BS IEC 62766-4-2:2017

BSI Standards Publication

Consumer terminal function for access to IPTV and open internet multimedia services

Part 4-2: Examples of IPTV protocol sequences

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National foreword

This British Standard is the UK implementation of IEC 62766-4-2:2017.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multimedia systems and equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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INTERNATIONAL STANDARD

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Consumer terminal function for access to IPTV and open internet multimedia services –
Part 4-2: Examples of IPTV protocol sequences

INTERNATIONAL
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CONSUMER TERMINAL FUNCTION FOR ACCESS TO IPTV AND OPEN INTERNET MULTIMEDIA SERVICES –

Part 4-2: Examples of IPTV protocol sequences

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The text of this International Standard is based on the following documents:

CDV	Report on voting
100/2547/CDV	100/2661/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

This International Standard is to be used in conjunction with IEC 62766-4-1.

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A list of all parts in the IEC 62766 series, published under the general title *Consumer terminal function for access to IPTV and open internet multimedia services*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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INTRODUCTION

The IEC 62766 series is based on a series of specifications that was originally developed by the OPEN IPTV FORUM (OIPF). They specify the user-to-network interface (UNI) for consumer terminals to access IPTV and open internet multimedia services over managed or non-managed networks as defined by OIPF.

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CONSUMER TERMINAL FUNCTION FOR ACCESS TO IPTV AND OPEN INTERNET MULTIMEDIA SERVICES –

Part 4-2: Examples of IPTV protocol sequences

1 Scope

This part of IEC 62766 provides informative examples of features defined in IEC 62766-4-1.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62766-4-1, *Consumer terminal function for access to IPTV and open internet multimedia services – Part 4-1: Protocols*[1]

IETF RFC 3261, *SIP: Session Initiation Protocol*

IETF RFC 3455, *Private Header (P-Header) Extensions to the Session Initiation Protocol (SIP) for the 3rd-Generation partnership Project (3GPP)*

IETF RFC 3588, *Diameter Base Protocol*

IETF RFC 3611, *RTP Control Protocol Extended Reports (RTCP XR)*

IETF RFC 4825, *The Extensible Markup Language (XML) Configuration Access Protocol (XCAP)*

3GPP TS 29.199-4, *Open Service Access (OSA); Parlay X web services; part 4: Short messaging*

Broadband Forum TR-135, *Data Model for a TR-069 Enabled STB*

3 Terms, definitions and abbreviations

For the purposes of this document, the terms, definitions and abbreviations given in IEC 62766-4-1 apply.

4 Examples of IPTV protocol sequences

4.1 General

All the examples in this document are based on the HNI-IGI HTTP option.

[1] Under preparation. Stage at time of publication: IEC CDV 62766-4-1:2016.

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4.2 IPTV service functions protocol sequences

4.2.1 COD Sequences

4.2.1.1 RTSP specific usage on UNIS-11 and NPI-10 for the managed model

In this example, the RTSP delivery parameters have been obtained as indicated in IEC 62766-4-1.

The RTSP URI is: rtsp://Cluster.orangeCDN.net/chevaliers_du_ciel

The session ID is 940211290776250.

Figure 1 depicts an RTSP Procedure on UNIS-11 for managed model.

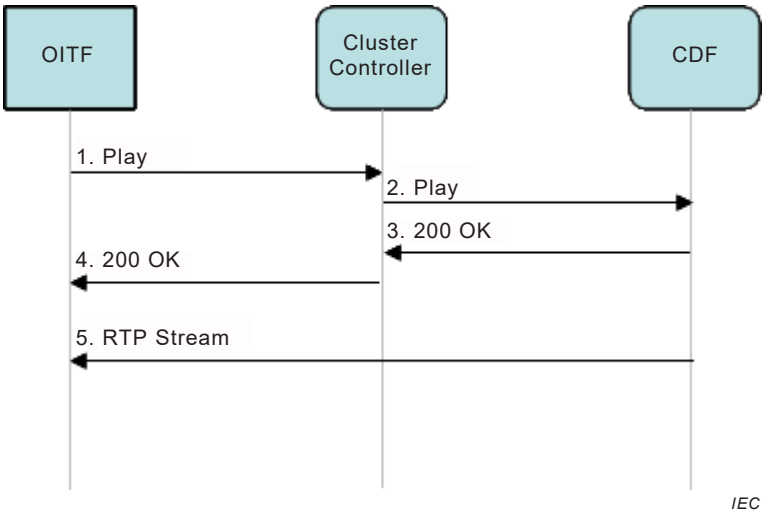

Figure 1 – RTSP Procedure on UNIS-11 for managed model

The call flow steps shown in Figure 1 are described further as follows:

Step 1: The OITF sends an RTSP PLAY to the Cluster Controller

– PLAY rtsp://Cluster.orangeCDN.net/chevaliers_du_ciel
  CSeq: 1981
  Session: 940211290776250

Step 2: The Cluster Controller forwards the PLAY message to the CDF

– PLAY rtsp://server1.Cluster.orangeCDN.net/chevaliers_du_ciel
  CSeq: 1981
  Session: 940211290776250

Step 3: The CDF replies to the Cluster Controller

– 200 OK
  CSeq: 1981
  Session: 940211290776250

Step 4: The Cluster Controller replies to the OITF with the appropriate RTSP session ID

– 200 OK
  CSeq: 1981
  Session: 940211290776250

Step 5: The RTP media starts

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4.2.1.2 RTSP specific usage on UNIS-11 and NPI-10 for the unmanaged model

The following example is only one example of performing redirection at initiation using the 303 Moved message. It does not take into account the effects of Network Address Translation (NAT).

Figure 2 depicts an RTSP Usage for COD on UNIS-11 and NPI-10.

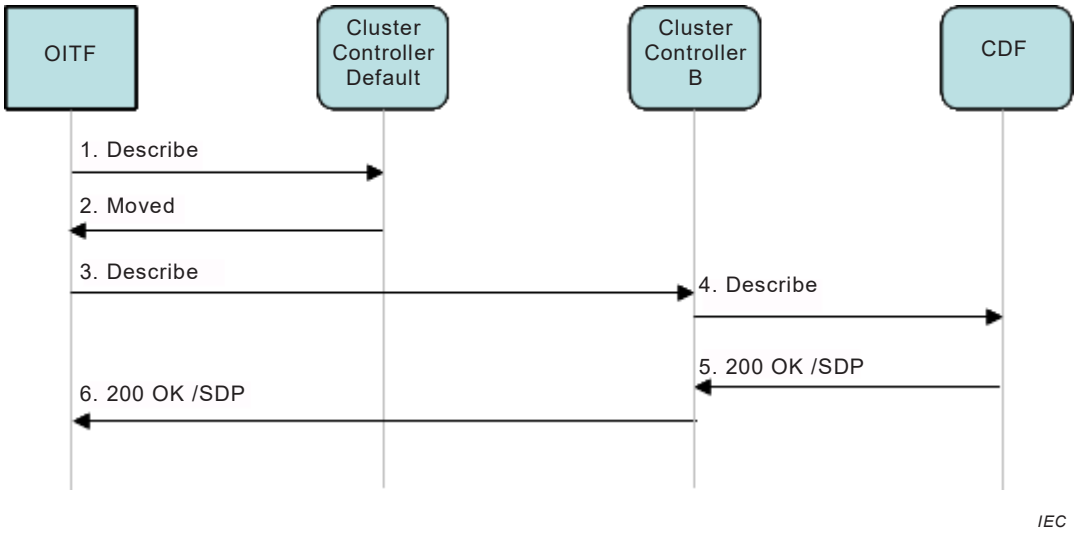

Figure 2 – RTSP Usage for COD on UNIS-11 and NPI-10

The call flow steps shown in figure 2 are described further as follows:

Step 1: The OITF to the Cluster Controller

– DESCRIBE rtsp://Cluster.orangeCDN.net/chevaliers_du_ciel RTSP/1.0

CSeq 1306

Accept: application/sdp

Step 2: The Cluster Controller responds to the OITF indicating redirection to Cluster Controller B

– RTSP/1.0 302 Moved Temporarily

CSeq 1306

Location: rtsp://Cluster_B.orangeCDN.net/ chevaliers_du_ciel RTSP/1.0

Step 3: The OITF sends a DESCRIBE to the indicated Cluster Controller

– DESCRIBE rtsp://Cluster_B.orangeCDN.net/chevaliers_du_ciel

CSeq: 1979

Accept: application/sdp

Step 4: The Cluster Controller chooses the appropriate CDF and forwards the DESCRIBE message to it

– DESCRIBE rtsp://Server1.orangeCDN.net/chevaliers_du_ciel RTSP/1.0

Cseq: 1979

Accept: application/sdp

Step 5: The CDF replies to the Cluster Controller with the appropriate SDP

– 200 OK

Cseq: 1979

content-Type: application/sdp

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content length: .....

//// SDP////

Step 6: The Cluster Controller replies to OITF with the appropriate SDP

– 200 OK

CSeq: 1979

content-Type: application/sdp

content length: ...

