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Technical Specification

3rd Generation Partnership Project; Technical Specification Group Core Network and Terminals; End-to-end Quality of Service (QoS) signalling flows (Release 6)



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3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

<http://www.3gpp.org>

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present specification gives examples of QoS signalling flows for resource reservation to provide end-to-end QoS. The flows are used as bases of developing QoS related protocol descriptions for new and existing specifications.

The present specification adds detailed flows of Service Based Local Policy (SBLP) procedures over the Go and Gq interfaces and their relationship with the bearer level signalling flows over the Gn interface.

The calls flows depicted in this Technical Specification represent usual cases, i.e. not all situations are covered. Detailed information provided in TS 29.207 [7] shall be taken into consideration.

The present specification also describes the mapping of QoS parameters among SDP, UMTS QoS parameters, and QoS authorization parameters.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 24.228: "Signalling flows for the IP multimedia call control based on SIP and SDP; Stage 3".
- [3] 3GPP TS 24.229: "IP Multimedia Call Control Protocol based on SIP and SDP; Stage 3".
- [4] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".
- [5] 3GPP TS 26.234: "End-to-end transparent streaming service; Protocols and codecs".
- [6] 3GPP TS 26.236: "Packet switched conversational multimedia applications; Transport protocols".
- [7] 3GPP TS 29.207: "Policy control over Go interface".
- [8] 3GPP TS 23.107: "Quality of Service (QoS) concept and architecture".
- [9] IETF RFC 2327: "SDP: Session Description Protocol".
- [10] IETF RFC 3556: "Session Description Protocol (SDP) Bandwidth Modifiers for RTP Control Protocol (RTCP) Bandwidth".
- [11] IETF RFC 3264: "An Offer/Answer model with the Session Description Protocol (SDP)".
- [12] 3GPP TS 29.209: "Policy control over Gq interface".
- [13] IETF RFC 3388: "Grouping of Media Lines in the Session Description Protocol (SDP)".
- [14] IETF RFC 3524: "Mapping of Media Streams to Resource Reservation Flows".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and in 3GPP TS 29.207 [7] apply.

3.2 Abbreviations

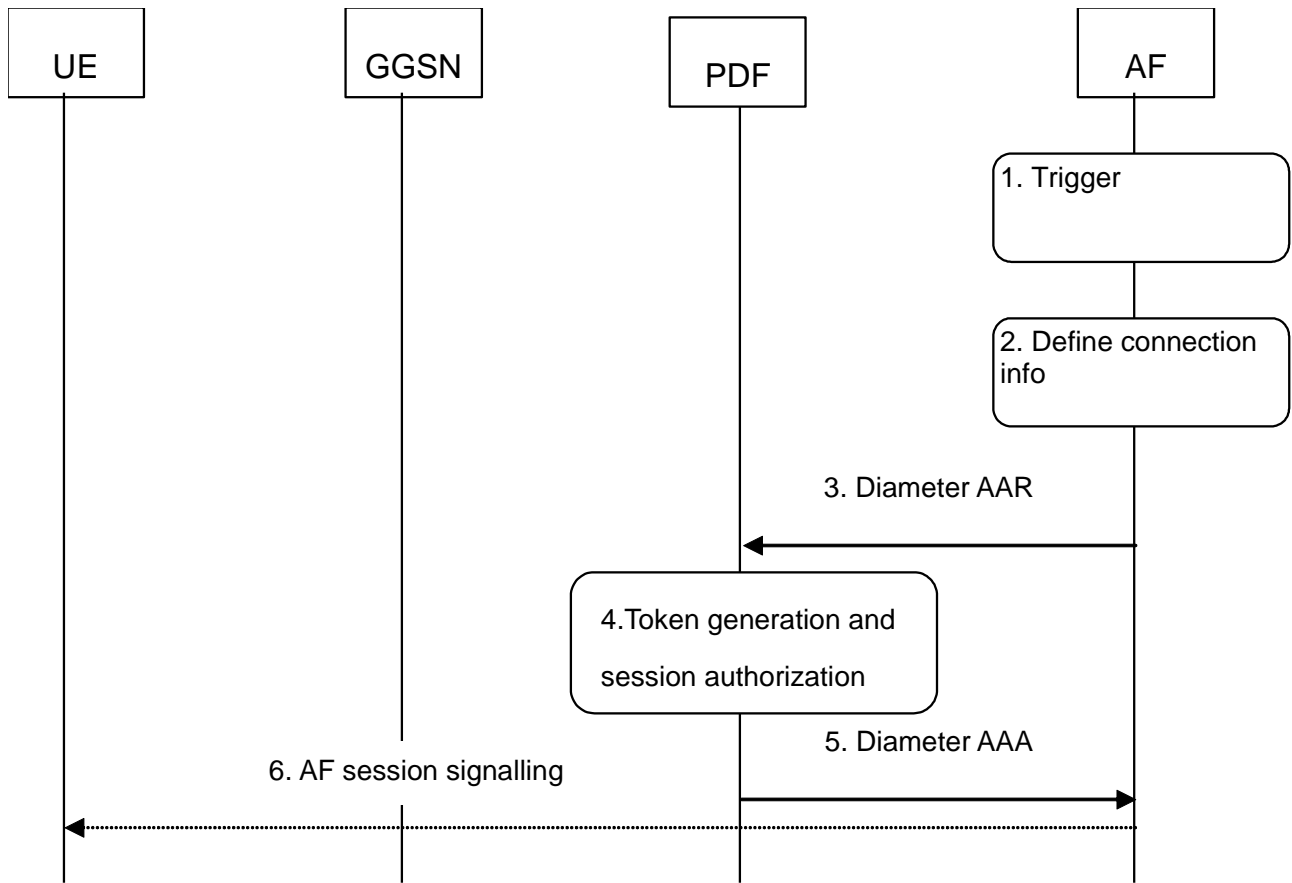
For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply:

AF	Application Function
COPS	Common Open Policy Service protocol
DEC	COPS DECision message
DRQ	COPS Delete ReQuest state message
IMS	IP Multimedia CN Subsystem
PDF	Policy Decision Function
REQ	COPS REQuest message
RPT	COPS RePorT state message
SBLP	Service Based Local Policy

4 Authorize QoS resources

4.1 Authorize QoS resources at AF session establishment

This clause covers the Authorize QoS resources procedure to be used when an AF session is established.



Legend:

- ▶ Mandatory
- - - - -▶ Optional

1. The AF receives an internal or external trigger to set up a new AF session.
2. The AF may identify the connection information needed (e.g. IP address of the IP flow(s), port numbers to be used etc...).
3. The AF requests the authorization token from the PDF by sending a Diameter AAR for a new Diameter session. The AF may instruct the PDF to request the full service information from the AF at resource reservation. The AF may also forward the part of or the entire service information at this stage in order to define the QoS resource authorisation.
4. The PDF authorizes the possibly received service information. The PDF generates the Authorization Token.
5. An authorization token is sent to the AF.
6. The Authorization token may be passed to the UE within AF session signalling.

Figure 4.1: Authorize QoS resources at session establishment

4.2 Authorize QoS resources at AF session modification

This clause covers the Authorize QoS resources procedure at AF session modification.

