCF to MF	2	Verify that TV watching is interrupted and the user is alerted
Step							
1	An emergency event is triggered on SCF to MF						
2	Verify that TV watching is interrupted and the user is alerted						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S	C O D S		
1								An emergency event is triggered on SCF
2					←		SIP	AS sends SIP MESSAGE including header field Priority set to "emergency" to CORE via ISC
3						→	SIP	CORE sends SIP MESSAGE including header field Priority set to "emergency" to CoDS via y2
4					←		SIP	CoDS sends SIP INFO message to CORE via y2
5			←				SIP	CORE sends SIP INFO messages to UE via Gm
6			→				SIP	UE sends 200 OK to CORE via Gm
7					→		SIP	CORE sends 200 OK to CoDS via y2
8					←		SIP	CoDS sends 200 OK to CORE via y2
9					→		SIP	CORE sends 200 OK to AS via ISC
10	←							TV watching is interrupted and the user is alerted

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.15 Incoming call management

In the test descriptions below, the same user B has two devices (UE):

- An IPTV device, identified by UE B or UE B1
- A phone device, identified by UE B2

The user A calls the user B and user B could accept or reject the incoming call.

The clauses below depict different Incoming Call behavior:

- 1) Incoming Call Rejection (4.4.9.18): The User B does not answer to the notification message (call rejection on notification time out)

- 2) Incoming Call Acceptance (4.4.9.19): The User B accepts the incoming call answering to the notification message, the call is sends on the IPTV device
- 3) Incoming Call Forwarding (4.4.9.20): The User B accepts the incoming call answering to the notification, the call is sends on the phone device

#### 4.4.15.1 Incoming call notification

Refer to Notification test description (4.4.9.4) using specific parameters as described in TS 183 063 [2], clause 5.3.6.1 (NotificationReason set to IncomingCall...). IncomingCallInfo shall be set to the information of the caller.

#### 4.4.15.2 Incoming call handling

Refer to Incoming Call test descriptions below for Incoming Call handling (TS 182 027 [1], clause 9.2.1).

#### 4.4.15.3 Incoming call rejection

This test description depicts the following procedure:

- User B is watching BC TV
- User A calls User B
- User B is notified of the incoming call
- User B ignore the notify message (time out)

Note that SIP messages as 100 TRYING are not included in sequence diagrams below.

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_ICM_0001	
<b>Summary:</b>		
<b>References:</b>	TS 182 027 [1], clauses 9.2.1 and 9.2.2; TS 183 063 [2], clause 5.3.6.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE B, Core IMS, IPTV AS, UE A	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE B is registered in Core IMS using userIPTV_priv identity</li> <li>• UE B is registered in home network</li> <li>• UE B is watching broadcast TV as described by TD_IMS_IPTV_BC_0001</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	UE A calls UE B
	3	UE B refused the incoming call
	4	Verify that TV signal was not interrupted
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table



Step	Direction						Protocol	Comment
	U s e r B	U E B	T & A	C O R E	A S	U s e r A		
1					←			An incoming call is received by CORE from UE A
2					→		SIP/SDP	CORE sends SIP INVITE request to AS via ISC
3					←		SIP/SDP	AS sends SIP MESSAGE with IncomingCallInfo to CORE via ISC (optional)
4			←				SIP/SDP	CORE sends SIP MESSAGE to UE B via Gm (optional)
5	←							Verify that UE B is informed of incoming call (optional)
6								UE B does not answer after timeout
7					←		SIP	AS sends SIP CANCEL to CORE via ISC
8					→		SIP	CORE sends SIP CANCEL to UE A
9					←		SIP	UE A sends SIP 200 OK to CORE
10					→		SIP	CORE sends SIP 200 OK to AS via ISC
11	←							Verify that TV signal was not interrupted

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.15.4 Incoming call acceptance on IPTV UE

This test description depicts the following procedure:

- User B is watching BC TV
- User A calls User B
- User B is notified of the incoming call
- User B accepts the incoming call on TV

Note that SIP messages as 100 TRYING and 183 SESSION PROGRESS are not included in sequence diagrams below. By the way, 183 SESSION PROGRESS message shall be checked.

