



**GMI 2008 Y2 Implementation Agreement
between S-CSCF and SS-MCF**

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Abstract:

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I. The MultiService Forum

The MultiService Forum (MSF) is a global association of service providers, system suppliers and other organizations committed to developing and promoting open-architecture, multiservice communication systems. Founded in 1998, the MSF is an open-membership organization comprised of the world's leading telecommunications companies.

The MSF's activities include developing implementation agreements, promoting worldwide compatibility and interoperability, and encouraging input to appropriate national and international standards bodies.

As part of MSF's effort to drive and promote interoperability, the MSF has created a number of programs geared toward accelerating real world network deployments:

1. Global MSF Interoperability (GMI) events. GMI events provide a real-world setting for vendors to test their solutions and provide evidence that vendor products meet the interoperability standards set forth by MSF Implementation Agreements. Each MSF GMI event is built around a set of capabilities defined for a given release of the MSF Architecture.
2. Next Generation Network (NGN) Test Bed. The NGN test bed provides a facility to enable carriers and vendors to perform in-depth testing of a specific interface as defined in a given release of the MSF architecture.
3. Certification Programs. For more mature technologies the MSF can provide Certification of compliance to a given Implementation Agreement where MSF members believe that it is of value to the industry to do so.

II. An introduction to MSF documentation and GMI 2008

This document is part of the MSF Release 4 set of architectural, protocol and test documentation.

The MSF Release 4 Architecture is a physical implementation of the functional architectures that have been proposed by the key Standards Development Organizations. As such the MSF Release 4 Architecture represents the current state of the industry and it identifies current open interfaces between physically separate network elements.

MSF Implementation Agreements define the protocols to be used over specific open interfaces. Where possible MSF Implementation Agreements are based on industry standard protocols augmented with additional information so as to ensure interoperability between communicating network elements. This level of interoperability is achieved by closing any gaps and tightening any optional capabilities in those industry standards to remove the danger of mutually incompatible selections by vendors. An MSF Implementation Agreement is targeted at a given release of the MSF architecture but can be used in any circumstance where an operator wishes to deploy the open interface and its functionality within their own network.

The MSF Release 4 architecture and its associated implementation agreements are used as the basis for GMI 2008. GMI 2008 is a global test event executed to demonstrate multi-vendor, multi-service interoperability based around IMS and includes IPTV and web based services.

As part of GMI 2008 a number of detailed test scenarios have been developed and a number of test plans defined. Test plans contain the set of test cases required to demonstrate a given MSF Release 4 capability and serve to exercise and validate the set of Implementation Agreements required to realize the capability.

Following the completion of GMI 2008 the MSF Release 4 architecture and individual implementation agreements will be updated if the testing identifies any deficiencies in the documents.

For more information about the scope of GMI2008 please go to <http://www.msforum.org>

III. Impact on previously published MSF documents

This is a new specification for MSF release 4 and GMI 2008.

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1. Scope of this document

The Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN) selected SIP as the protocol to use on Y2 interface between S-CSC and SS-MCF-IPTV of the IMS based IPTV [4]. The MSF have adopted the Y2 interface for the session initiation interface between S-CSC and SS-MCF-IPTV of the Release 4 architecture [11]. This Implementation agreement provides details of Y2 interface, as used in the MSF R4 architecture.

2. Definitions and abbreviations

2.1. Definitions

- “method 1” The playback control method, e.g. in the VoD Service, which uses a subset of the RTSP methods defined in RFC 2326 [6], interpreting SIP INVITE and SIP BYE as triggers for RTSP Session Initiation and termination.
- “method 2” The playback control method, e.g. in the VoD Service, which follows RFC 2326 [6].

2.2. Abbreviations

BC	Broadcast
BCG	Broadband Content Guide
CoD	Content on Demand
DVB	Digital Video Broadcasting
DVBSTP	DVB SD&S Transport Protocol
ESG	Electronic Service Guide
IGMP	Internet Group Management Protocol
IMS	IP Multimedia Subsystem
MCF	Media Control Function
MDF	Media Delivery Function
NGN	Next Generation Network
nPVR	network-side Personal Video Recorder
OMA	Open Mobile Alliance
SCF	Service Control Function
SD&S	Service Discovery and Selection
SDF	Service Discovery Function
SIP	Session Initiation Protocol
SSF	Service Selection Function
TsTV	Time shift TV
UE	User Equipment
UPSF	User Profile Server Function
URI	Uniform Resource Identifier
VoD	Video On Demand

3. Applicability

The scope of the interface described in this IA is shown in the figure below.