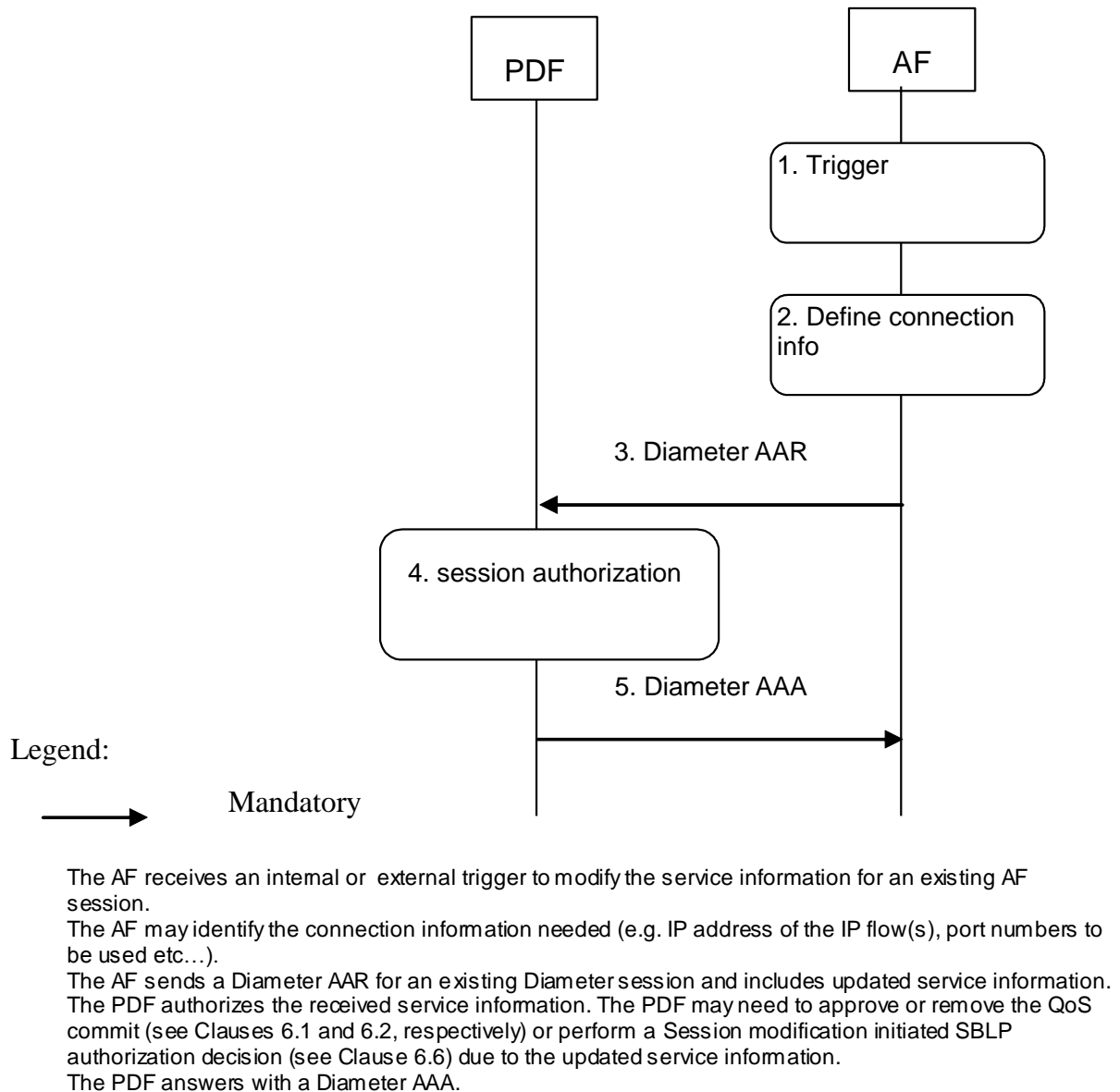
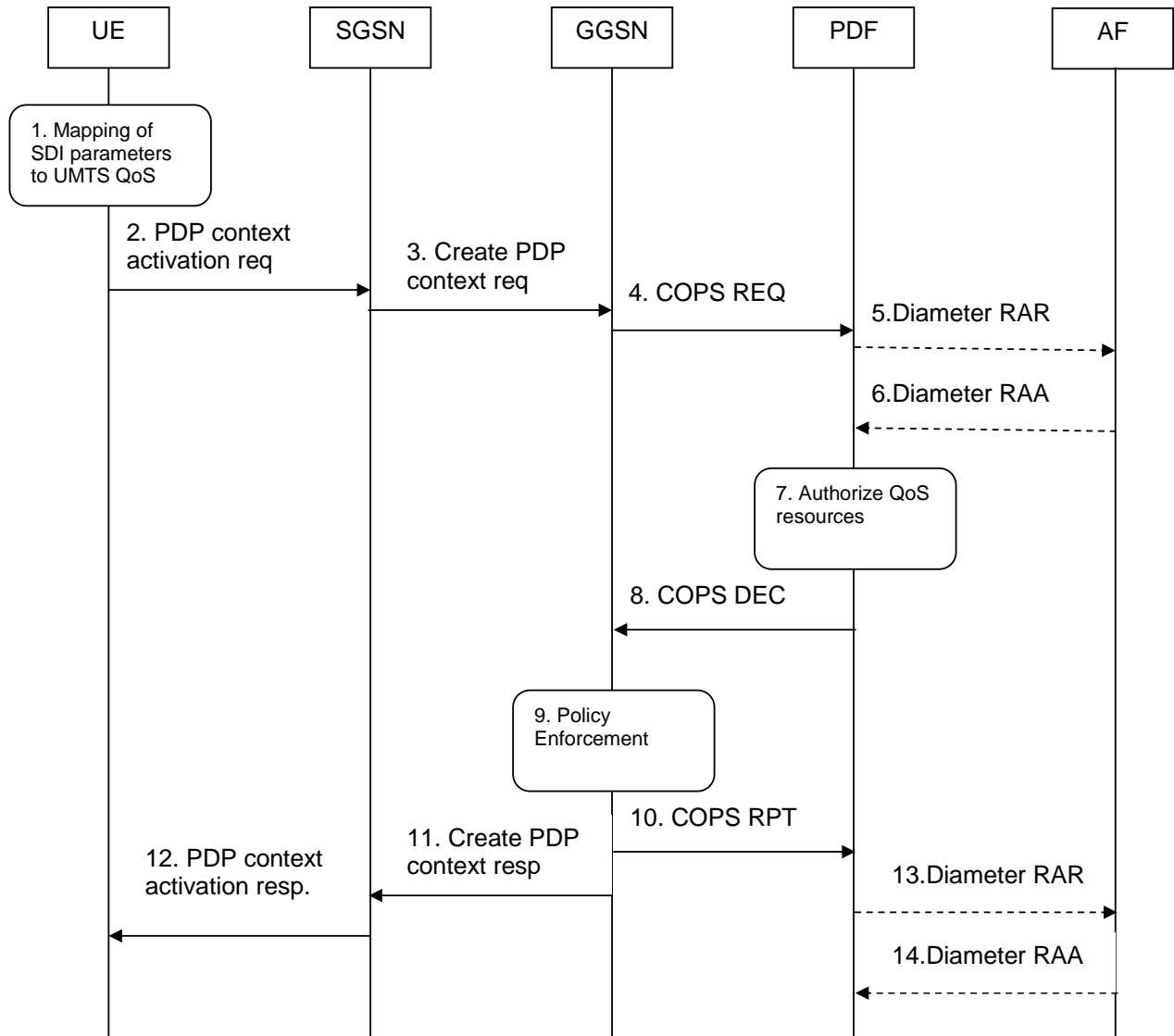


Figure 4.2: Authorize QoS resources at AF session modification

5 Resource reservation flow with Service-based local policy

This clause describes a resource reservation flow with service based local policy. The service based local policy is done via exchange of information through the Go and Gq interfaces. The Go and Gq interfaces allow the service based local policy and QoS interworking information to be requested by the GGSN from a PDF and the AF.