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_ICM_0002	
<b>Summary:</b>		
<b>References:</b>	TS 182 027 [1], clause 9.2.2; TS 183 063 [2], clause 5.3.6.1	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE B, Core IMS, IPTV AS, UE A	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE B is registered in Core IMS using userIPTV_priv identity</li> <li>• UE B is registered in home network</li> <li>• UE B is watching broadcast TV as described by TD_IMS_IPTV_BC_0001</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	UE A calls UE B
	2	Verify that UE B is notified
	3	UE B accepts the incoming call
	4	Verify that UE A and UE B are connected
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r B	U E B	T & A	C O R E	A S	U s e r A		
1					←			An incoming call is received by CORE from UE A
2					→		SIP/SDP	CORE sends SIP INVITE request to AS via ISC
3					←		SIP/SDP	AS sends SIP MESSAGE with IncomingCallInfo to CORE via ISC (optional)
4			←				SIP/SDP	CORE sends SIP MESSAGE to UE B via Gm (optional)
5	→							Verify that UE B is informed of incoming call (optional)
6			→				SIP/SDP	UE B sends SIP 200 OK to CORE via Gm (UE B accepts the incoming call)
7					→		SIP/SDP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP/SDP	AS sends SIP INVITE request to CORE via ISC
9			←				SIP/SDP	CORE sends SIP INVITE to UE B via Gm
10			→				SIP/SDP	UE B sends SIP 200 OK to CORE via Gm
11					→		SIP/SDP	CORE sends SIP 200 OK to AS via ISC
12					←		SIP/SDP	AS sends SIP 200 OK to CORE via ISC
13					→		SIP/SDP	CORE sends SIP 200 OK to UE A
14	←							Verify that TV signal is paused and phone is ringing
15			→				SIP/SDP	UE B sends SIP ACK to CORE via Gm
16					→		SIP/SDP	CORE sends SIP ACK to AS via ISC
17					←		SIP/SDP	AS sends SIP ACK to CORE via ISC
18					→		SIP/SDP	CORE sends SIP ACK to UE A
19	←							Verify that UE A and UE B are connected

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.15.5 Incoming call forwarding to other UE

This test description depicts the following procedure:

- UE B1 has registered call forward to User B2
- UE B1 is watching BC TV
- UE A calls UE B1
- UE B2 is notified of the incoming call
- UE B2 accepts the incoming call

Note that SIP messages as 100 TRYING and 183 SESSION PROGRESS are not included in sequence diagrams below. By the way, 183 SESSION PROGRESS message shall be checked.

Interoperability Test Description											
<b>Identifier:</b>	TD_IMS_IPTV_ICM_0003										
<b>Summary:</b>											
<b>References:</b>	TS 182 027 [1], clause 9.2.2; TS 183 063 [2], clause 5.3.6.1										
<b>Configuration:</b>	CF_IMS_IPTV										
<b>Required Equipment:</b>	IPTV aware UE B, Core IMS, IPTV AS, UE A										
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>• UE B1 and User B2 are registered in Core IMS using userIPTV_priv identity</li> <li>• UE B1 is registered in home network</li> <li>• UE B1 is watching broadcast TV as described by TD_IMS_IPTV_BC_0001</li> <li>• UE B1 has registered call forward to User B2</li> </ul>										
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>UE A calls UE B1, call is forwarded to UE B2</td> </tr> <tr> <td>2</td> <td>Verify that UE B is notified</td> </tr> <tr> <td>3</td> <td>UE B accepts the incoming call</td> </tr> <tr> <td>4</td> <td>Verify that UE A and UE B are connected</td> </tr> </tbody> </table>	Step		1	UE A calls UE B1, call is forwarded to UE B2	2	Verify that UE B is notified	3	UE B accepts the incoming call	4	Verify that UE A and UE B are connected
Step											
1	UE A calls UE B1, call is forwarded to UE B2										
2	Verify that UE B is notified										
3	UE B accepts the incoming call										
4	Verify that UE A and UE B are connected										
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table						
Check											
1	Message exchange follows the below table										