////SDP ////

4.2.2 Content reporting and content reporting management

4.2.2.1 Content reporting

Figure 3 shows a call flow for an OITF initiating content reporting. Below is a brief description of the call flow.

Step 1: It is assumed that the OITF established a regular scheduled content session, and that the IPTV Control FE indicated its willingness to receive content Reporting Info Package (through Recv-Info header in SIP 200 OK response to the INVITE). It is assumed that the timer for content reporting is pre-configured.

Step 2: If zapping is performed and stopped for the configured timer or in case of powerup without zapping and the user settled on a channel for the configured timer, the OITF issues a request to the IG for content reporting.

Step 3: The IG validates the request then issues a SIP INFO to the network including the content Reporting Info Package to report the watched content.

Step 4: The ASM forwards the request to the IPTV control FE.

Steps 5-7: The IPTV control FE generates a 200 OK that is proxied all the way to the IG, then from the IG to the OITF it is forwarded in an HTTP 200 OK response.

Step 8: The user performs channel zapping.

Step 9: The user stops zapping and finally settles on a channel for the configured timer.

Step 10: This step reports the watched content and is similar to steps 2-7.

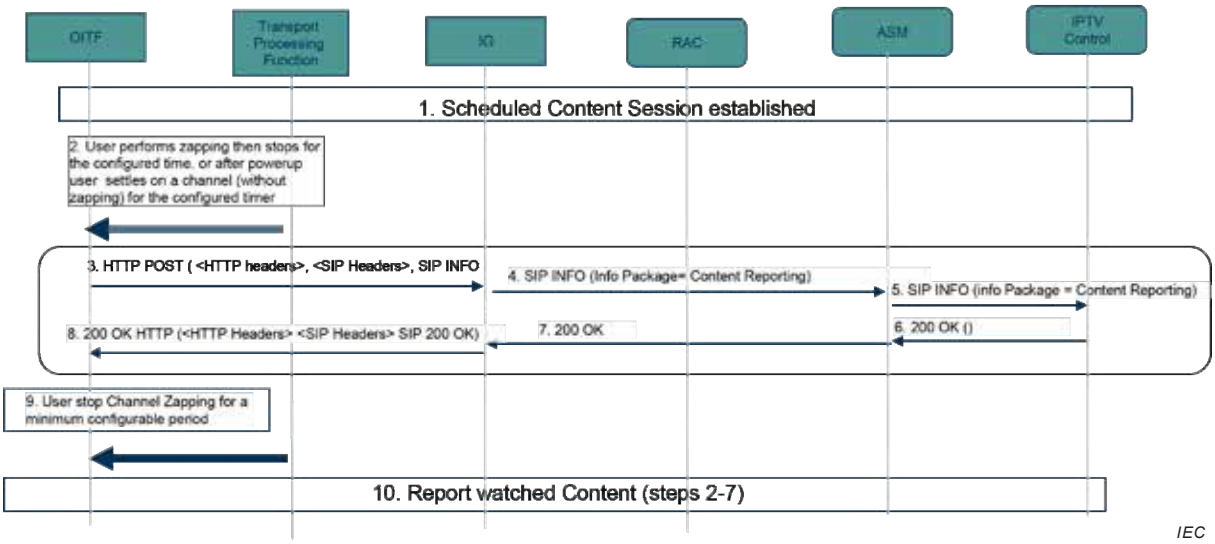

Figure 3 – Content reporting

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4.2.2.2 Management of content reporting

Figure 4 shows a call flow for the management of content reporting. Below is a brief description of the call flow.

Step 1: The OITF established a scheduled content and performs content reporting as required by the IPTV Control FE.

Step 2: The OITF performs content reporting when user performs zapping then stops for the configured time.

Step 3: The OITF issues an HTTP HNI-IG PENDING_IG request to the IG. This request can be issued at any time after step 1.

Step 4: At some point in time, the IPTV control FE decided that it does not want any more content reporting. The IPTV control FE sends a SIP UPDATE with the Recv-Info header set to 'nil' to the ASM to that effect.

Step 5: The ASM forwards the SIP UPDATE to the IG.

Step 6: The IG forwards the SIP UPDATE in an HTTP 200 OK response to the OITF.

Steps 7-9: The OITF issues an HTTP POST request to the IG that includes the SIP 200 OK response. The SIP 200 OK is forwarded all the way to the IPTV control FE.

Step 10: The user performs channel zapping and no content reporting is performed.

Step 11: The OITF issues an HTTP HNI-IGI PENDING_IG request to the IG.

Steps 12-14: These steps request the OITF to start reporting the watched content and are similar to steps 4-6. The difference is that the Recv-Info header is set to content Reporting Info Package.

Steps 15-17: The OITF issues an HTTP POST request to the IG that includes the SIP 200 OK response. The SIP 200 OK is forwarded all the way to the IPTV Control FE.

Step 18: This step reports the watched content. See Figure 4 for the detailed call flow.

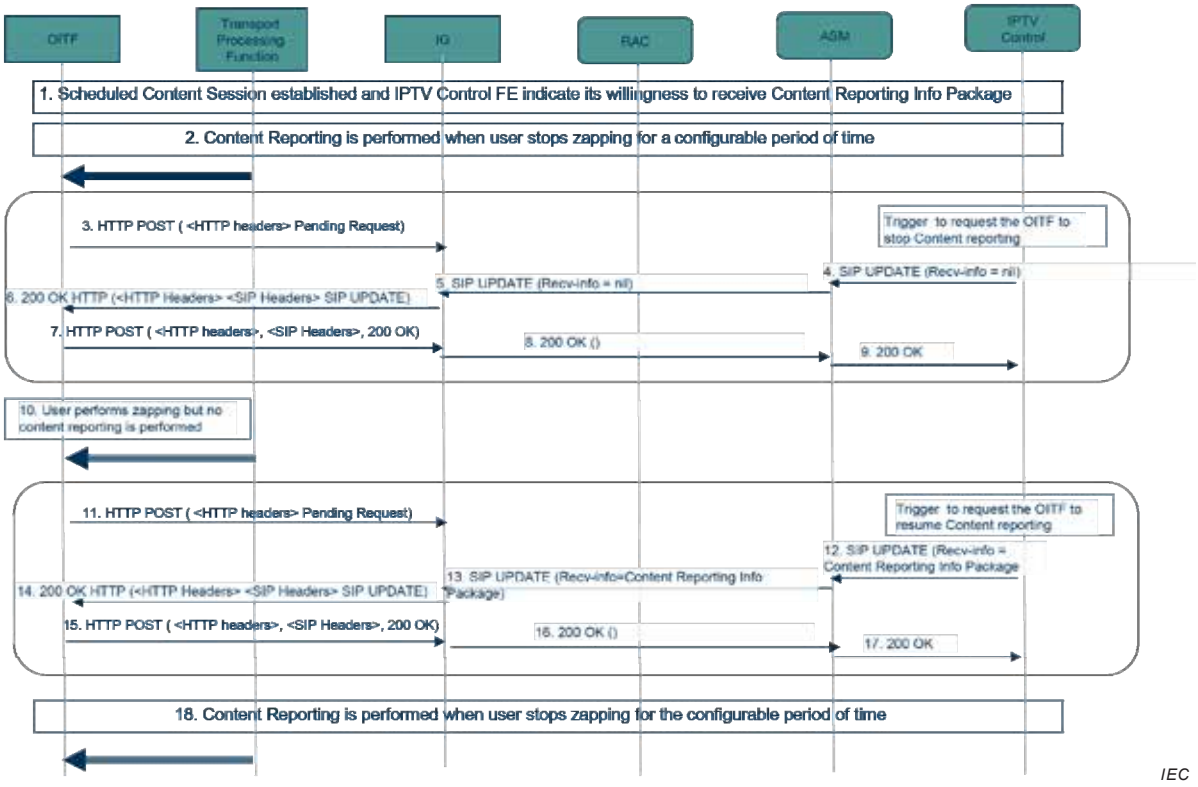

Figure 4 – Management of content reporting

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4.2.3 Purchase of digital media
Purchase request procedure of selected digital media related to the content

Confirmation process: After retrieving and advertising the digital media, users can select the digital media they want to buy. When a user selects one digital media, the OITF pops up a dialog box to let the user confirm the selected digital media for purchase purpose.

Repeat billing check: Before sending the purchase request for digital media, the OITF shall check the user's profile first (in order to avoid repeat billing). If the requested digital media is already recorded in user's profile, the OITF pops up a dialog box to let user know the repeat billing, and then stop sending the purchase request.

If the requested digital media is not recorded in user's profile, the OITF sends the HTTP purchase request to IG, and IG generates a SIP request to IPTV Control FE through ASM FE, and then the IPTV Control FE sends the purchase request (ACR) to Charging FE.

After receiving the purchase response (ACA) from Charging FE, and if the purchase is successful, the IPTV Control FE sends digital Purchase Request to IPTV applications FE to update the user's profile, and then the IPTV applications FE sends the XCAP PUT to IPTV Service Profile FE to update the purchased digital media record.