Legend:
 -----> Optional
 -----> Mandatory

1. The UE may use SDI or application specific settings in order to define the UMTS QoS parameter needed to request a PDP context.
2. The UE sends a PDP context activation request to the SGSN. The UE shall include binding information in the PDP context activation message to associate the PDP context bearer with policy information.
3. The SGSN carries out the procedures identified in 3GPP TS 23.060 [4] related to the PDP context activation and sends a Create PDP context request to the GGSN.
4. The GGSN receives the PDP context activation request with the binding information. The GGSN uses the authorisation token in order to localise the PDF. The GGSN sends a COPS REQ message to the PDF and includes the binding information.
5. A PDF generated authorization token enables the PDF to identify the authorisation status information. The PDF sends an authorisation request to that AF, if instructed by the AF in the initial authorisation request from the AF.
6. If step 5 happens, the AF sends the service information to the PDF.
7. The PDF performs the authorization decision.
8. The decision taken by the PDF is returned via the COPS DEC message. The DEC message includes the policy information to be used by the GGSN in order to perform the policy-based admission control.
9. The GGSN enforces the PDF policy decision on the IP flows based on the received authorization information from the PDF for the media components carried by the PDP context.
10. The GGSN sends COPS RPT message back to the PDF and reports its success or failure in carrying out the PDF decision.

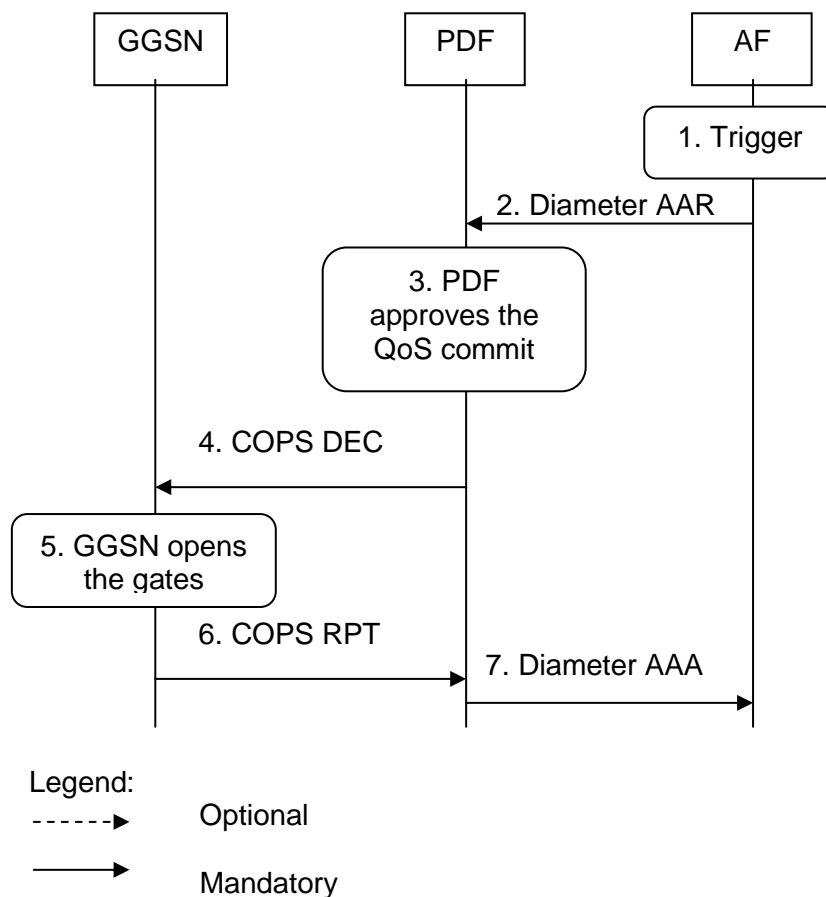
11. The GGSN accepts the PDP context request based on the results of the authorisation policy decision enforcement. If the requested QoS parameters are not within the authorized QoS, the GGSN downgrades the requested UMTS QoS parameters.
12. The SGSN sends an Activate PDP Context Accept message to the UE indicating that the PDP context has been activated and that the QoS requirements have been authorized for both downlink and uplink.
13. The PDF may send an indication for the successful bearer establishment, which contains the received GPRS charging information to the AF.
14. If step 13 happens, the AF sends an answer back to the PDF.

Figure 5.1: Resource reservation flow with service based local policy

6 Other flows over Go and Gq interfaces

6.1 Approval of QoS commit

Through the Approval of QoS Commit procedure the PDF makes a final decision to enable the allocated QoS resource for the authorized IP flows of the media component (s) if the QoS resources are not enabled at the time they are authorized by the PDF, or if previously disabled IP flow(s) or media components are resumed.