Step	Direction						Protocol	Comment
	U s e r B1	U E B1	U s e r B2	C O R E	A S	U s e r A		
1					←			An incoming call is received by CORE from UE A
2					→		SIP/SDP	CORE sends SIP INVITE request to AS via ISC
3					←		SIP/SDP	AS sends SIP MESSAGE with IncomingCallInfo to CORE via ISC (optional)
4			←				SIP/SDP/SDP	CORE sends SIP MESSAGE to UE B1 via Gm (optional)
5	→							Verify that UE B1 is informed of incoming call (optional)
6			→				SIP/SDP	UE B1 sends SIP 200 OK to CORE via Gm (UE B accepts the incoming call)
7					→		SIP/SDP	CORE sends SIP 200 OK to AS via ISC
8					←		SIP/SDP	AS sends SIP INVITE request to CORE via ISC
9			←				SIP/SDP	CORE sends SIP INVITE to UE B2 via Gm
10			→				SIP/SDP	UE B sends SIP 200 OK to CORE via Gm
11					→		SIP/SDP	CORE sends SIP 200 OK to AS via ISC
12					←		SIP/SDP	AS sends SIP 200 OK to CORE via ISC
13					→		SIP/SDP	CORE sends SIP 200 OK to UE A
14	←							Verify that TV signal is not interrupted on UE B1 paused and phone is ringing
15								Verify that UE B2 is ringing
16			→				SIP/SDP	UE B2 sends SIP ACK to CORE via Gm
17					→		SIP/SDP	CORE sends SIP ACK to AS via ISC
18					→		SIP/SDP	CORE sends SIP ACK to UE A
18	←							Verify that UE A and UE B2 are connected

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.16 Time Shifted TV

The Time Shift TV (tsTV) service allows user to view a video content that has already been broadcasted. In order to enable TsTV IPTV SP needs to record content in the MDF. IPTV SP may limit BC content available for TsTV. The logic for TsTV is very similar to that introduced for nPVR. The main difference resides in duration of expiration time: for TsTV, the expiration time is very short (some few minutes). In consequence, the test description logics are also very close to that introduced by Impulsive recording request and Watching a recorded content (refer to test descriptions TD\_IMS\_IPTV\_nP2\_0001 and TD\_IMS\_IPTV\_nP2\_0003).

#### 4.4.17 Parental Control

For test descriptions below, the IPTV user profile shall be modified to set the parental control level.

##### 4.4.17.1 Parental Control applied for BC

Referring to test descriptions TD\_IMS\_IPTV\_BC\_0001 (4.4.2.1) and TD\_IMS\_IPTV\_BC\_0005 (4.4.2.5) for the logic of the test, add the checks listed below:

- 1) Check that EPG is filtered correctly, this means that channels not compatible with parental control level
- 2) SCF shall refused a BC request not compatible with parental control level

##### 4.4.17.2 Parental Control applied for CoD

Referring to test description TD\_IMS\_IPTV\_CoD1\_0001 (4.4.5.1) for the logic of the test, add the checks listed below:

- 1) Check that EPG is filtered correctly, this means that channels not compatible with parental control level
- 2) SCF shall refused a CoD content request not compatible with parental control level

##### 4.4.17.3 Parental Control applied for UGC

Referring to test description TD\_IMS\_IPTV\_UGC\_0004 (4.4.5) for the logic of the test, add the checks listed below:

- 1) Check that EPG is filtered correctly, this means that channels not compatible with parental control level
- 2) SCF shall refused a UGC content request not compatible with parental control level

##### 4.4.17.4 Parental Control applied for PVR

Referring to test descriptions TD\_IMS\_IPTV\_nP1\_0001 (4.4.7.1), TD\_IMS\_IPTV\_nP1\_0002 (4.4.7.2) and TD\_IMS\_IPTV\_nP1\_0003 (4.4.7.3) for the logic of the test, add the checks listed below:

- 1) Check that EPG is filtered correctly, this means that channels not compatible with parental control level
- 2) SCF shall refused a n-PVR content request not compatible with parental control level

#### 4.4.18 Content Marker Service (CM)

This feature allows users to bookmark content (entire movies/channels or individual scenes) for sharing with other users.

##### 4.4.18.1 Creating, updating and querying Content Marker (CM)

Using parameters, this test description logic covers procedure applied to creating (IPTVContentMarkerID provided by UE does not exist), updating and querying (IPTVContentMarkerID provided by UE exists) Content Marker. We assume that Content Marker procedures occur within an existing SIP session.