After receiving the HTTP response sent from IPTV Service Profile FE, the IPTV applications FE sends the response to IPTV Control FE. The IPTV Control FE sends the SIP 200 OK response (with no message body) to IG through ASM FE if purchase request success; otherwise, the IPTV Control FE sends the SIP 403 Forbidden response (the message body is Result-Code that is defined in IETF RFC 3588) to IG through ASM FE. Finally, the IG sends the HTTP 200 OK to OITF with purchase result (it can be either "success" or Result-Code).

Figure 5 shows the purchase request procedure of selected digital media related to the content.

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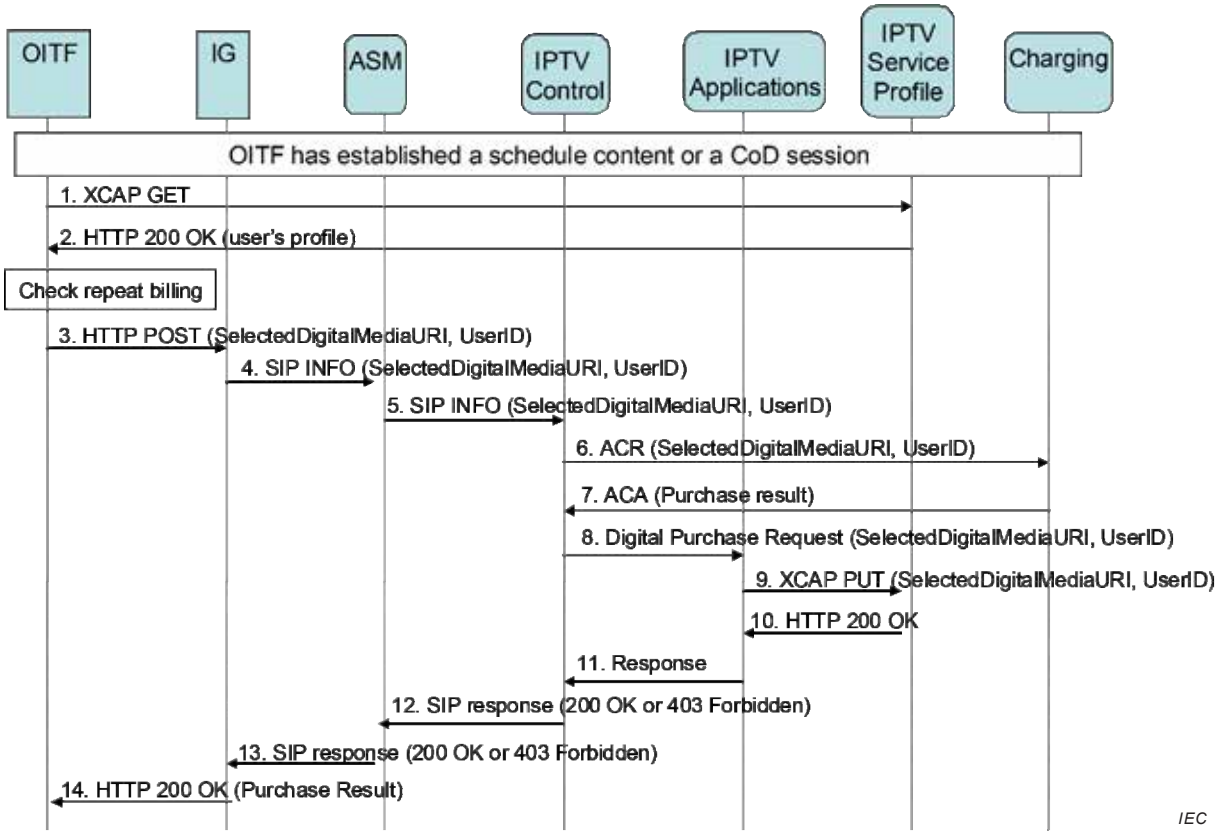

Figure 5 – Purchase request procedure of selected digital media related to the content

Because the purchase request happens in the period of pause during a scheduled content (if supported) or a CoD content, the OITF has already established a session between itself and IPTV Control FE. The SIP INFO will use this established session to transmit information about purchase request. Below is a brief description of the call flow.

Step 1: The OITF sends XCAP GET to IPTV Service Profile FE to get the user's profile about digital media.

Step 2: The IPTV Service Profile FE returns HTTP 200 OK with user's profile to OITF. If the requested digital media is already recorded in user's profile, the OITF needs to pop up a dialog box to let user know the repeat billing, and then stop sending the purchase request.

Step 3: The OITF sends an HTTP POST (with SelecteddigitalmediaURI, UserID) to IG for purchasing selected digital media.

Step 4: The IG sends a SIP INFO Request (with SelecteddigitalmediaURI, UserID) to ASM FE for authentication.

Step 5: The ASM FE forwards the SIP INFO (with SelecteddigitalmediaURI, UserID) to IPTV Control FE for purchase.

Step 6: The IPTV Control FE sends Accounting-Request (ACR) message (with SelecteddigitalmediaURI, UserID) to Charging FE.

Step 7: The Charging FE returns Accounting-Answer (ACA) message with purchase result (success or fail) to IPTV Control FE.

Step 8: The IPTV Control FE sends the digital purchase request (with SelecteddigitalmediaURI, UserID) to IPTV applications FE.

Step 9: The IPTV applications FE issues an XCAP PUT request to IPTV Service Profile FE to update user's profile (adds a SelecteddigitalmediaURI and/or other information). In order to avoid falsifying the information about Purchase of digital media in user's profile cannot be updated by OITF.

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Step 10: The IPTV Service Profile FE returns an HTTP 200 OK to IPTV applications FE.

Step 11: The IPTV applications FE returns a response to IPTV Control FE.

Step 12: The IPTV Control FE returns SIP 200 OK (if purchase request success) or 403 Forbidden including Result-Code (if purchase request failure) to ASM FE.

Step 13: The ASM FE forwards SIP 200 OK (if purchase request success) or 403 Forbidden including Result-Code (if purchase request failure) to IG.

Step 14: The IG sends the HTTP response including purchase result to OITF.

4.2.4 Pay per view

4.2.4.1 General

The PPV stream may be protected, and the key may be retrieved in the PPV subscription procedure.

4.2.4.2 PPV service initiation without existing scheduled content session

4.2.4.2.1 General

Figure 6 shows a typical call flow for watching an initiating PPV service without an existing scheduled content session and the call flow is described in the steps below.

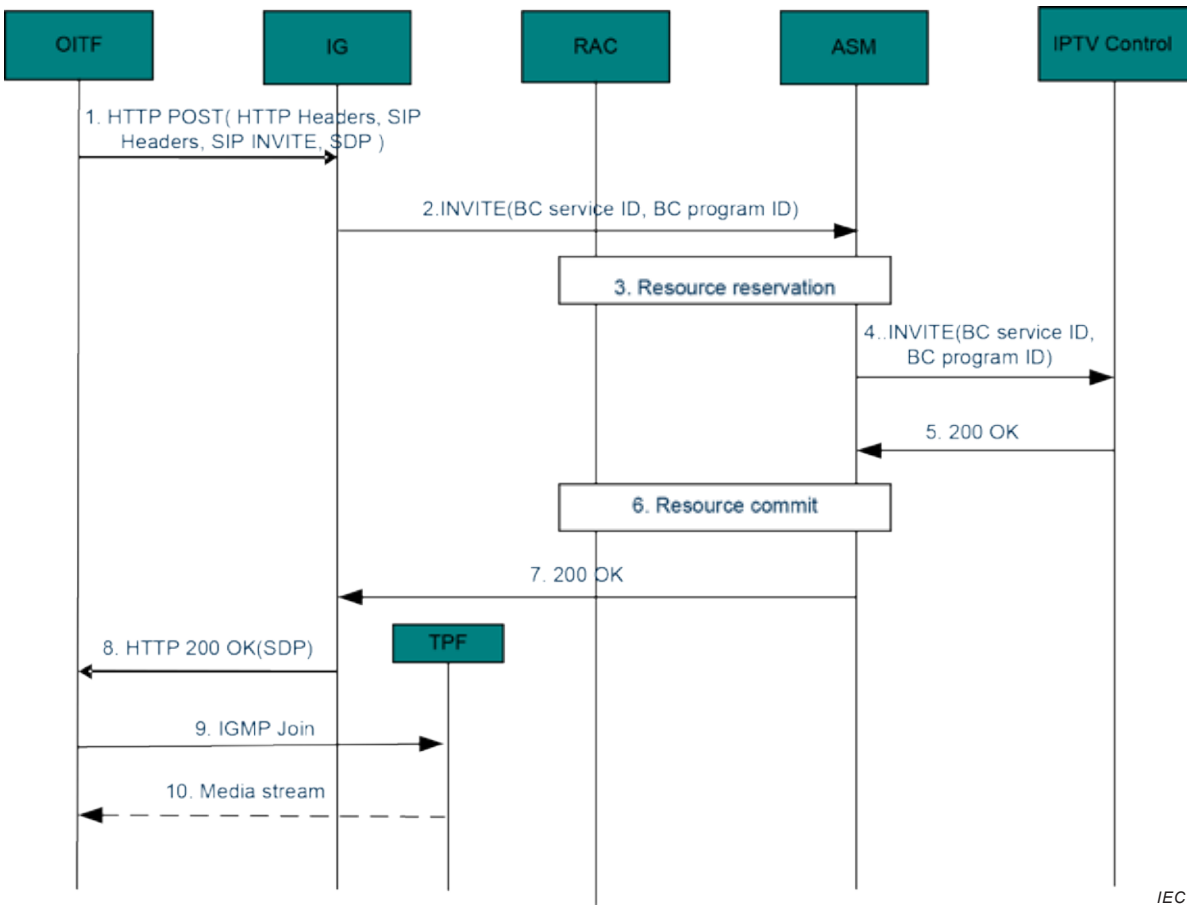

Figure 6 – User-initiated PPV service without existing scheduled content session

Step 1: The OITF sends a HTTP POST to the IG to initiate a PPV session.