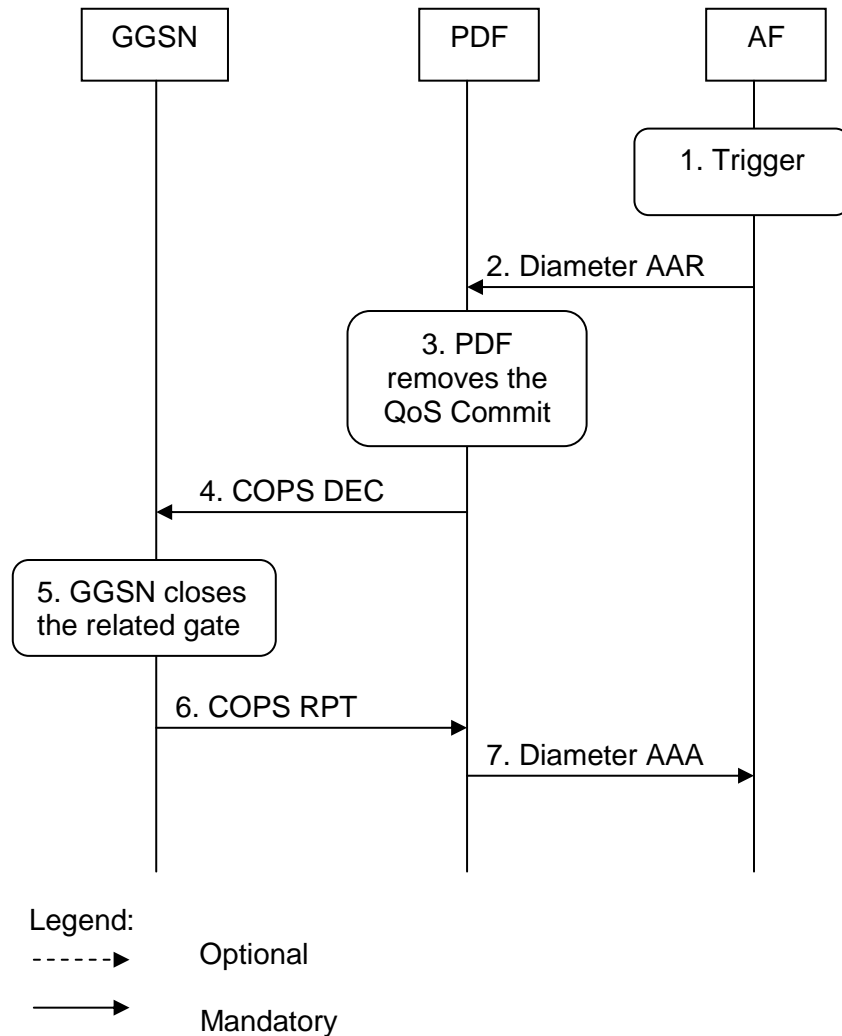


1. The AF receives an internal or external trigger.
2. The AF sends a Diameter AAR to the PDF, requesting that gates shall be opened.
3. The PDF approves the QoS Commit.
4. The PDF sends COPS DEC message(s) to the GGSN to open the 'gates' e.g. enable the use of the authorised QoS resources.
5. The GGSN receives the COPS DEC message(s) and opens the 'gates' e.g. enables the use of the authorised QoS resources.
6. The GGSN sends COPS RPT message(s) back to the PDF.
7. The PDF sends a Diameter AAA to the AF. This may trigger further actions in the AF.

Figure 6.1.1: Approval of QoS Commit

6.2 Removal of QoS commit

The "Removal of QoS commit" procedure is used when the AF decides to disable IP flow(s) or media component(s), e.g. when a session is released and the related IP flows are removed from a PDP context that multiplexes IP flows from several sessions.



1. The AF receives an internal or external trigger to disable the flow.
2. The AF sends a Diameter AAR to the PDF, requesting that gates shall be closed.
3. The PDF removes the QoS Commit.
4. The PDF sends the COPS DEC message(s) to the GGSN to close the relevant media IP flow gate(s), leaving the possible related RTCP gate(s) open to keep the connection alive.
5. The GGSN receives the COPS DEC message(s) and closes the requested gate(s).
6. The GGSN sends the COPS RPT message(s) back to the PDF.
7. The PDF sends a Diameter AAA back to the AF.

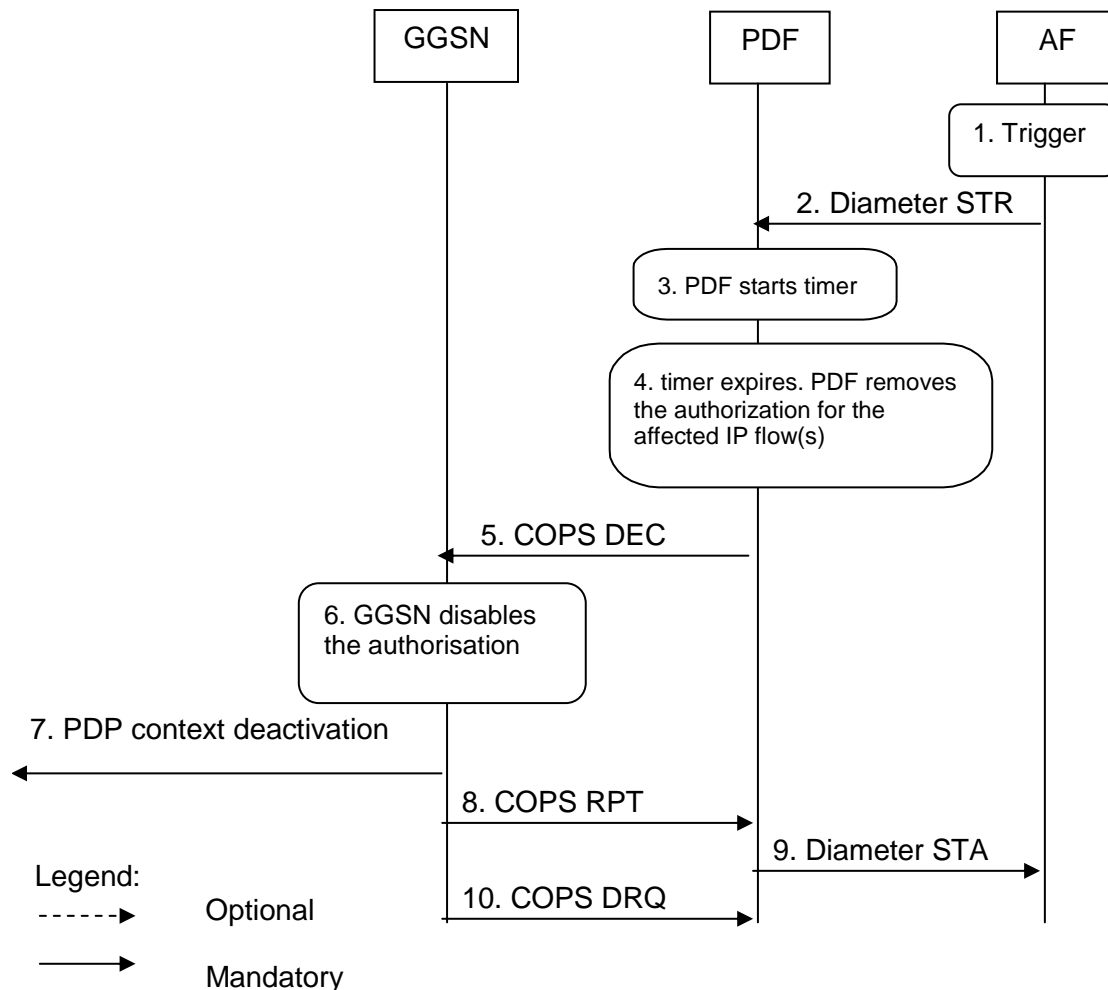
Figure 6.2.1: Removal of QoS commit

6.3 Revoke authorization for GPRS and IP resources

The "Revoke Authorization for GPRS and IP Resources" procedure is used e.g. upon session release or upon session redirection of the only or last session of a given client handle (PDP context) or upon SIP final error response initiated after bearer establishment. The PDF decision of "Revoke Authorization for GPRS and IP Resources" shall be sent as a separate decision to the GGSN corresponding to the previous "Authorize QoS Resources" request.

6.3.1 AF initiated session release

Figure 6.3.1 presents the "Revoke Authorization for GPRS and IP Resources" at Network initiated session release (of the only or last session of a given client handle) for both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.