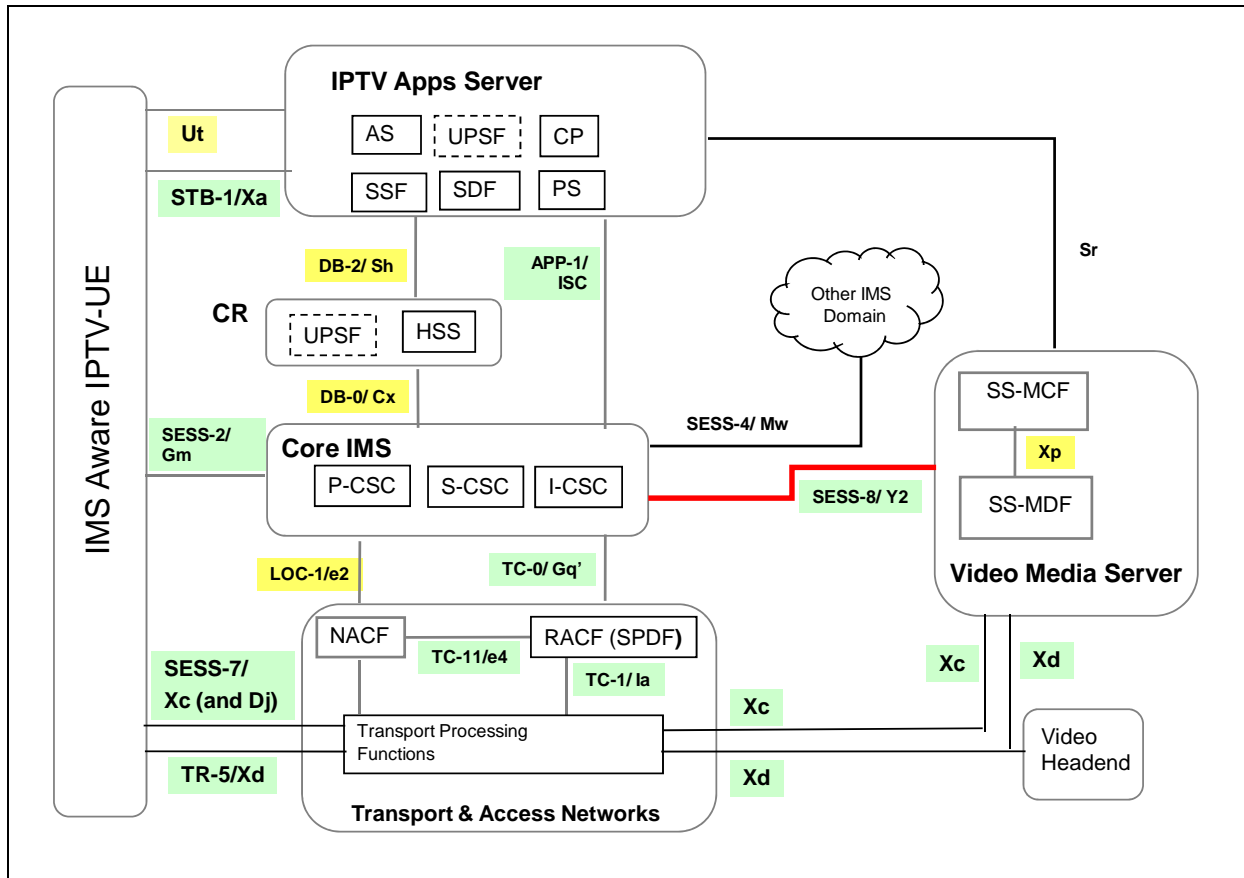


Figure 1 Y2 Interface in the MSF R4 Architecture [11]

Session initiation in the MSF R4 architecture can be applied between the IMS aware IPTV UE and the SS-MCF-IPTV. BC service other than trick-play mode services is out of scope, while trick-play mode of BC service is in scope.

4. Y2 Interface for VoD

This Implementation Agreement builds upon the TISPAN 183 063 [5].

Editor's note: TISPAN has been studying the series of protocols for IMS based IPTV including Y2 interface [5]. Even though the working document from TISPAN has never been published in public at this moment, this IA refers the working document from TISPAN according to the guide to refer the unpublished documents from other standards bodies as discussed in IPTV working group phone meeting on February 21, since the working document looks almost stable and feasible.

Note: This IA is subject to change, because of based on the current working draft.

This IA refers current working draft about IMS based IPTV protocol of TISPAN [5]. The differences from the working draft are summarized as follows:

- This IA focuses on Y2 only, even though [5] treats other interfaces.
- This IA uses texts and figures replacing some key words, such as VoD, SS-MCF-IPTV and IMS aware IPTV UE from originally named CoD, MCF and UE in order to conform to MSF R4 architecture.

The SS-MCF-IPTV shall support the procedures specified in ES 283 003 [25] applicable to a terminating UA.

4.1. Procedure for providing missing parameters before session initiation

When receiving SIP OPTIONS request, the SS-MCF-IPTV shall examine the VoD content identifier present in the user-part of the TO header.

The SS-MCF-IPTV may decide to redirect the request to another SS-MCF-IPTV as described in TS 182 027 clause 5.1.3.3. In this case, the SS-MCF-IPTV shall return a 301 response if the content is not managed by this SS-MCF-IPTV and the SS-MCF-IPTV indicates one or more SS-MCF-IPTV addresses in the contact header as indicated in ES 283 003 [3].

In case the SS-MCF-IPTV responds to the request, the SS-MCF-IPTV shall answer with the SDP description of the content delivery channel conforming to clause 4.2.1.1, as requested by the request URI.

4.2. Session initiation

When receiving VOD session initiation SIP request, the SS-MCF-IPTV shall examine the VoD content identifier present in the user-part of the TO header and the media parameters in the received SDP, if present.

The SS-MCF-IPTV may decide to redirect the request to another SS-MCF-IPTV as described in TS 182 027 clause 5.1.3.3.

In this case, the SS-MCF-IPTV shall return a 301 response if the content is not managed by this SS-MCF-IPTV or 302 response for any other reasons (e.g. load-balancing).

The SS-MCF-IPTV indicates one or more SS-MCF-IPTV addresses in the contact header as indicated in ES 283 003 [3].

4.2.1. Procedure for establishing the RTSP content control and content delivery channel

4.2.1.1. SS-MCF-IPTV as SDP answerer

In the case when the SS-MCF-IPTV receives a session initiation request, the SS-MCF-IPTV shall examine the RTSP SDP parameters and shall allocate server ports for the VoD session. In case the SS-MCF-IPTV supports VoD RTSP playback control Method 1 as defined in complementary document [10], the SS-MCF-IPTV shall generate an RTSP session ID for the content control channel. The SS-MCF-IPTV shall also examine the media lines of the media channel SDP offer.