Step 2: The IG validates the request and sends an INVITE to the ASM. The ASM uses the services of the "Resource and Admission Control" functional entity to perform resource reservation.

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Step 3: The ASM uses the services of the RAC functional entity to perform resource reservation.

Step 4: The ASM forwards the INVITE to the IPTV Control. Using the BC service ID and BC program ID, the IPTV Control verifies that the user has a PPV subscription. The IPTV Control verifies whether the program has started or not. If the program has started and is encrypted, the IPTV Control may interact with CSP functions directly or through the IPTV application to verify the user entitlements, and then performs the following steps. If the program has started and is not encrypted, the IPTV Control performs the following steps. If the program has not started, the IPTV Control refuses the request.

Step 5: The IPTV Control sends a 200 OK response to the ASM with the bandwidth required for the specific scheduled content channels and other parameters.

Step 6: The ASM instructs the RAC to commit the reserved resources.

Step 7: Finally, a 200 OK for the session setup request is forwarded to the OITF.

Step 8: The IG returns the SDP to the OITF in a HTTP 200 OK response.

Step 9: The OITF issues an IGMP Join request to the transport processing functions to access the multicast channel for the PPV service.

Step 10: The media stream is delivered to the OITF.

4.2.4.2.2 User-initiated switch from PPV service to a scheduled content service

The user initiates a switch from the PPV service to a regular scheduled content.

If the scheduled content service is inside the set of channels negotiated at PPV session initiation, the OITF shall send an IGMP Leave request to stop watching the PPV service, and send an IGMP Join request to join the scheduled content service.

If the scheduled content service is outside the set of channels negotiated at PPV session initiation, the OITF shall initiate a scheduled content Session Modification request as described in IEC 62766-4-1.

4.2.4.2.3 User-initiated switch from regular scheduled content to PPV service

The user initiates a switch from the regular scheduled content to a PPV service.

The OITF shall initiate a PPV Session Modification request as described in IEC 62766-4-1.

4.2.4.3 User-initiated PPV service switched from the scheduled content service

4.2.4.3.1 General

Figure 7 shows a typical call flow for watching a PPV service switched from the scheduled content service initiated by the user.

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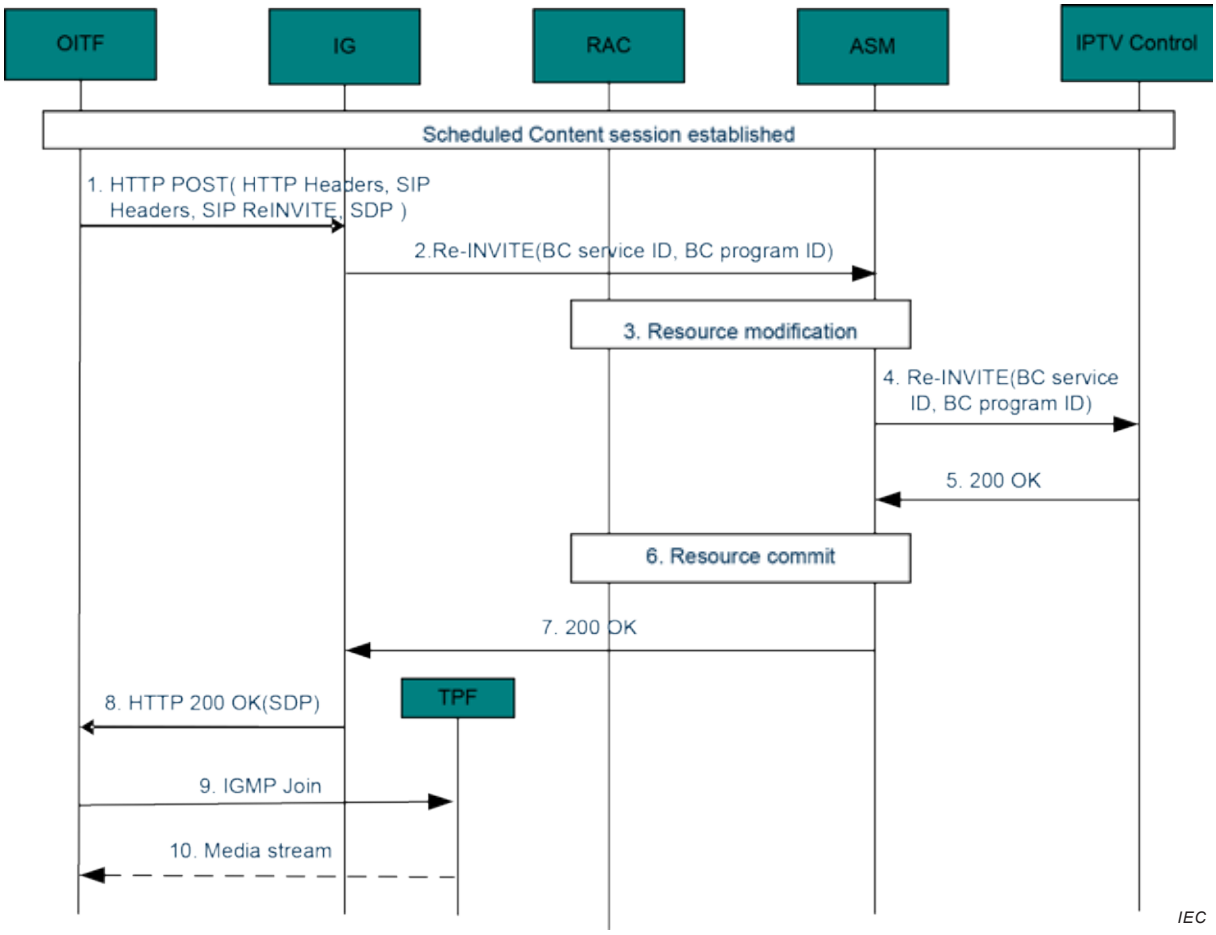

Figure 7 – User-initiated PPV service switched from the scheduled content service

It is assumed that the user has established a scheduled content session. When the user switches from the scheduled content service to a PPV service, the OITF shall send a HTTP POST to the IG to modify the scheduled content session to a PPV session.

4.2.4.3.2 User-initiated switch from PPV service to a scheduled content service

The user initiates to switch from PPV service to a regular scheduled content.

If the scheduled content service is inside the set of channels negotiated at PPV session initiation, the OITF shall send an IGMP Leave request to stop watching the PPV service, and send an IGMP Join request to join the scheduled content service.

If the scheduled content service is outside the set of channels negotiated at PPV session initiation, the OITF shall initiate a scheduled content Session Modification request as described in IEC 62766-4-1.

4.2.4.3.3 User-initiated switch from a PPV service to another PPV service

The user initiates to switch from a PPV service to another PPV service.

The OITF shall initiate a PPV session modification request as described in IEC 62766-4-1.

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4.2.5 Network-based scheduled content time shift

4.2.5.1 User Activation for scheduled content time shift

Figure 8 shows a call flow for an IPTV end-user activating a scheduled content time shift. Below is a brief description of the call flow (the procedure assumes that the scheduled content to be time shifted is recorded in the network, and is thus available for time shifting).

Step 1: It is assumed that the OITF successfully established a scheduled content session.

Step 2: The activation of time shift procedure can be triggered by the user, through a menu selection, invoking the time shift option.

Step 3: The OITF issues a request to the IG to activate the scheduled content time shift.

Step 4: The IG validates the request then issues a SIP re-INVITE to the network.

Step 5: The ASM performs initial resource modification as per the incoming request.

Step 6: The ASM forwards the re-INVITE to the IPTV Control FE.

Step 7: The IPTV Control FE performs the necessary validation as per IEC 62766-4-1.

Steps 8-18: These steps show how the unicast session is established.

Step 19: The IG forwards the SIP 200 OK to the OITF in an HTTP 200 OK response.

Step 20: The OITF issues an HTTP POST request to send an ACK.