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_CM_0001						
<b>Summary:</b>	UE creates, update or queries a Content Marker						
<b>References:</b>	TS 183 063 [2], clauses 5.1.14.1 and 6.1.1.7						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>The SCF must have indicated its willingness to receive the IPTV-Content-Marker Info Package</li> <li>The UE is watching CoD content (see TD_IMS_IPTV_CoD1_0001)</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>User creates a Content Marker</td> </tr> <tr> <td>2</td> <td>Verify that the Content Marker was created</td> </tr> </tbody> </table>	Step		1	User creates a Content Marker	2	Verify that the Content Marker was created
Step							
1	User creates a Content Marker						
2	Verify that the Content Marker was created						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S			
1		→						User creates a Content Marker
2			→				SIP	UE sends SIP INFO including IPTV-Content-Marker Info Package to CORE via Gm
3					→		SIP	CORE sends SIP INFO to AS via ISC
4					←		SIP	AS sends SIP 200 OK response to CORE via ISC
5			←				SIP	CORE sends SIP 200 OK response to UE via Gm
6		→						Verify that the Content Marker was created
7			→				HTTP	UE sends HTTP POST request including the domain name of the SSF to AS via Xa
8			←				HTTP	AS sends HTTP 200 OK to UA via Xa
9		←					XML	Evaluate payload in HTTP response to verify that UE received to correct Content Marker

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.18.2 Removing Content Marker (CM)

We assume that removing Content Marker occurs outside an existing SIP session.

Interoperability Test Description		
<b>Identifier:</b>	TD_IMS_IPTV_CM_0002	
<b>Summary:</b>	UE removes a Content Marker	
<b>References:</b>	TS 183 063 [2], clauses 5.1.14.1 and 6.1.1.7	
<b>Configuration:</b>	CF_IMS_IPTV	
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, IPTV AS	
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>The UE is register to CORE IMS</li> <li>The UE has retrieved EPG (see clause 4.4.1)</li> <li>The SCF must have indicated its willingness to receive the IPTV-Content-Marker Info Package</li> <li>At least one Content Marker was created</li> </ul>	
<b>Test Sequence:</b>	<b>Step</b>	
	1	User removes a Content Marker
	2	Verify that the Content Marker was removed
<b>Conformance Criteria:</b>	<b>Check</b>	
	1	Message exchange follows the below table

Step	Direction						Protocol	Comment
	U s e r	U E	T & A	C O R E	A S			
1		→						User removes a Content Marker
2				→			SIP	UE sends SIP MESSAGE including IPTV-Content-Marker Info Package to CORE via Gm
3					→		SIP	CORE sends SIP MESSAGE to AS via ISC
4					←		SIP	AS sends SIP 200 OK response to CORE via ISC
5		←					SIP	CORE sends SIP 200 OK response to UE via Gm
6		→						Verify that the Content Marker was removed
7				→			HTTP	UE sends HTTP POST request including the domain name of the SSF to AS via Xa
8		←					HTTP	AS sends HTTP 404 Not Found to UA via Xa

Refer to test description TD\_IMS\_IPTV\_CoD2\_0007 (4.4.6.7) - Step 8 for normal session termination initiated by UE.

#### 4.4.19 Content Recommendation (CR)

Refer to Notification test description (4.4.9.4) using specific parameters as described in TS 183 063 [2], clause 5.3.6.1 (NotificationReason set to ContentRecommendation...) and TS 182 027 [1], clause 8.13.

#### 4.4.20 Presence

Note that SIP messages as 100 TRYING and 183 SESSION PROGRESS are not included in sequence diagrams below.

## 4.4.20.1 Subscribing to presence

Interoperability Test Description					
<b>Identifier:</b>	TD_IMS_IPTV_PRE_0001				
<b>Summary:</b>	UE subscribes to Presence service				
<b>References:</b>	TS 182 027 [1], clause 9.1, TS 183 063 [2], clauses 5.1.6, 5.1.6.1 and annex E				
<b>Configuration:</b>	CF_IMS_IPTV				
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, Presence server, CoD				
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>The UE is register to CORE IMS</li> <li>The UE is registered on CoD (refer to TD_IMS_IPTV_CoD1_0001 for the details of CoD session initiation procedure)</li> </ul>				
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Verify that UE displays the "available" presence status</td> </tr> </tbody> </table>	Step		1	Verify that UE displays the "available" presence status
Step					
1	Verify that UE displays the "available" presence status				
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table
Check					
1	Message exchange follows the below table				

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					UE has completed The CoD session initiation procedure
2			→			SIP/XML	UE sends SIP SUBSCRIBE message to CORE via Gm
3					→	SIP/XML	CORE sends SIP SUBSCRIBE message to AS via ISC
4					←	SIP	AS sends SIP 200 OK including the expiration time to CORE via ISC
5		←				SIP	CORE sends SIP 200 OK including the expiration time to UE via Gm
6			→			SIP/XML	UE sends SIP PUBLISH message including CoDServicePresence XML element to CORE via Gm
7					→	SIP/XML	CORE sends SIP PUBLISH message including CoDServicePresence XML element to AS via ISC
8					←	SIP	AS sends SIP 200 OK to CORE via ISC
9		←				SIP	CORE sends SIP 200 OK to UE via Gm
10	←						Verify that UE displays the "available" presence status

Refer to test description TD\_IMS\_IPTV\_CoD1\_0001 (4.4.5.1) for normal session termination.