If none of the media lines in the SDP offer are acceptable, it shall reply with a SIP error code 488 Not Acceptable here, response. One reason may be that the SDP does not match the indicated content.

Else, the SS-MCF-IPTV shall answer with a SIP 200 OK, indicating the SDP answer. If the content that the user has selected cannot be found the SS-MCF-IPTV shall reply with appropriate, SIP error code 404 Not Found, response.

The SDP parameters for the RTSP channel shall be set as follows:-

- an 'm' line for an RTSP stream of format: m=<media> <port> <transport> <fmt>
 - The media field shall have a value of "application".
 - The port field is setup according to ES 283 003 [3]. The port number is set to the port allocated by the SS-MCF-IPTV. The 'setup' attribute is set to 'passive' indicating that connection shall be initiated by the other endpoint (UE).
 - The transport field shall be identical to the one received in the SDP offer.
 - The fmt field shall be identical to the one received in the SDP offer.
(ex. m=application 554 tcp iptv_rtsp).
- An "a=setup" attribute shall be present and set as "passive" as defined in ES 283 003 [3]
(ex:a=setup:passive).
- An "a= connection" attribute shall be present and set as "new" as defined in ES 283 003 [3]
(ex:a=connection:new).

NOTE: RTSP over UDP is out of scope of this release.

- One or more a=fmtp lines representing RTSP specific attributes set as follows:
 - a "fmtp:iptv_rtsp h-uri" attribute shall be set to the RTSP URL to be used in the RTSP requests The h-uri can be in form of absolute or relative URI. If absolute URI is specified then it is used as-is in subsequent RTSP requests. If relative URI is specified in form of a media path, then the RTSP absolute URL could be constructed by the UE using the IPAddress (from c-line) and port (from m-line) as the base followed by h-uri value for the media path.
 - (a=fmtp:rtsp h-uri=<request-uri>).
 - In case the SS-MCF-IPTV supports VoD RTSP playback control Method 1 as defined in [10], the SS-MCF-IPTV shall include a "fmtp:iptv_rtsp h-session" attribute representing the session-id of the RTSP session to be created.
(ex. a=fmtp:iptv_rtsp h-session: <rtsp-session>).
 - For content related to BC service with trick-play mode the SS-MCF-IPTV shall include "fmtp:iptv_rtsp h-offset" attribute that indicates where the playback is to start from.
(ex. a=fmtp:iptv_rtsp h-offset: <media-offset>).

For each media stream controlled by the RTSP content control channel, SDP answer shall include a content delivery channel media description set as follows:

- the "m=" line indicates the type of the media, the transport protocol and the port of the related content delivery channel. If an fmt parameter is in the SDP offer it shall be completed with the supported format by the SS-MDF-IPTV,

- the "c=" line shall include the network type with the value set to IN, the address type set to IP4 or IP6 and unicast address of the flow related to the content delivery channel, (ex. c=IN IP4 <IP_ADDRESS>)
the "b=" line shall contain the proposed bandwidth. Since the VOD media stream is unidirectional the bandwidth shall be set to 0, except for the case that the transport is RTP and RTCP is allowed.
(ex. b=AS:0)
- an "a=" line with a "sendonly"
(ex. a=sendonly)

4.2.2. Procedure for establishing the RTSP channel separately

4.2.2.1. SS-MCF-IPTV as SDP answerer

When the SS-MCF-IPTV receives the SDP offer for establishing only the RTSP channel in the session initiation request, the SS-MCF-IPTV shall examine the SDP parameters.

If the SDP offer is not acceptable, the SS-MCF-IPTV shall reply with an SIP error response.

Else, the SS-MCF-IPTV shall answer with a SIP 200 OK, indicating the SDP answer.

The SDP parameters for the RTSP channel shall be set as follows:

- an 'm' line for an RTSP stream of format: m=<media> <port> <transport> <fmt>
- The media field shall have a value of "application".
- The port field is setup according to ES 283 003 [3]. Typically, the port number is a port number of 554 (rtsp server port) on its 'm' line, and the 'setup' attribute is set to 'passive' indicating that connection shall be initiated by the other endpoint (UE).
- The transport field shall be identical to the one received in the SDP offer.
- The fmt field shall be identical to the one received in the SDP offer.
- If "a=setup" attribute is present in the offer, it shall be present and set to "passive" as defined in ES 283 003 [3].
- If "a= connection" attribute is present in the offer, it shall be present and set to "new" as defined in ES 283 003 [3].

4.3. Session modification

Upon receipt of a re-INVITE request or an UPDATE request, the SS-MCF-IPTV shall modify the session as specified in ES 283 003 [3] if the request is acceptable to the SS-MCF-IPTV in accordance with the user subscription.

In order to modify the session from the SS-MCF-IPTV side, the SS-MCF-IPTV shall send a re-INVITE or an UPDATE request.

The SDP parameters for the RTSP channel shall be set to the same parameters as specified in clause 4.2.2.1 except for the "a=connection" attribute. The attribute shall be set to "existing" as defined in ES 283 003 [3].

For each media stream controlled by the RTSP content control channel the SDP offer shall include a content delivery channel media description set as follows:

- the "m=" line indicates the type of the media, the transport protocol the port of the related content delivery channel.
- the "c=" line shall include the network type with the value set to IN, the address type set to IP4 or IP6, and unicast address of the flow of the related content delivery channel.
- the "b=" line shall contain the proposed bandwidth.
- A "a=" line with a "sendonly".

The SS-MCF-IPTV shall not modify RTSP channel m-line description in the SDP if the media delivery streams controlled by RTSP are not removed(port not set to zero in m-lines) in the SDP.