Steps 21-24: The ACK is propagated to the IPTV Control server FE.

Step 25: The OITF can deploy RTSP media control commands to start streaming the unicast content.

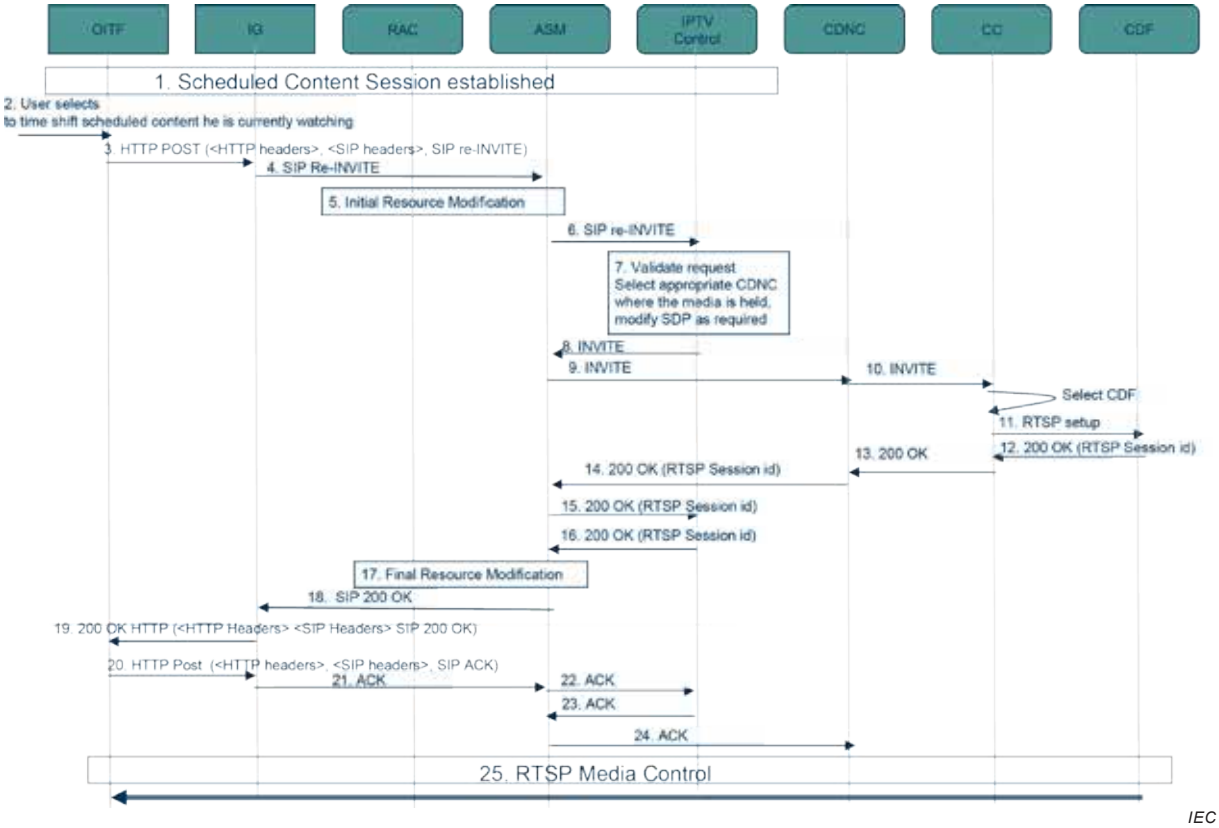

Figure 8 – IPTV end-user activation of scheduled content time shift

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4.2.5.2 User deactivation for scheduled content time shift

Figure 9 shows a call flow for an IPTV end-user initiating a deactivation of a scheduled content time shift. Below is a brief description of the call flow:

Step 1: It is assumed that the OITF is successfully streaming a unicast session representing a time shifted scheduled content.

Step 2: The procedure can be triggered by the user, through a menu selection, invoking the deactivation of the time shift option.

Step 3: The OITF issues a request to the IG to activate the scheduled content time shift.

Step 4: The IG validates the request then issues a SIP re-INVITE to the network.

Step 5: The ASM performs initial resource modification as per the incoming request.

Step 6: The ASM forwards the re-INVITE to the IPTV Control FE.

Step 7: The IPTV Control FE performs the necessary validation as per IEC 62766-4-1.

Steps 8-18: These steps show how the unicast session is terminated.

Step 19: The IG forwards the SIP 200 OK to the OITF in an HTTP 200 OK response.

Step 20: The OITF issues an HTTP POST request to send an ACK.

Steps 21-24: The ACK is propagated to the IPTV Control server FE.

Step 25: OITF can issue an IGMP JOIN to join the multicast address for the last viewed channel.

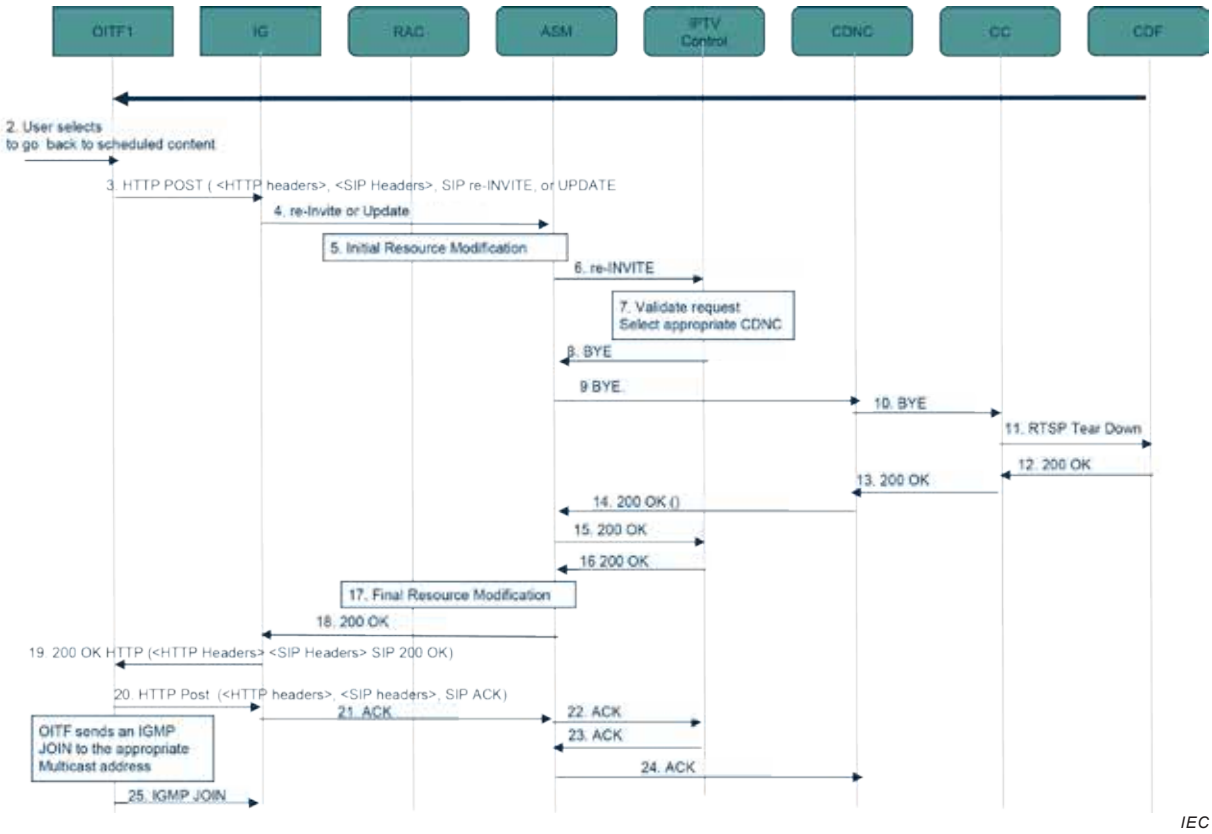

Figure 9 – IPTV end-user deactivation of scheduled content time shift

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4.2.6 What is on TV service

Figure 10 shows a call flow for a user, with parental control authority, acquiring information related to the content being streamed on an OITF, watched by another user under the parental supervision of the request originator. Below is a brief description of the call flow.

Steps 1-4: These steps are optional and show how the IPTV control FE may store state information to support the feature. Optionally this storage may be on the presence server. The rest of the call flow describes this option.

Step 5: The OITF issues an HTTP POST request to subscribe to the Parental Control Watched content event.

Step 6: The IG validates the request then issues a SIP SUBSCRIBE to the network.

Step 7: The ASM forwards the request to the IPTV control FE.

Steps 8-11: The IPTV control FE validates that the user is allowed to access the requested information. If successful, steps 8-10 are optional and are implemented only if the IPTV control FE uses presence to support the feature as per IEC 62766-1-4.

Step 12: The IPTV control FE generates a SIP 200 OK if the user is allowed access to requested information or proxies the received 200 OK from the presence server if steps 8-11 are performed. The SIP 200 OK response is sent to the ASM.