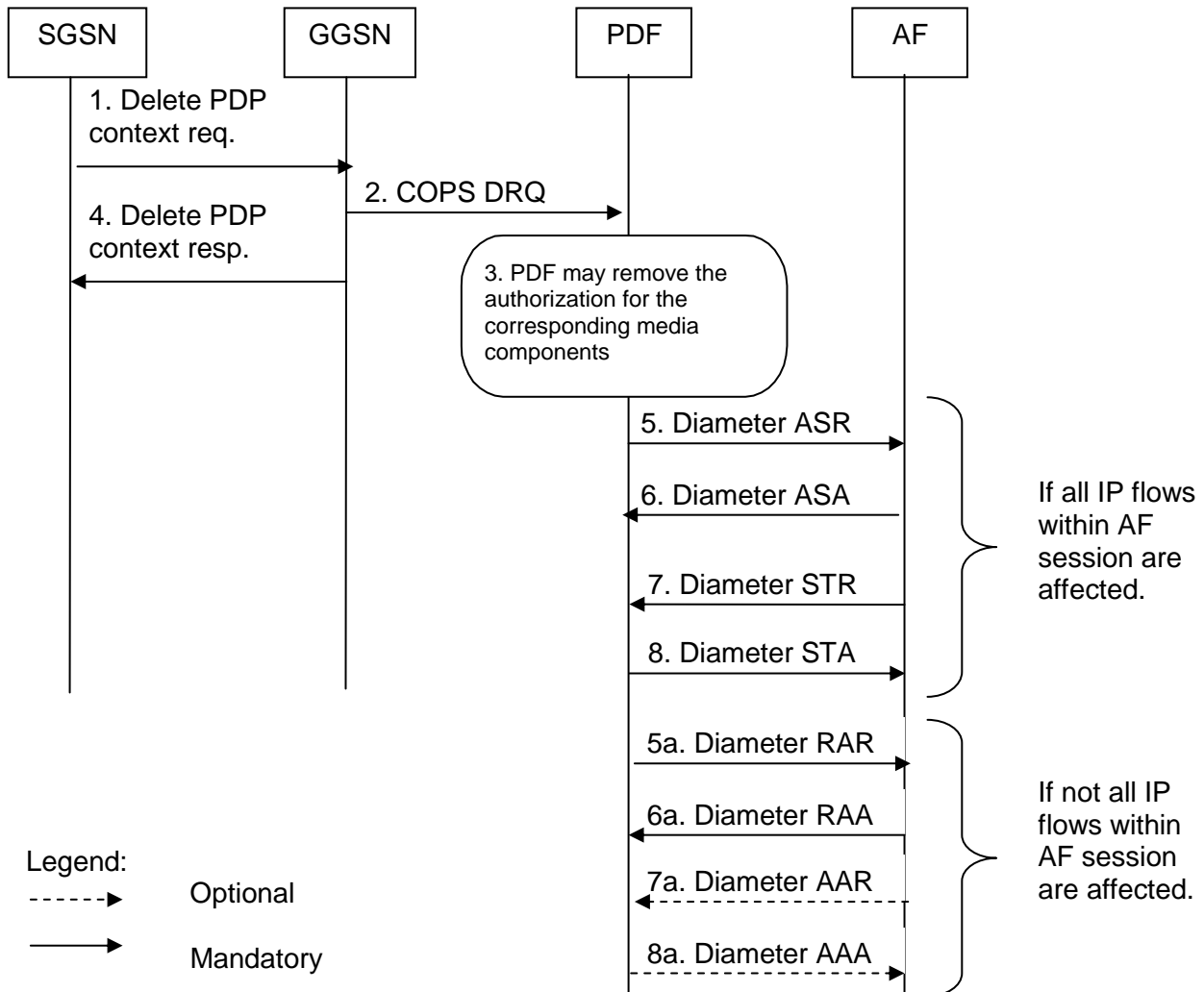


1. The AF receives an internal or external trigger for a session release.
2. The AF sends session termination request to the PDF to initiate revocation of the authorisation
3. PDF starts timer.
4. The timer expires but the PDF has not been notified that the affected PDP context(s) have been modified or deactivated. The PDF removes the authorisation for the affected IP flow(s) of this session, which it authorized previously.
5. If step 4 occurs, the PDF sends COPS DEC message(s) to the GGSN including client handle(s), which identifies the PDP context(s) to be deactivated.
6. The GGSN receives the COPS DEC message, and disables the use of the authorized QoS resources.
7. The GGSN initiates deactivation of the PDP context(s) used for the IP multimedia session, in case the UE has not done it before.
8. GGSN sends RPT message back to the PDF.
9. The PDF sends session termination answer to the AF.
10. The GGSN sends COPS DRQ message(s) to the PDF.

Figure 6.3.1: Revoke authorization for GPRS and IP resources - at Mobile initiated session release or Network initiated session release

6.4 Indication of PDP Context Release

The "Indication of PDP Context Release" procedure is used upon the release of a PDP Context that was established based on authorisation from the PDF.



1. The SGSN deactivates the PDP context carrying IP flow(s) of media component(s) by sending the Delete PDP Context Request message to the GGSN.
2. The GGSN sends a COPS DRQ message to the PDF.
3. The PDF receives the COPS DRQ message and the PDF may remove the authorization for the media component(s) with the client handle corresponding to that PDP context.
4. The GGSN sends the Delete PDP Context Response message to the SGSN to acknowledge the PDP context deletion.

The following steps shall be performed separately for each AF session that is affected by the PDP context release:

If all IP flow(s) within the AF session are affected by the PDP context release:

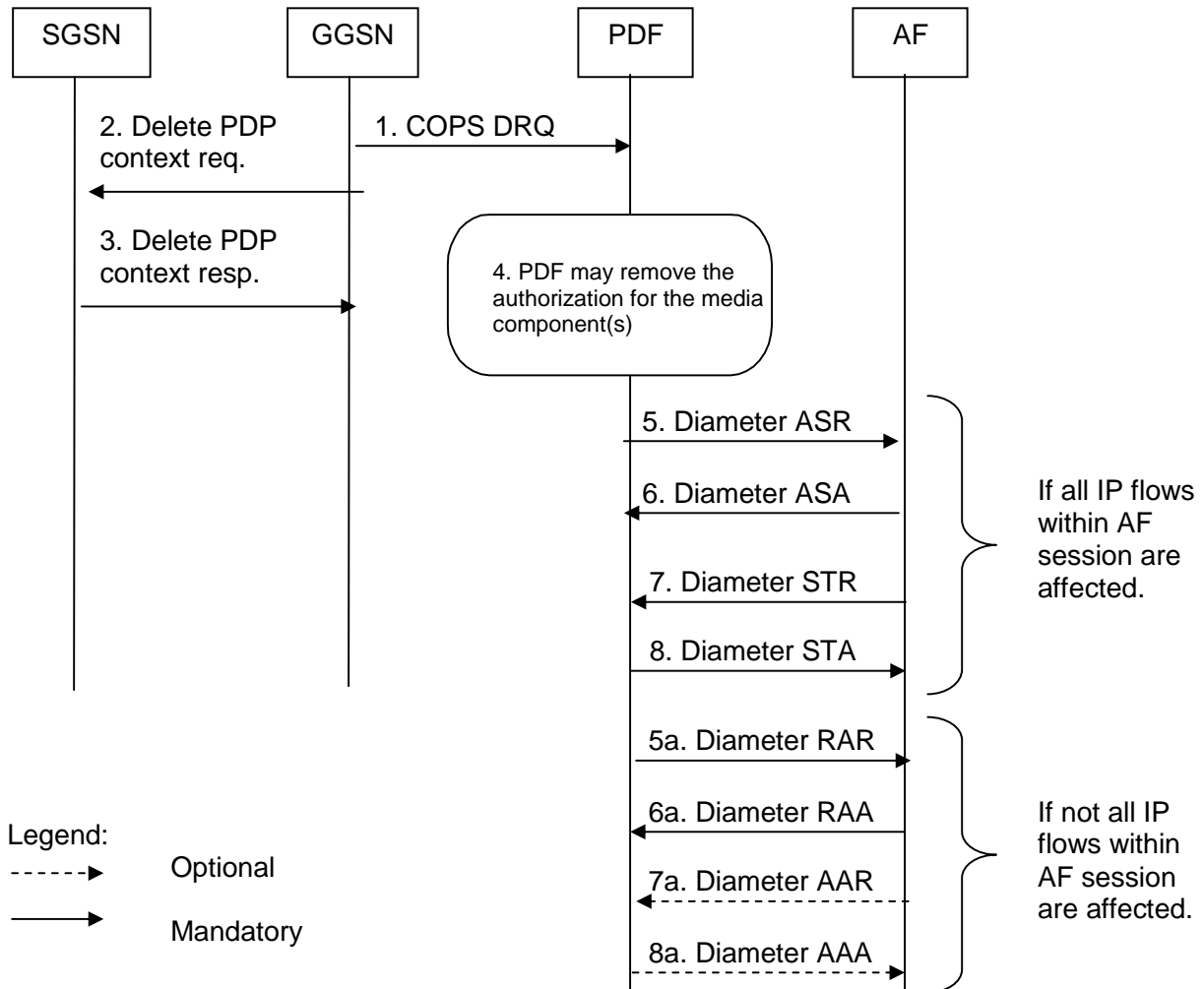
5. The PDF indicates the session abort to the AF by sending an abort session request to the AF if the PDP context was the last one for the session.
6. The AF responds by sending an abort session answer to the PDF.
7. The AF sends session termination request to the PDF to indicate that the session has been terminated.
8. The PDF responds by sending a session termination answer to the AF.