4.3.1. Procedure for establishing the content delivery channel

4.3.1.1. SS-MCF-IPTV as SDP answerer

When the SS-MCF-IPTV receives the SDP offer for establishing content delivery channel in the session modification request, the SS-MCF-IPTV shall examine the SDP parameters and answer with a SIP 200 OK, indicating the SDP answer.

The SDP parameters for the RTSP channel shall be set to the same parameters as specified in clause 4.2.2.1 except for the "a=connection" attribute. The attribute shall be set to "existing" as defined in ES 283 003 [3].

The SDP parameters shall include one or more media description sets as follows:

- The "m=" line indicates the type of the media, the transport protocol and the port. The type of the media, the transport protocol shall be identical to the one received in the SDP offer. The port shall be set to the value used for the content delivery channel.
- The "c=" line shall include the network type with the value set to IN, the address type set to IP4 or IP6 and unicast address of the flow of the related content delivery channel.
- The "b=" line shall contain the bandwidth. The bandwidth attribute shall be identical to the one received in the SDP offer.
- The "a=" line with a "sendonly".

4.4. Session termination

Upon receipt of a BYE request, the SS-MCF-IPTV shall terminate the session as specified in ES 283 003 [3].

In order to terminate the session from the SS-MCF-IPTV side, the SS-MCF-IPTV shall first close the RTSP session that was established during session initiation by closing the underlying TCP connection if existing (e.g. in case of persistent TCP connection).The SS-MCF-IPTV shall then send a BYE request as specified in ES 283 003 [3].

4.5. Procedures for handling VOD Service action data

Upon receiving normal playback RTSP PLAY (scale header set to 1) (See Note below) request from UE, the SS-MCF-IPTV may send a SIP INFO request to the SCF containing the user related IPTV service action data. The content of INFO request shall be as follows:

- The value of the Request-URI shall be set to the one used in the related session.

- From and To headers shall be set to the one defined during the session initiation procedure.
- Call-ID shall be set to the same value as that of the VoD session.
- CSeq shall be generated by UE following rules defined in ES 283 003 [3] for request within a dialog.
- The Content-type header shall include the registered MIME type of XML documents representing IPTV service action data: "application/vnd.etsi.iptvsad-cod+xml".
- The message body carries the service action data: the matching "Available CoD" object shall be updated so that CoDDeliveryStatus is set to "Ongoing".

NOTE 1: This will only be performed when the very first RTSP PLAY (scale header=1) request is received by the SS-MCF-IPTV for a given VoD session (to avoid overflowing the network with unnecessary updates when user presses Play subsequently to FFW or FRW).

Editor's Note: Some constant strings uses CoD instead of VoD to represent video on demand service in [5]. So far we use CoD so as to be compliant to [5]. To take reader's attention, the constant string "CoDs". are high lighted.

In the case of normal end of streaming, SS-MCF-IPTV may send a SIP INFO request to the SCF containing the related service action data. The content of INFO request shall be as follows:

- The value of the Request-URI shall be set to the one used in the related session.
- From and To headers shall be set to the one defined during the session initiation procedure.
- Call-ID shall be set to the same value as that of the VoD session.
- CSeq shall be generated by UE following rules defined in ES 283 003 [3] for request within a dialog
- The Content-type header shall include the registered MIME type of XML documents representing IPTV service action data: "application/vnd.etsi.iptvsad-cod+xml".
- The message body carries the service action data: the matching "Available CoD" object shall be updated so that CoDDeliveryStatus is set to "Completed".

In the case of error occurring in streaming, SS-MCF-IPTV may send a SIP INFO request to the SCF containing the related service action data. The content of INFO request shall be as follows:

- The value of the Request-URI shall be set to the one used in the related session..
- From and To headers shall be set to the public identity of the user issuing the INFO message.
- Call-ID shall be set to the same value as that of the VoD session.
- CSeq shall be generated by SS-MCF-IPTV.

- The Content-type header shall include the registered MIME type of XML documents representing IPTV service action data: "application/vnd.etsi.iptvsad-cod+xml".
- The message body carries the service action data: the matching "Available CoD" object shall be updated so that CoDDeliveryStatus is set to "Failed".

NOTE 2: The XML schema mapping to the MIME type: "application/vnd.etsi.iptvsad-cod+xml" is available in annex K of TS 183 067 [5].

If the INVITE request received in session initiation contains an Allow header that does not describe INFO, the SS-MCF-IPTV shall not send INFO request of VoD service action data.

Note: INFO request may arrive at the UE if the SCF acts as a proxy. Handling of that case is not specified in the current release. If the SIP INFO request of service action data resulted in 405 or 415 response, the SS-MCF-IPTV must not send again the INFO request of service action data.

5. Y2 Interface for BC with trick mode

As a general rule, the MCF is not involved in the BC service. Only in the case of a user initiating trick play mode of a Broadcast TV session, the MCF in charge of recording the requested channel will be linked to the session.

At receipt of an INVITE message from the SCF, the MCF will derive the content ID in real time and from the channel identifier it received in the TO header then carry out the same steps as described for the CoD session (see clause 4.2) before replying back, in a positive case, with the 200 OK message.

In the SDP answer, the only difference with regards to the media descriptors compared to a normal CoD session is the inclusion of an h-offset attribute different than 0.

At receipt of the ACK message acknowledging the 200 OK, trick mode can be initiated.

When the trick mode is deactivated by the UE, the MF will receive a BYE message as in the CoD session termination. The successful release of resources will imply responding with a 200 OK to the SCF.

6. Y2 Interface for nPVR Session

The MF follows procedures outlined in clause 4 for CoD session initiation, modification and termination procedures.

7. References

- [1] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture Release 2".
- [2] ETSI ES 282 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture".