Step 13: The ASM proxies the SIP 200 OK response to the IG.

Step 14: The IG returns the SIP 200 OK to the OITF in an HTTP 200 OK response.

Step 15: The OITF issues an HTTP HNI-IGI PENDING_IG request to the IG in anticipation of the incoming SIP NOTIFY.

Steps 16-17: These steps are implemented only if the IPTV control FE uses presence per steps 1-4. In these steps, the SIP NOTIFY including the requested information is sent to the IPTV control FE via the ASM.

Step 18: If presence is not used to support this feature, the IPTV control FE generates the SIP NOTIFY, otherwise the received NOTIFY from the presence server is proxied to the ASM.

Step 19: The ASM proxies the SIP NOTIFY to the IG.

Step 20: The IG forwards the SIP NOTIFY in an HTTP 200 OK response to the OITF.

Steps 21-23: The OITF issues an HTTP POST request to the IG that includes the SIP 200 OK response. The SIP 200 OK is forwarded all the way to the IPTV control FE.

Steps 24-25: These steps are optional if presence is used to support the feature.

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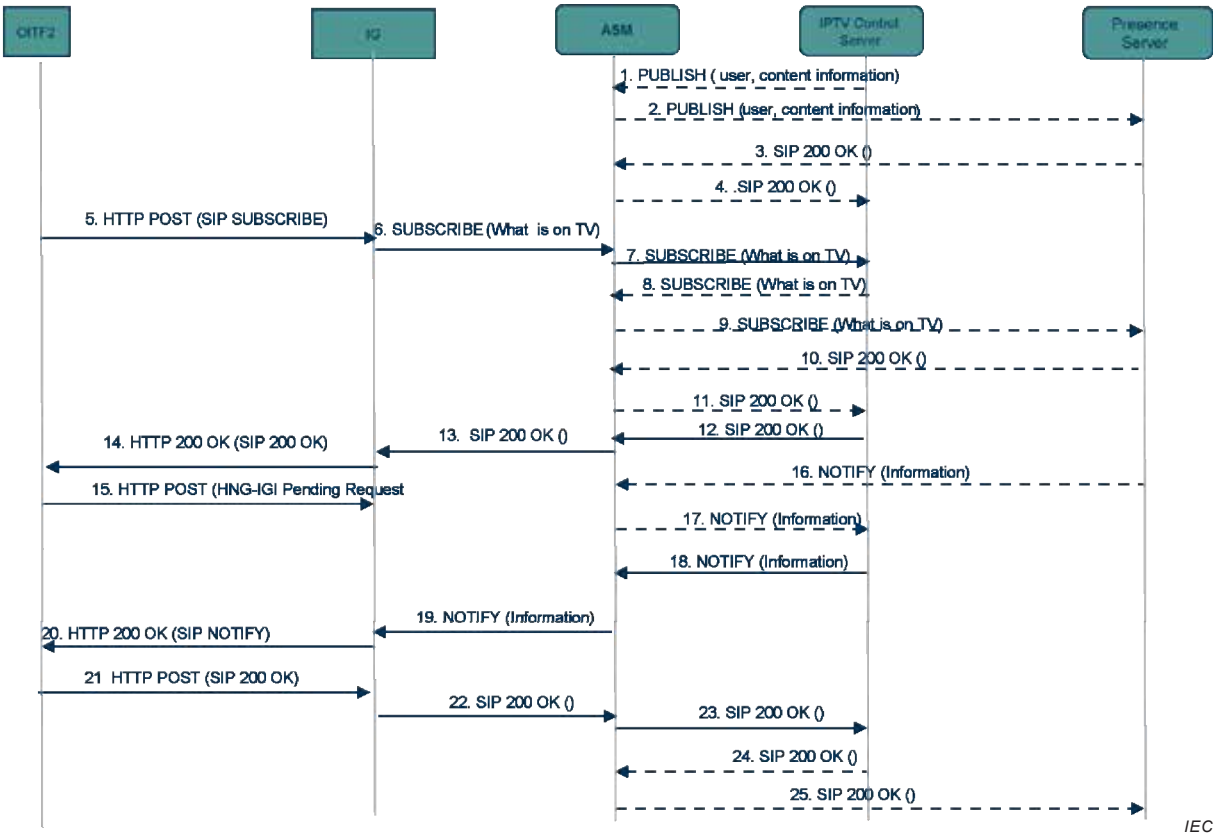

Figure 10 – Acquiring information on content streamed on an OITF

4.2.7 What is on TV service – SMS initiated

Figure 11 shows a call flow for a user, with parental control authority, acquiring information related to the content being streamed on an OITF, watched by another user under the parental supervision of the request originator. Below is a brief description of the call flow.

Step 1: The end-user through his cellular device issues a text message to the MSISDN (or short code) associated with IPTV application AS supporting the parental control feature to query what content is being watched by another user. The MSISDN (or short code) for this service is allocated by the SP and is given to subscribers who subscribe to this service. The content of the text message is implementation specific.

Step 2: The message is routed through the cellular network to the notification AS which implements the network side Parlay X SMS Web Service Interfaces specified in 3GPP TS 29.199-4.

Step 3: The notification AS notifies the SMS reception to the IPTV AS which implements the application side Parlay X SMS Web Service Interfaces. The delivery of SMS reception is done by invoking the NotifySMSReception operation in Smsnotification Web Service Interface exposed by the IPTV AS.

Step 4: The IPTV AS sends a request to the IPTV Control FE to query the content being watched by another user. This interface is implementation specific.

Steps 5-8: The IPTV Control FE authorizes the request. Request authorization can be achieved if the calling subscriber is validated to be the parental control authority for the incoming request. If the request is authorized then steps 5-8 are performed only if the IPTV Control FE uses the presence server for storing watched content by an OITF. In the case where a presence mechanism is used, an extension of the Presence Information Data Model is needed which is vendor specific. Other means are possible but are not described in this specification.

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Step 9: The IPTV control FE returns to the IPTV AS the requested information in a response. This interface is implementation specific. Note that the IPTV Control FE may return the requested information per request, or based on a preconfigured time interval, or continuously until the stop request is received, etc.

Step 10: The IPTV AS invokes the SendSms operation in SendSms Web Service Interface exposed by the notification AS.

Steps 11-12: The message is delivered to the cellular device through the cellular network.

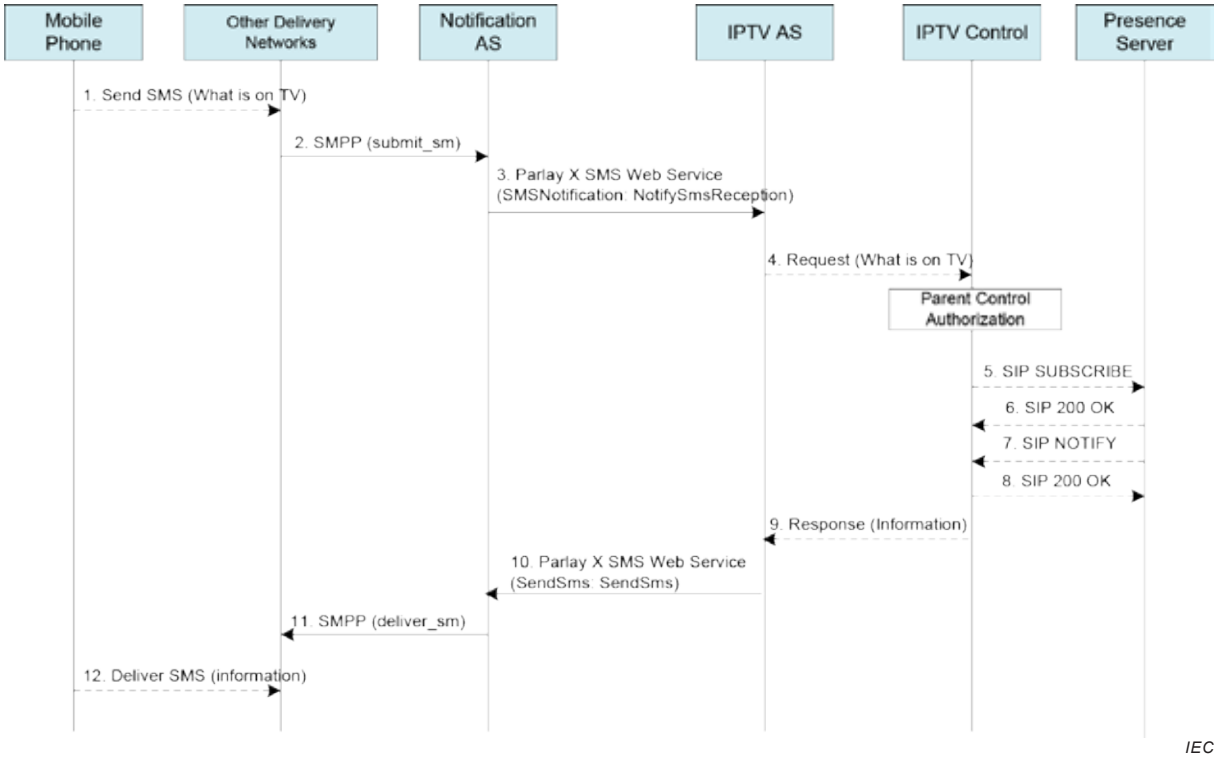

Figure 11 – Call flow for an SMS initiated parental control request

4.2.8 Parental control for scheduled content sequences

Figure 12 shows a detailed call flow which takes the channel change as an example for the parental control command. The following is a brief description of the steps.