## 4.4.20.2 Receiving presence notifications

Interoperability Test Description							
<b>Identifier:</b>	TD_IMS_IPTV_PRE_0002						
<b>Summary:</b>	UE subscribes to Presence service						
<b>References:</b>	TS 182 027 [1], clause 9.1, TS 183 063 [2], clause 5.1.6.2						
<b>Configuration:</b>	CF_IMS_IPTV						
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, Presence server, CoD						
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>The UE is register to CORE IMS</li> <li>The UE has subscribed to Presence service (refer to TD_IMS_IPTV_PRE_0001)</li> </ul>						
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>UE receive a presence notification message</td> </tr> <tr> <td>2</td> <td>Verify that UE displays the display the presence information</td> </tr> </tbody> </table>	Step		1	UE receive a presence notification message	2	Verify that UE displays the display the presence information
Step							
1	UE receive a presence notification message						
2	Verify that UE displays the display the presence information						
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table		
Check							
1	Message exchange follows the below table						

Step	Direction					Protocol	Comment
	U s e r	U E	T & A	C O R E	A S		
1		→					UE has subscribed to Presence service
2					←	SIP/XML	AS sends SIP NOTIFY message to CORE via ISC
3			←			SIP/XML	CORE sends SIP NOTIFY message to UE via Gm
4				→		SIP	UE sends SIP 200 OK to CORE via Gm
5					→	SIP	CORE sends SIP 200 OK to AS via ISC
6	←						Verify that UE displays the presence information

Refer to test description TD\_IMS\_IPTV\_CoD1\_0001 (4.4.5.1) for normal session termination.

## 4.4.21 Service Continuation

An example of Service Continuation occurs when a user A in watching a CoD or BC content on a first IPTV device (an IPTV mobile for instance), he decides to transfer the current watching session on a second IPTV device (his computer) without interruption of the content. The Service Continuation proceeds in two stages: the pause procedure and the restart procedure.



## 4.4.21.1 Service Continuation between IPTV UEs

Interoperability Test Description									
<b>Identifier:</b>	TD_IMS_IPTV_ST2_0001								
<b>Summary:</b>	UE initiates a CoD content transfer								
<b>References:</b>	TS 183 063 [2], clause 5.1.20.2								
<b>Configuration:</b>	CF_IMS_IPTV								
<b>Required Equipment:</b>	IPTV aware UE, Core IMS, Presence server, CoD								
<b>Pre-test conditions:</b>	<ul style="list-style-type: none"> <li>The UEA is register to CORE IMS</li> <li>The UEA is watching a CoD content (refer to refer to TD_IMS_IPTV_CoD1_0001)</li> <li>User has selected the transferee: UE B, UE A is the transferor</li> </ul>								
<b>Test Sequence:</b>	<table border="1"> <thead> <tr> <th>Step</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>UE A initiates the transfer to UE B</td> </tr> <tr> <td>2</td> <td>Verify that UE A watching session is terminated</td> </tr> <tr> <td>3</td> <td>Verify that UE B displays the same content from the correct play time</td> </tr> </tbody> </table>	Step		1	UE A initiates the transfer to UE B	2	Verify that UE A watching session is terminated	3	Verify that UE B displays the same content from the correct play time
Step									
1	UE A initiates the transfer to UE B								
2	Verify that UE A watching session is terminated								
3	Verify that UE B displays the same content from the correct play time								
<b>Conformance Criteria:</b>	<table border="1"> <thead> <tr> <th>Check</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Message exchange follows the below table</td> </tr> </tbody> </table>	Check		1	Message exchange follows the below table				
Check									
1	Message exchange follows the below table								