- [3] ETSI ES 283 003 R2: Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN);IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3
- [4] ETSI TS 182 027: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV functions supported by the IMS subsystem".
- [5] ETSI TS 183 063: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); IMS based IPTV Stage 3 Specification" (to be published in near future)
- [6] IETF RFC 2326: Real Time Streaming Protocol (RTSP)
- [7] IETF RFC 3261: "SIP: Session Initiation Protocol"
- [8] IETF RFC 4145: "TCP-Based Media Transport in the Session Description Protocol (SDP)"
- [9] IETF RFC 4756: Forward Error Correction Grouping Semantics in Session Description Protocol
- [10] MSF contribution, "GMI 2008 Xc Implementation Agreement between UE and Video Media Server (SS-MCF)", msf2008.095.04
- [11] MSF contribution, "MSF IMS-IPTV Physical Architecture for GMI08", msf2008.139.01

Appendix A Example Signaling Flows of VoD operation using method 1

A.1 Session Initiation

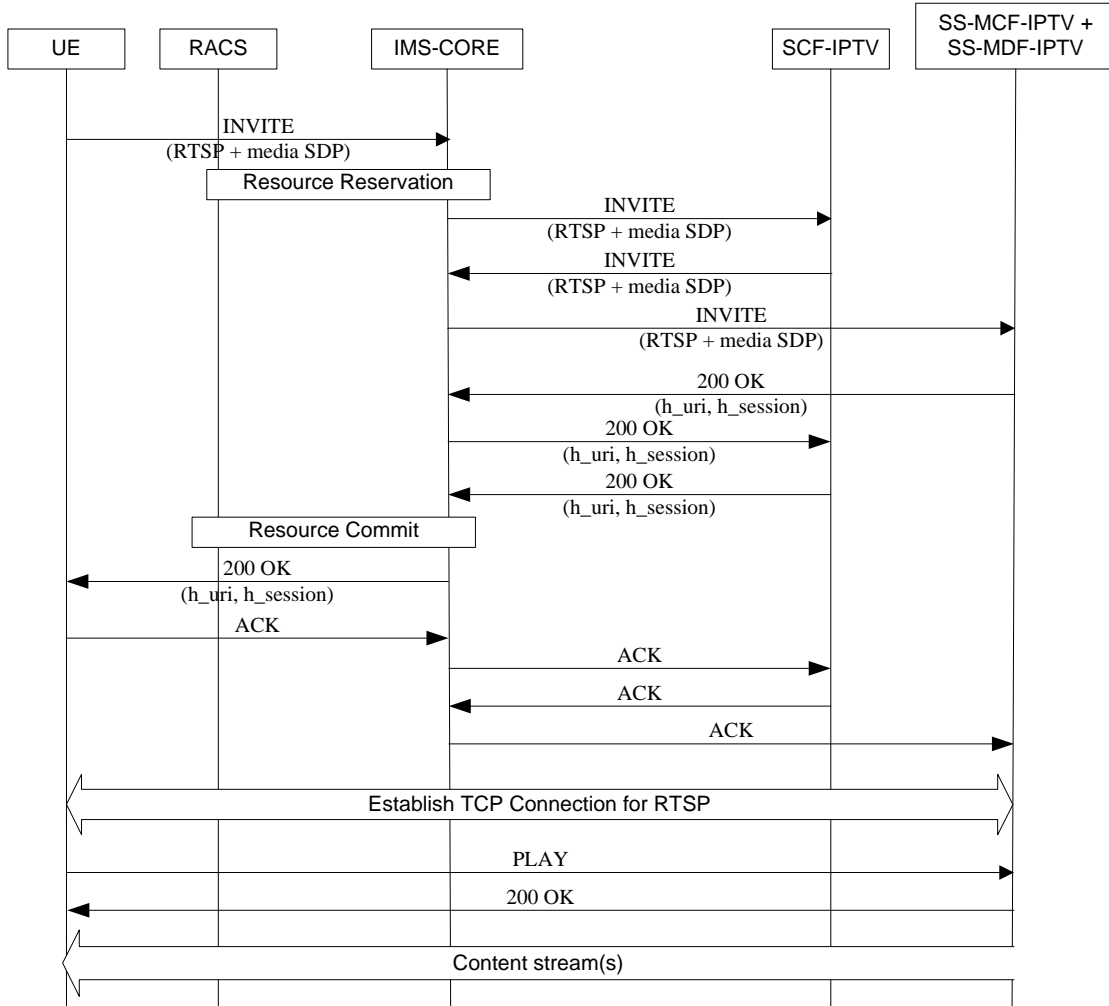


Figure 2 Example signaling flow for session initiation for method 1

A.2 Session termination

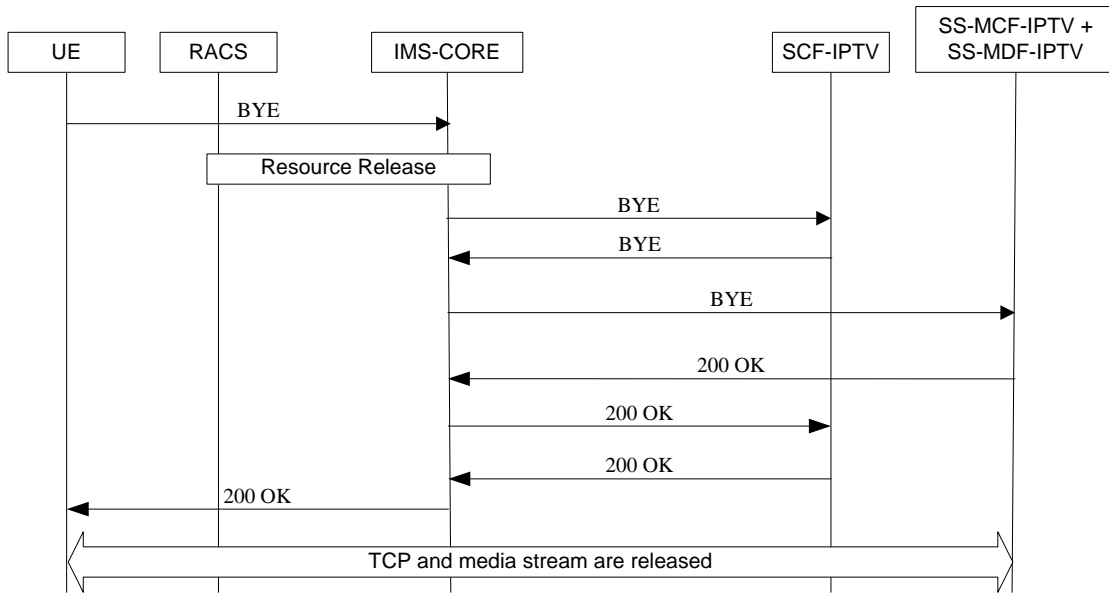
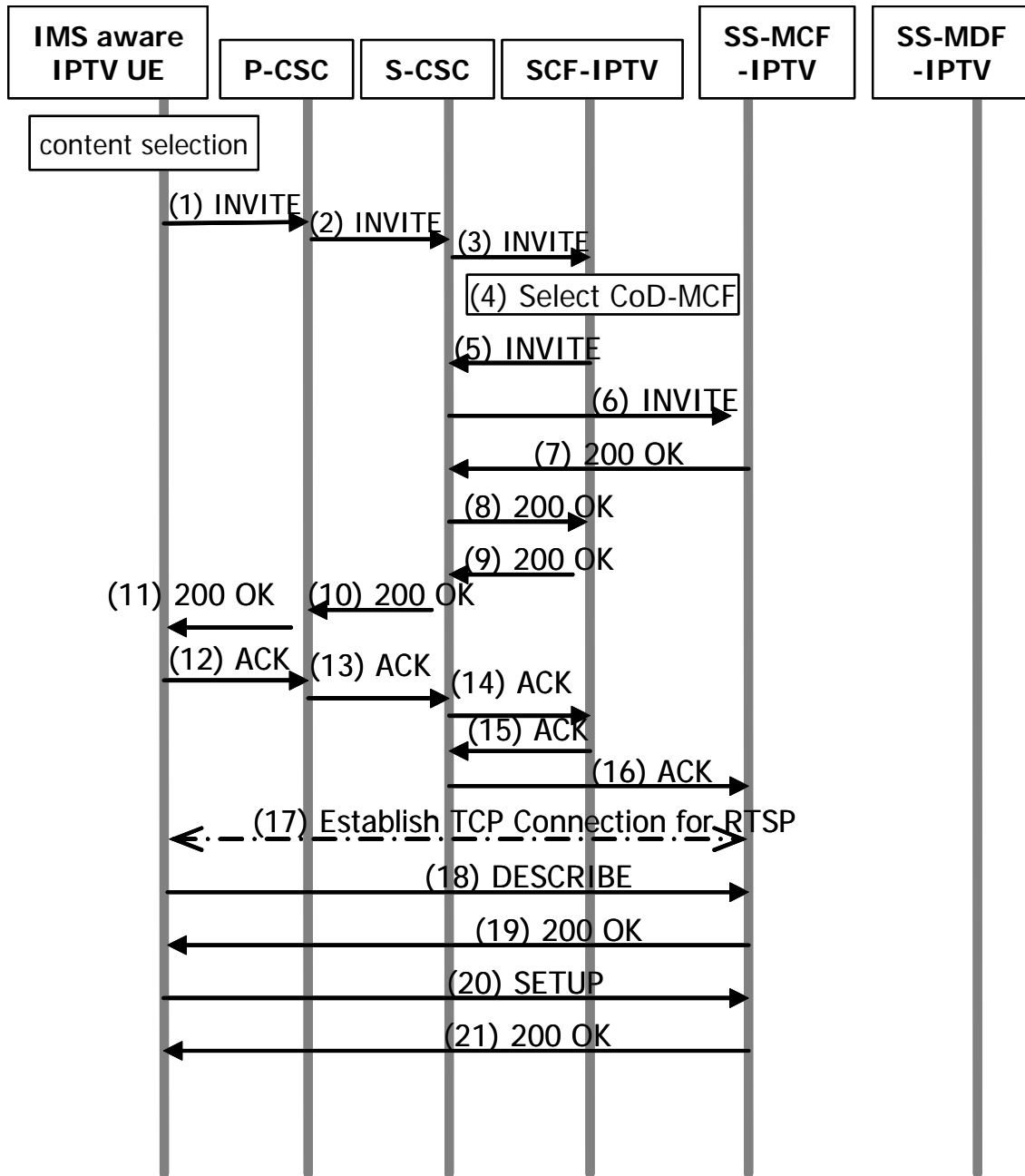


Figure 3 Example signaling flows of session termination for method 1

Appendix B Example Signaling Flows of VoD operation using method 2

B.1 Session Initiation

B.1.1 Session initiation flows for case of establishing content control channel and content delivery channels separately



(to be continued to the next page)