Step 1: The child is watching a scheduled content program as described in IEC 62766-4-1.

Step 2: The parent retrieves information related to the watched scheduled content as described in 4.2.6.

Step 3: The parent decides to block the content being watched by the child. The OITF issues a request to the IG as described in IEC 62766-4-1 and includes the following parameters:

- PC-Command: the command for parental control, e.g. channel change, session teardown.
- PC-ChannelChangedTo: When the PC-Command is channel change, the PC-ChannelChangedTo may be included. It indicates the new channel to change to.
- PC-contentControlled: the identifier of the content being blocked by the controller. For scheduled content, it shall be the BC service ID. Controlling content on Demand is for future study.

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Step 4: The IG validates the request and issues a SIP MESSAGE to the ASM as described in IEC 62766-4-1.

Steps 5-7: The ASM routes the SIP MESSAGE to the IPTV Control Function which validates the MESSAGE and checks whether the initiator has the right to perform Parental Control on the other user. Then the IPTV Control function forwards the SIP MESSAGE to the ASM as described in IEC 62766-4-1. The ASM routes the SIP MESSAGE to the OITF of the controlled user.

Steps 8-10: Upon receiving the SIP MESSAGE, the OITF of the controlled user implements the command according to the PC-Command as described in IEC 62766-4-1.

Steps 11-16: The response to the SIP MESSAGE is sent from the OITF of the controlled user to the OITF of the controller via the IG, ASM and IPTV Control Function.

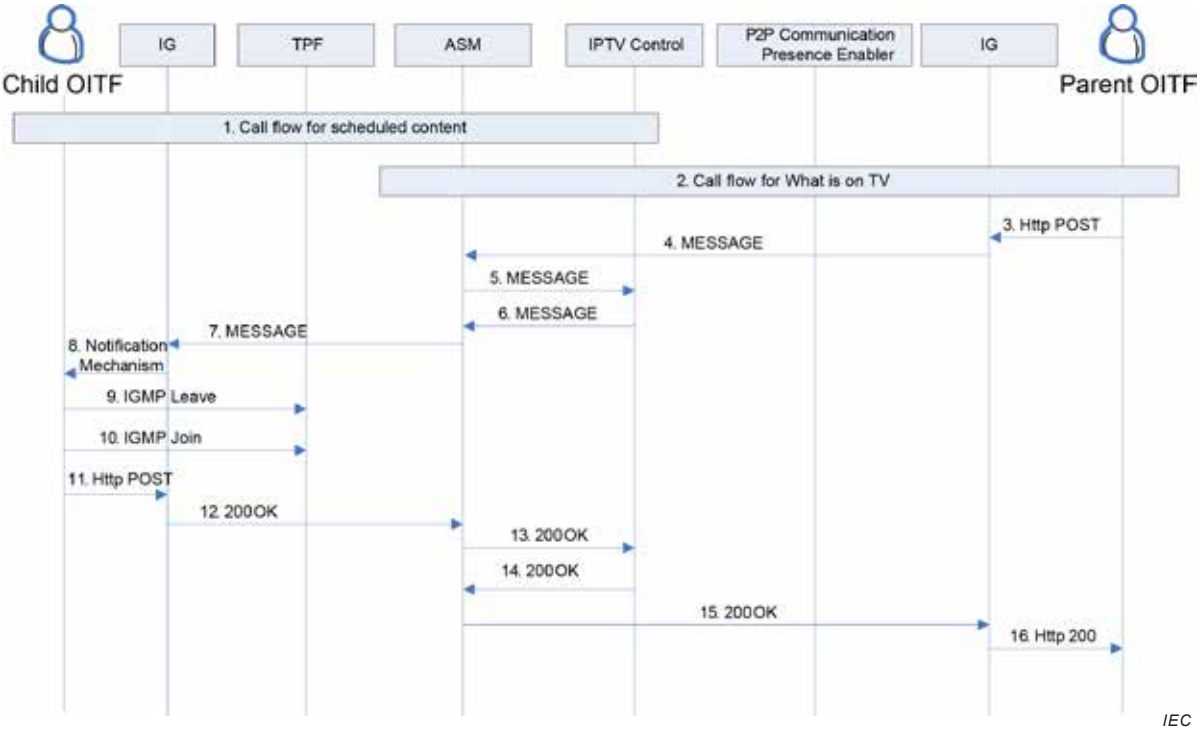

Figure 12 – Procedure for parental control command to change channels

4.2.9 Network-based user notification services

4.2.9.1 Native HNI-IGI (IMS) based user notification setup request

Figure 13 shows a call flow for a user setting up a notification request. Below is a brief description of the call flow.

Step 1: It is assumed that user is interacting with the EPG and made a selection for a notification request for one of the services offered by the service provider. This could include a broadcast reminder, or services related to recorded content requested by the user.

Step 2: The OITF issues an HTTP POST request to the IG to request the service.

Step 3: The IG validates the request then issues a SIP MESSAGE to the network.

Steps 4-5: The Messaging AS validates the request then forwards the request to the IPTV Control FE via the ASM.

Step 6: The IPTV Control FE validates the request then issues a store request to the appropriate IPTV application.

Step 7: The IPTV application validates the included schema, then issues an XCAP PUT request to the IPTV service profile.

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Step 8: The IPTV service profile returns an HTTP 200 OK to the IPTV AS.

Step 9: The IPTV AS returns a response to the IPTV control FE.

Steps 10-13: The IPTV control FE generates a SIP 200 OK that reaches the IG via the ASM.

Step 14: The IG returns the SIP 200 OK to the OITF in an HTTP 200 OK response.

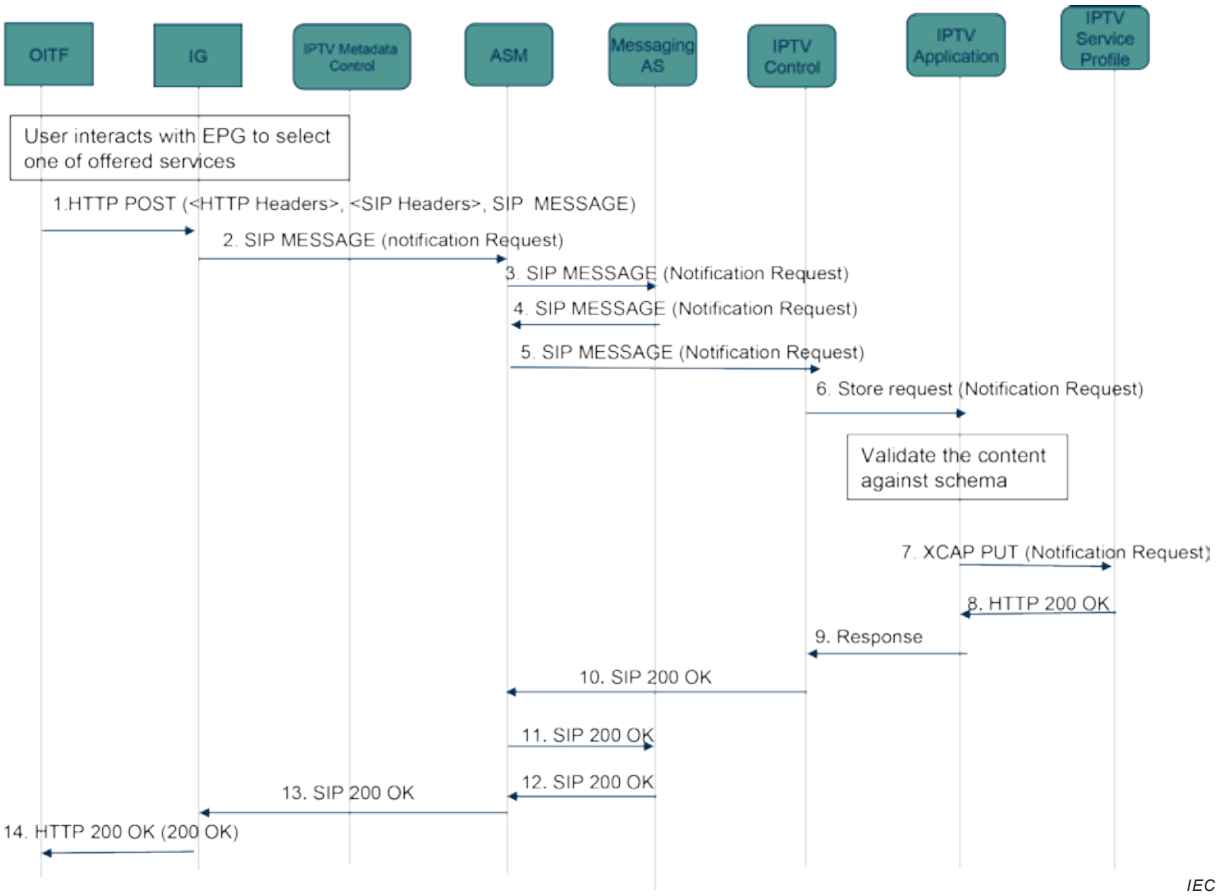

Figure 13 – IMS-based user notification setup request

4.2.9.2 DAE-based user notification setup request

Figure 14 shows a call flow for a DAE-based user notification setup request. Below is a brief description of the call flow.