If not all IP flow(s) within the AF session are affected by the PDP context release:

- 5a. The PDF indicates the PDP context release to the AF by sending an RAR.
- 6a. The AF responds by sending an RAA to the PDF.
- 7a. The AF may send an AAR to the PDF to update the session information.
- 8a. If step 7a occurs, the PDF responds by sending an AAA to the AF.

Figure 6.4.1: Indication of PDP Context Release

Figure 6.4.2 presents the case when the GGSN initiates the release of a PDP context, i.e. after an error condition has been detected in GGSN.



1. The GGSN sends a COPS DRQ message to the PDF.
2. The GGSN deactivates the PDP context carrying IP flow(s) of media component(s) by sending the Delete PDP Context Request message to the SGSN.
3. The SGSN sends the Delete PDP Context Response message to the GGSN to acknowledge the PDP context deletion.
4. The PDF receives the COPS DRQ message and the PDF may remove the authorization for the media component(s) authorized for this client handle.

The following steps shall be performed separately for each AF session that is affected by the PDP context release:

If all IP flows within an AF session are affected by the PDP context release:

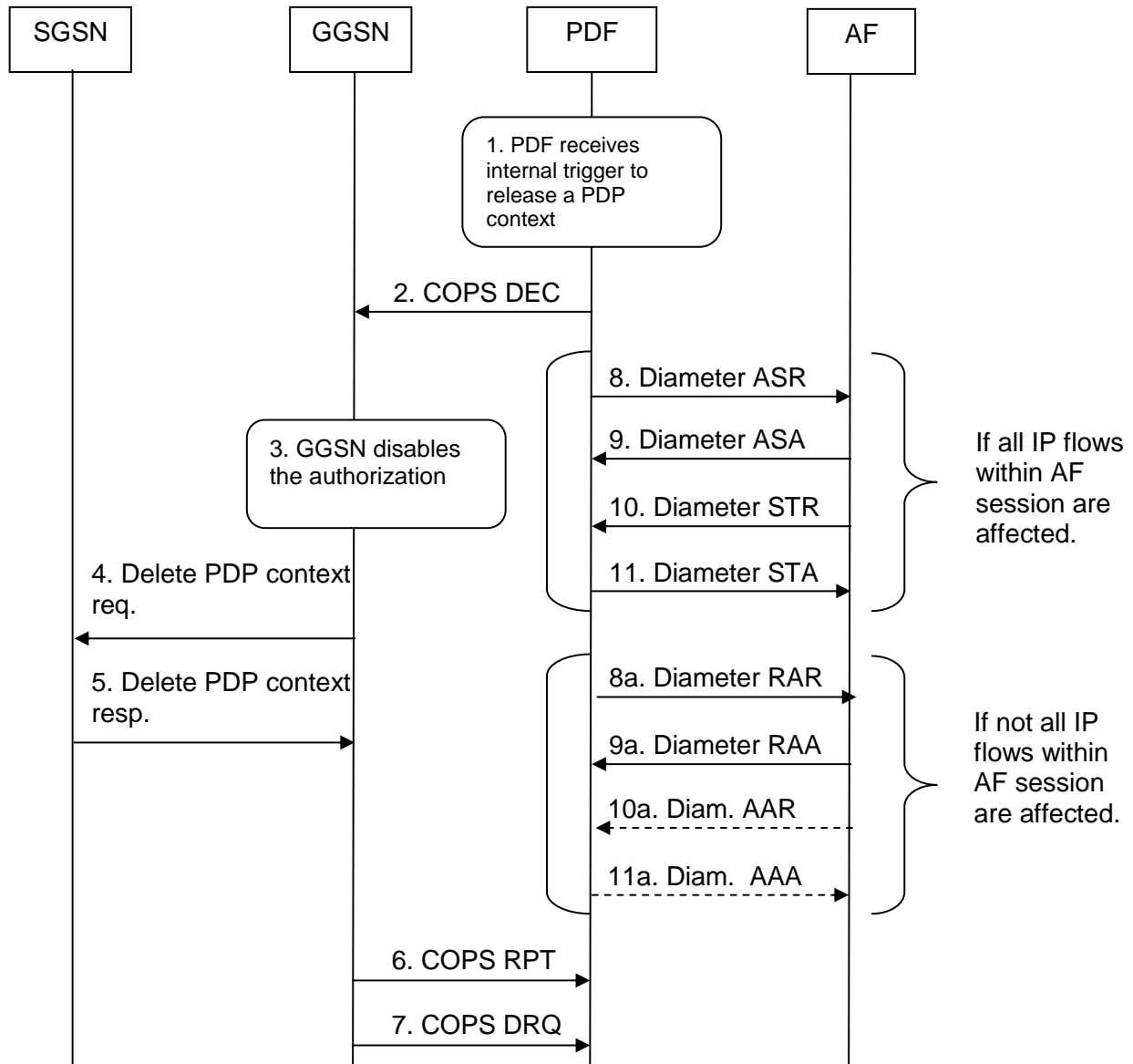
5. The PDF indicates the session abort to the AF by sending an abort session request to the AF if the PDP context was the last one for the session.
6. The AF responds by sending an abort session answer to the PDF.
7. The AF sends session termination request to the PDF to indicate that the session has been terminated.
8. The PDF responds by sending a session termination answer to the AF.

If not all IP flows within an AF session are affected by the PDP context release:

- 5a. The PDF indicates the PDP context release to the AF by sending an RAR:
- 6a. The AF responds by sending an RAA to the PDF.
- 7a. The AF may send an AAR to the PDF to update the session information.
- 8a. If step 7a occurs, the PDF responds by sending an AAA to the AF.

Figure 6.4.2: Indication of GGSN-initiated PDP Context Release

Figure 6.4.3 presents the case when the PDF initiates the release of a PDP context. This may occur due to an internal error or overload condition within the PDF, or if the PDF decides to terminate AF sessions due to a shortage of bearer resources.