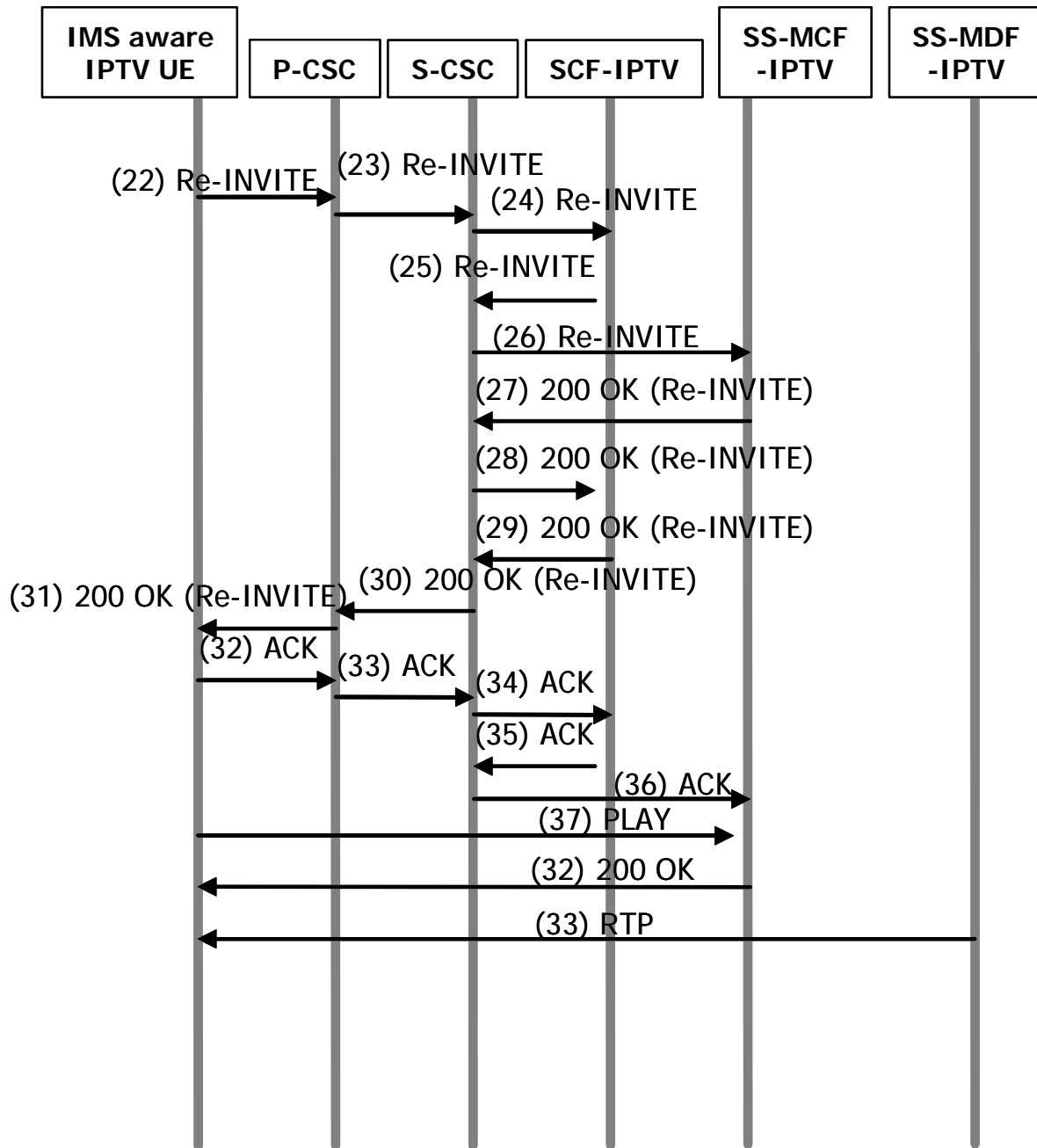


Figure 4 Example signaling flow for session initiation for case of establishing content control channel and content delivery channels separately

B.1.2 Session initiation flows for case of establishing content control channel and content delivery channels using method 2