It is assumed that user is interacting with the EPG and made a selection for a notification request for one of the services offered by the service provider. This could include a broadcast reminder, or services related to recorded content requested by the user.

Step 1: The OITF sends an HTTP PUT to the IPTV application to submit the notification setup request.

Step 2: The IPTV application authorizes and validates the request. Upon successful completion of the above, it sends an XCAP PUT request to the IPTV service profile to store the request.

Step 3: The response is returned by the IPTV service profile in an HTTP 200 OK response.

Step 4: The IPTV application in turn returns the response to the OITF in an HTTP 200 OK response.

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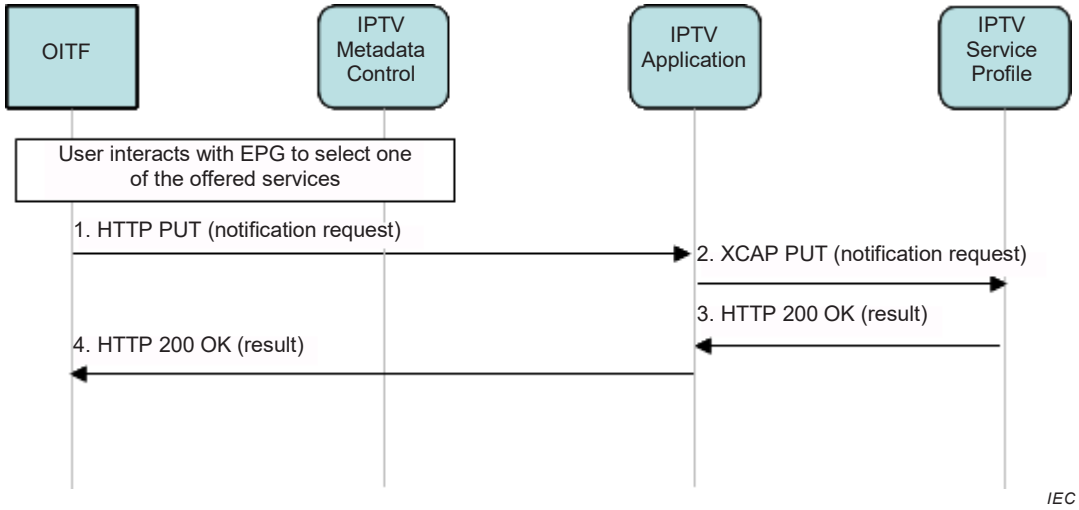

Figure 14 – DAE-based user notification setup request

4.2.9.3 Native HNI-IGI update of pending notification requests

Figure 15 shows an IMS-based call flow for updating pending user notification requests.

Below is a brief description of the call flow.

Step 1: The OITF issues an XCAP GET request to the IPTV service profile to fetch all outstanding notification requests.

Step 2: The IPTV service profile returns the requested data in an HTTP 200 OK response.

Step 3: The user performs the necessary modification.

Step 4: The OITF issues an XCAP PUT request to the IPTV service profile to store the updated the list of pending notification requests.

Step 5: The IPTV service profile updates the IPTV Control FE in regard to the changes to the list of pending notification requests.

Step 6: The IPTV Control FE sends a update request to the IPTV application so it can update its state.

Step 7: The IPTV application updates its internal state.

Step 8: The IPTV application then acknowledges the request to the IPTV Control FE.

Step 9: The IPTV Control FE acknowledges the request to the IPTV Service profile.

Step 10: The IPTV Service Profile returns an HTTP 200 OK response to the OITF.

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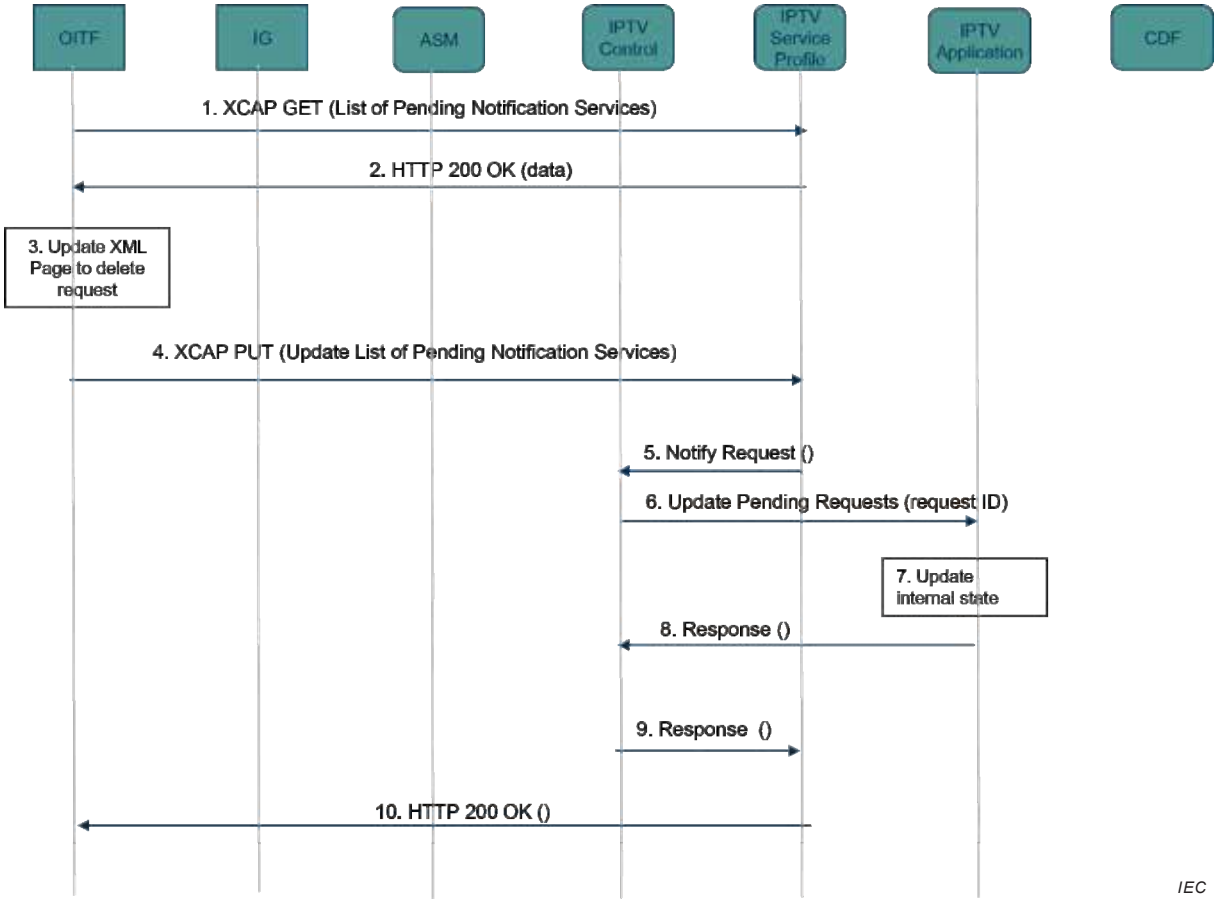

Figure 15 – IMS-based update of pending notification requests

4.2.9.4 DAE-based update of pending notification requests

Figure 16 shows a DAE-based call flow to update pending user requests.

Below is a brief description of the call flow.

Step 1: The OITF issues an HTTP GET request to the IPTV application service profile to fetch all outstanding notification requests.

Step 2: The IPTV application validates and authorizes the request. Upon successful completion of the above, it sends an XCAP GET request to the IPTV service profile to store the request.

Step 3: The response is returned by the IPTV service profile in an HTTP 200 OK response.

Step 4: The IPTV application in turn returns the response to the OITF in an HTTP 200 OK response.

Step 5: The user performs the necessary modification.

Step 6: The OITF issues an HTTP PUT request to the IPTV application service profile to update pending notification requests.

Step 7: The IPTV application validates and authorizes the request. Upon successful completion of the above, it updates its internal state.

Step 8: Following that, the IPTV application sends an XCAP PUT request to the IPTV service profile to store the updated pending requests.

Step 9: The response is returned by the IPTV service profile in an HTTP 200 OK response.

Step 10: The IPTV application in turn returns the response to the OITF in an HTTP 200 OK response.

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