Legend:

- > Optional
- > Mandatory

1. The PDF receives an internal trigger to disable a PDP context. The PDF removes the authorization for the IP flow(s) within this PDP context, which it authorized previously.
 2. The PDF sends COPS DEC message to the GGSN including client handle, which identifies the PDP context to be deactivated.
 3. The GGSN receives the COPS DEC message, and disables the use of the authorized QoS resources.
 4. The GGSN initiates deactivation of the PDP context.
 5. The GGSN receives delete PDP context response from SGSN.
 6. The GGSN sends a COPS RPT message back to the PDF.
 7. The GGSN sends COPS DRQ message to the PDF.
- The following steps shall be performed separately for each AF session that is affected by the PDP context release:

If all IP flows within the AF session are affected by the PDP context release:

8. The PDF indicates the session abortion to the AF by sending an abort session request.
9. The AF responds by sending an abort session answer to the PDF.
10. The AF sends session termination request to the PDF to indicate that the session has been terminated
11. The PDF responds by sending a session termination answer to the AF.

If not all IP flows within the AF session are affected by the PDP context release:

- 8a. The PDF indicates the PDP context release to the AF by sending an RAR.
- 9a. The AF responds by sending an RAA to the PDF.

- 10a. The AF may send an AAR to the PDF to update the session information.
- 11a. If step 10a occurs, the PDF responds by sending a AAA to the AF.

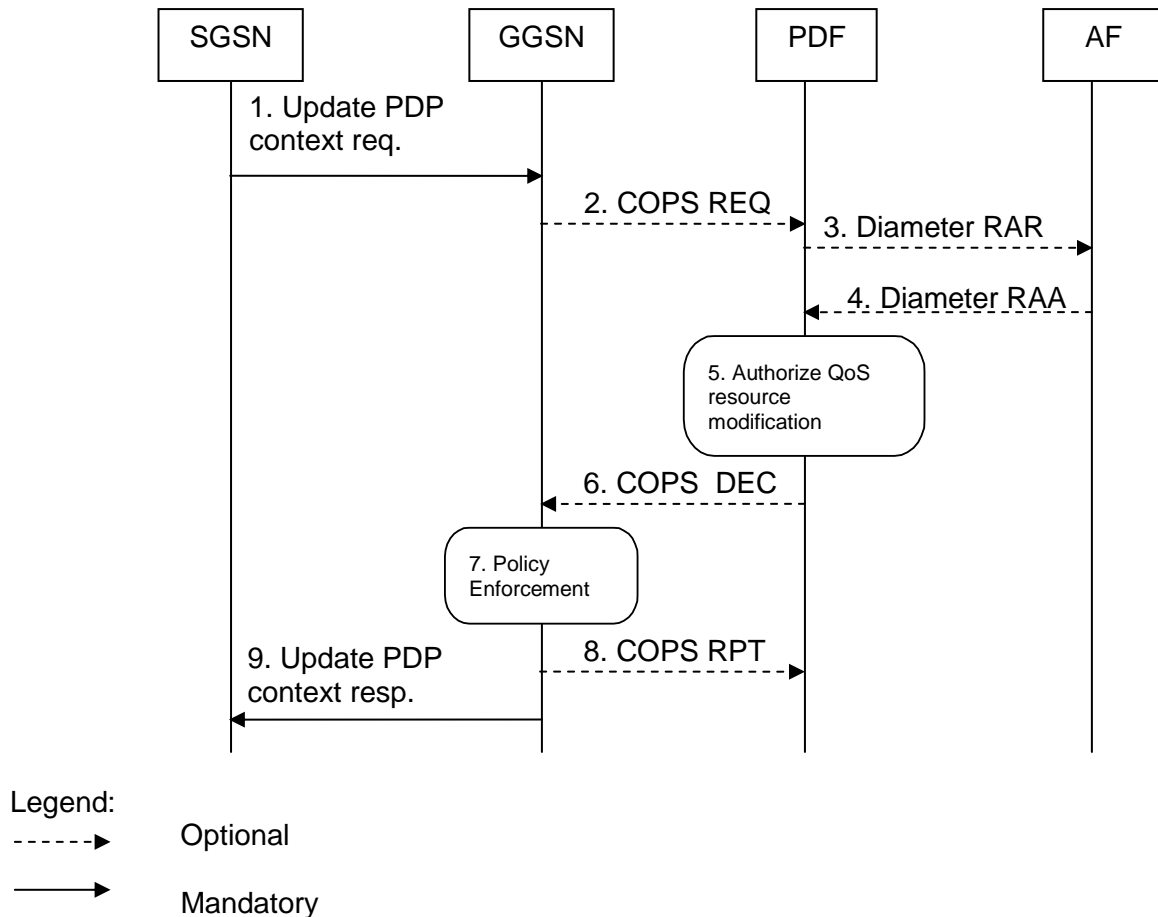
Figure 6.4.3: Indication of PDF-initiated PDP Context Release

6.5 Modification of PDP Context

The "Modification of PDP Context" procedure is used when a PDP Context is modified such that the requested QoS falls outside of the limits that were authorized at PDP context activation (or last modification) or such that the maximum bit rate (downlink and uplink) is downgraded to 0 kbit/s. In these cases, the GGSN communicates with the PDF as described below.

6.5.1 Authorization of PDP Context Modification

Figure 6.5.1 presents the "Modification of PDP Context" when the UMTS QoS which were authorized at PDP context activation (or last modification) has been changed.