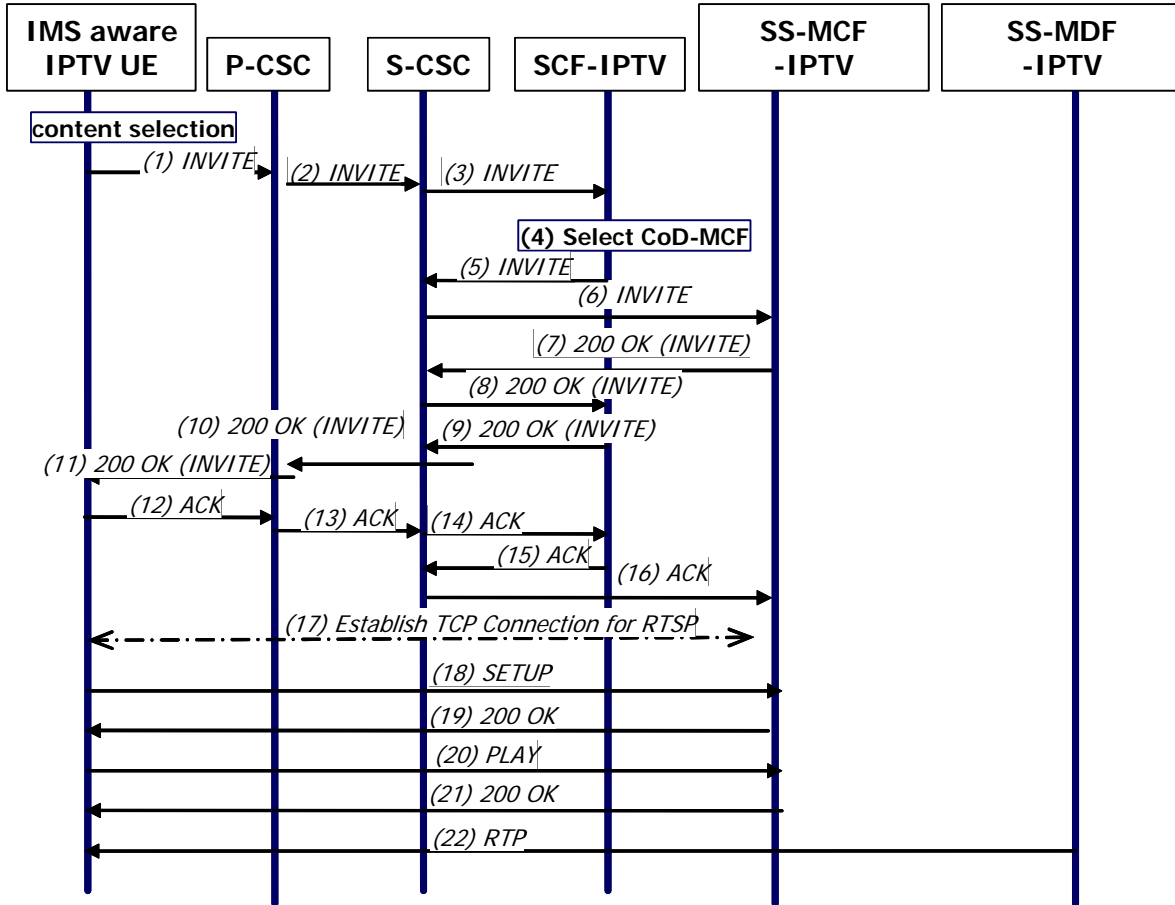


Figure 5 Example signaling flow for session initiation for case of establishing content control channel and content delivery channels using RTSP method 2

B.2 Session Termination

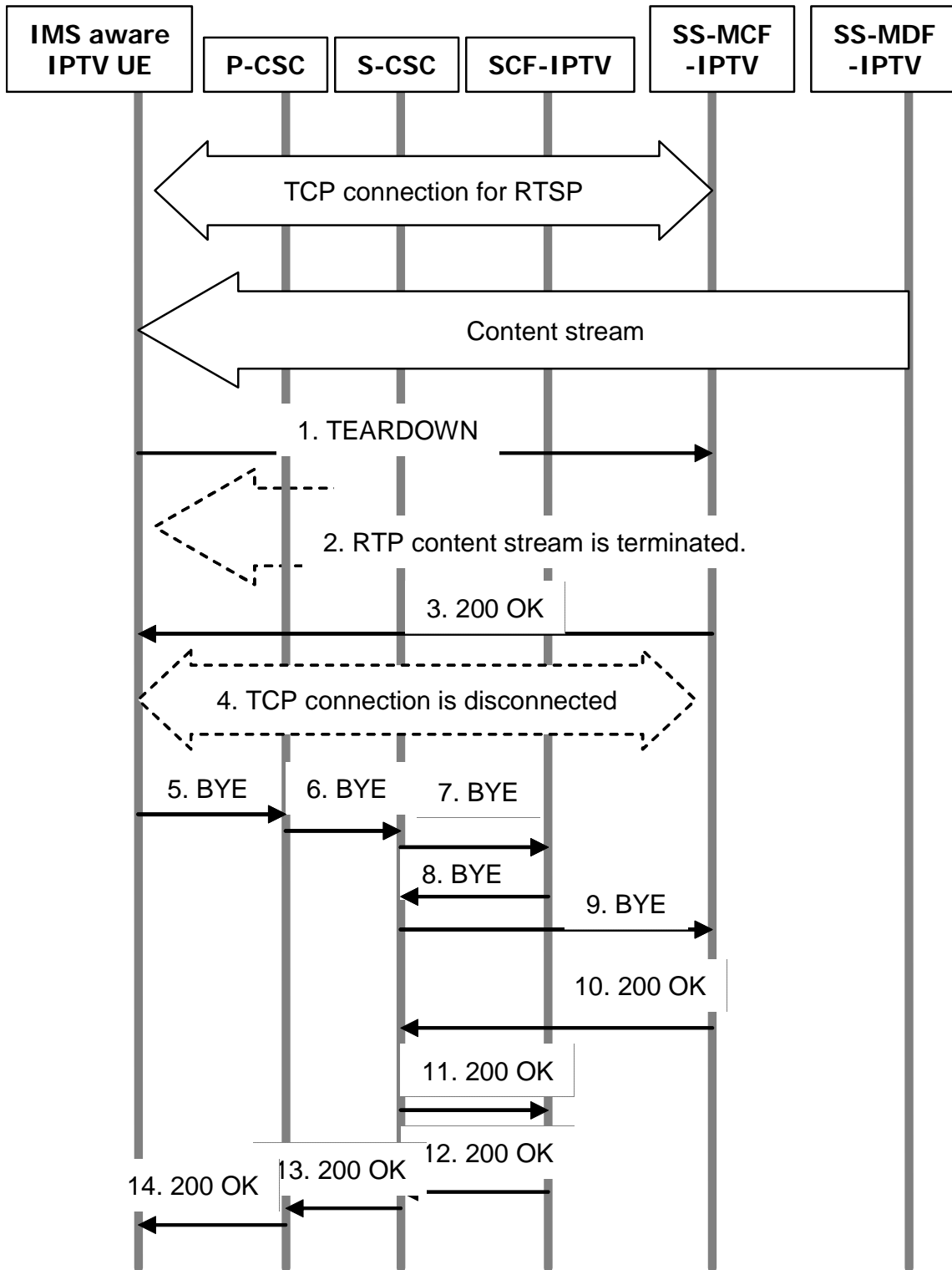


Figure 6 Example signaling flows of session termination