Step	Direction						Protocol	Comment
	U s e r	U E A	U E B	C O R E	A S	C o D s		
1								UE A displays CoD content
2								User request a watching session transfer
3							RTSP	UE A sends a RTSP PAUSE including the current play time to CoDs via Xc
4							RTSP	CoDs sends RTSP 200 OK to UE A via Xc
5							SIP/SDP	UE A sends SIP REFER request including the GRUU of the target device and the IPTV Content Marker to CORE via Gm
6							SIP/SDP	CORE sends SIP REFER request including the GRUU of the target device and the IPTV Content Marker to AS via ISC
7							SIP/SDP	AS sends SIP REFER request including the GRUU of the target device and the IPTV Content Marker to CORE via ISC
8							SIP/SDP	CORE sends SIP REFER request including the GRUU of the target device and the IPTV Content Marker to CoDs via y2
9							SIP	CoDs sends SIP 202 ACCPETED to CORE via y2
10							SIP	CORE sends SIP 202 ACCPETED to AS via ISC
11							SIP	AS sends SIP 202 ACCPETED to CORE via ISC
12							SIP	CORE sends SIP 202 ACCPETED to UE via Gm
13							SIP/SDP	CoDs sends SIP INVITE to CORE via y2
14							SIP/SDP	CORE sends SIP INVITE to AS via ISC
15							SIP/SDP	AS sends SIP INVITE to CORE via ISC
16							SIP/SDP	CORE sends SIP INVITE to UE B via Gm
17							SIP	UE B sends SIP 200 OK to CORE via Gm
18							SIP	CORE sends SIP 200 OK to AS via ISC
19							SIP	AS sends SIP 200 OK to CORE via ISC
20							SIP	CORE sends SIP 200 OK to CoDs via y2
21							SIP	CoDs sends SIP ACK to CORE via y2
22							SIP	CORE sends SIP ACK to AS via ISC

Step	Direction						Protocol	Comment
	U s e r	U E A	U E B	C O R E	A S	C o D s		
23							SIP	AS sends SIP ACK to CORE via ISC
24							SIP	CORE sends SIP ACK to UE B via Gm
25							SIP	UE B sends SIP NOTIFY to CORE via y2
26							SIP	CORE sends SIP NOTIFY to AS via ISC
27							SIP	AS sends SIP NOTIFY to CORE via ISC
28							SIP	CORE sends SIP NOTIFY to UE A via Gm
29							SIP	UE A sends SIP 200 OK to CORE via Gm
30							SIP	CORE sends SIP 200 OK to AS via ISC
31							SIP	AS sends SIP 200 OK to CORE via ISC
32							SIP	CORE sends SIP 200 OK to CoDs via y2
33							SIP	CoDs sends SIP BYE to CORE via y2
34							SIP	CORE sends SIP BYE to AS via ISC
35							SIP	AS sends SIP BYE to CORE via ISC
36							SIP	CORE sends SIP BYE to UE A via Gm
37							SIP	UE A sends SIP 200 OK to CORE via Gm
38							SIP	CORE sends SIP 200 OK to AS via ISC
39							SIP	AS sends SIP 200 OK to CORE via ISC
40							SIP	CORE sends SIP 200 OK to CoDs via y2
41							RTSP	UE A sends a RTSP PLAY including the current play time to CoDs via Xc
42							RTSP	CoDs sends RTSP 200 OK to UE A via Xc
43								Verify that UE A session is terminated
44								Verify that UE B displays the same content from the correct play time

Refer to test description TD\_IMS\_IPTV\_CoD1\_0001 (4.4.5.1) for normal session termination.

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## Annex A (informative): Bibliography

IETF RFC 4566: "SDP: Session Description Protocol".

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## Annex B (informative): Change history

Date	WG Doc.	CR	Rev	CAT	Title / Comment	Current Version	New Version
20-10-10	TISPAN(10)0182	01		B	Scope_ and ToC_ update_ for_ IMS-IPTV_ test-spec	3.0.0	3.0.3
15-03-11	TISPAN06(11)0002r2	02		B	new testcases	3.0.3	3.0.4
15-06-11	TISPAN06(11)0015r2	03		B	additional testcases for services from Release 3 and incorporate input from STF-413	3.0.4	3.0.5
15-06-11	TISPAN06(11)0016r1	04		F	WI6061 update for figure 1	3.0.4	3.0.5
					Publication	3.0.5	3.1.1

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## History

<b>Document history</b>		
V2.1.1	December 2009	Publication
V3.1.1	July 2011	Publication