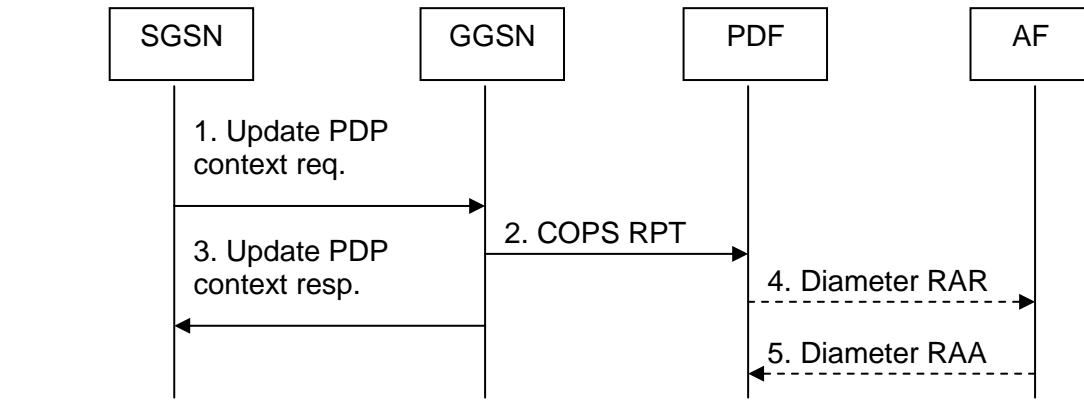


1. A request to modify the PDP context carrying the IP flows of media component(s), of which at least one may have been modified or removed, is indicated by sending the Update PDP Context Request message to the GGSN with the changed UMTS QoS parameters.
2. If the GGSN supports a Local Policy Decision Point(LPDP), it can consult the local policy decision stored in the LPDP before sending the COPS REQ message to the PDF. In case the requested QoS is within the already authorized QoS and the binding information is not changed, the GGSN does not need to send an authorization request to the PDF and proceeds to step 7. Otherwise, the GGSN sends a COPS REQ message to the PDF.
3. If the PDF receives the COPS REQ message, it performs an authorization decision according to the requested modification. If the AF has instructed earlier that the PDF needs to contact the AF in bearer modification, the PDF sends a re-authorization request to the AF.
4. If step 3 happens, the AF responds to the re-authorization request.
5. If the PDF has received a COPS REQ message in step 2, the PDF performs the authorization decision.
6. If the PDF has received a COPS REQ message in step 2, the decision taken by the PDF is returned via the COPS DEC message. The DEC message includes the policy information to be used by the GGSN in order to perform the policy-based admission control.
7. The GGSN enforces the policy decision based on the authorization information cached on the GGSN LPDP or received from the PDF for the IP flows of media component(s) carried by the PDP context.
8. If step 6 has happened, the GGSN sends COPS RPT message back to the PDF and reports its success or failure in carrying out the PDF decision and notifies state changes if any.
9. The Update PDP Context Response message is sent to the SGSN to acknowledge the PDP context modification.

Figure 6.5.1: Authorization of PDP Context Modification

6.5.2 Indication of PDP Context Modification

Figure 6.5.2 presents the "Indication of PDP Context Modification" procedure to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side when the maximum bit rate (downlink and uplink) for the PDP context is modified to and from 0 kbit/s.



Legend:

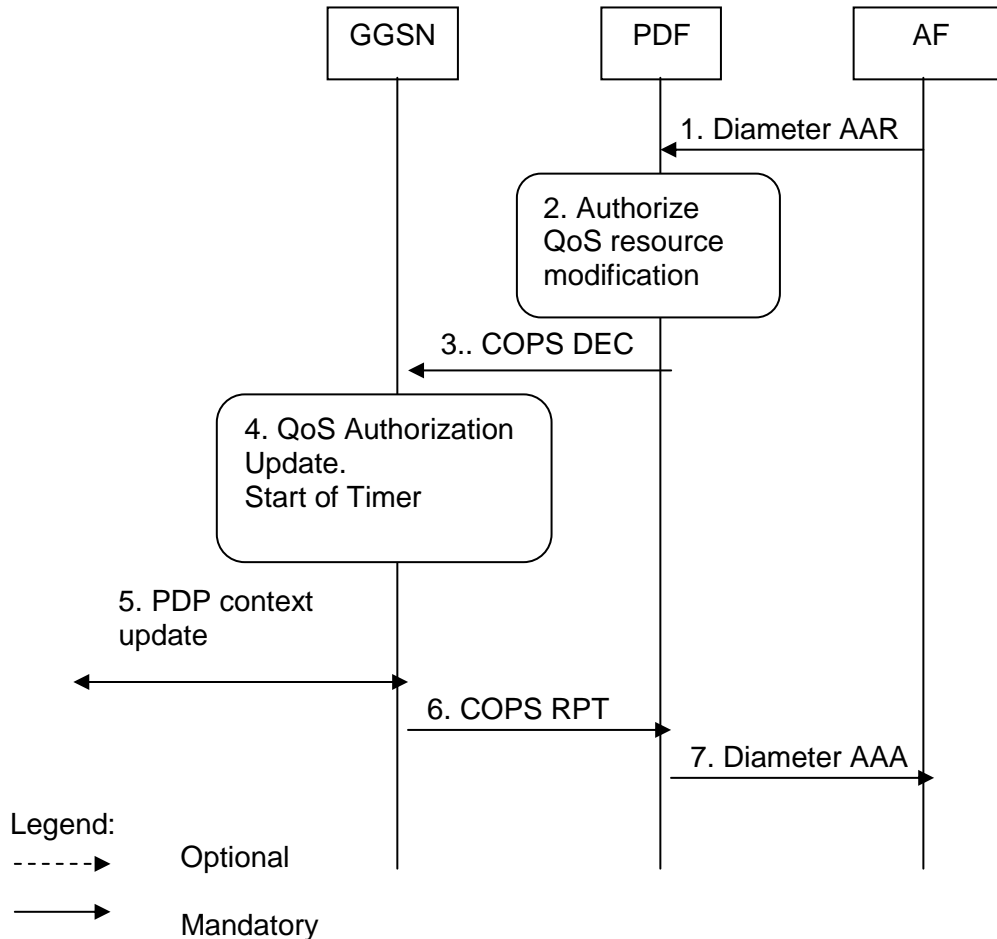
- > Optional
- > Mandatory

1. The SGSN modifies the streaming or conversational PDP context carrying the IP flows of media component(s) to or from 0 kbits/s by sending the Update PDP Context Request message to the GGSN.
2. The GGSN sends a COPS RPT message to the PDF notifying the PDP context modification.
3. The GGSN sends the Update PDP Context Response message to the SGSN to acknowledge the PDP context modification.
4. If the AF has instructed the PDF earlier that the PDF needs to contact the AF when the bandwidth of the PDP context is modified to 0 kbit/s, the PDF sends a re-authorization request to the AF.
5. If step 4 happens, the AF sends a re-authorization answer back to the PDF. If the PDP context is modified to 0 kbit/s, the authorization may be kept or removed depending on operator's policies.

Figure 6.5.2: Indication of PDP Context Modification

6.6 Session modification initiated SBLP authorization decision

The GGSN receives an unsolicited authorization decision from the PDF, when a session is modified without adding or removing media components or IP flows (refer to 3GPP TS 29.207 [7]), i.e. when the binding information of the AF session remains unchanged. The authorization update operation through the Go interface, described in figure 6.6.1, is identical in the originating and terminating cases. If the existing QoS of the PDP context exceeds the updated authorised QoS and the UE does not modify the PDP context accordingly, the GGSN shall perform a network initiated PDP context modification to reduce the QoS to the authorised level.



1. The AF sends a Diameter AAR to the PDF to indicate the change in the session information
2. The PDF analyses the session information and updates the authorization accordingly.
3. The PDF sends a COPS DEC message to the GGSN to indicate the change of the authorised QoS resources (e.g. bandwidth) and/or the update of packet classifiers (e.g. port numbers).
If the session modification is related to packet classifiers, the COPS DEC message indicates the installation of the new gate in replacement of the previous gate.
Note: The gate opening may be sent in the same decision; in that case, the GGSN opens the related gate(s) and the procedure continues with step 6.
4. When the session modification is related to QoS authorization, the GGSN updates the QoS authorization information of the session and starts a timer to supervise the PDP context update.
5. If the existing QoS of the PDP context exceeds the updated authorised QoS and the UE does not modify the PDP context accordingly, the GGSN sends an Update PDP Context Request message to the SGSN after the expiry of the timer.
6. The GGSN sends a COPS RPT message back to the PDF.
7. The PDF sends an AAA to the AF.

Figure 6.6.1: Authorization update upon session modification

7 QoS parameter mapping

7.0 Overview of QoS parameter mapping

The AF derives information about the service from the SDI or from other sources. The AF passes service information to the PDF. The PDF notes and authorizes the IP flows described within this service information by mapping from service information to Authorized IP QoS parameters for transfer to the GGSN via the Go interface. The GGSN will map from the Authorized IP QoS parameters to the Authorized UMTS QoS parameters.

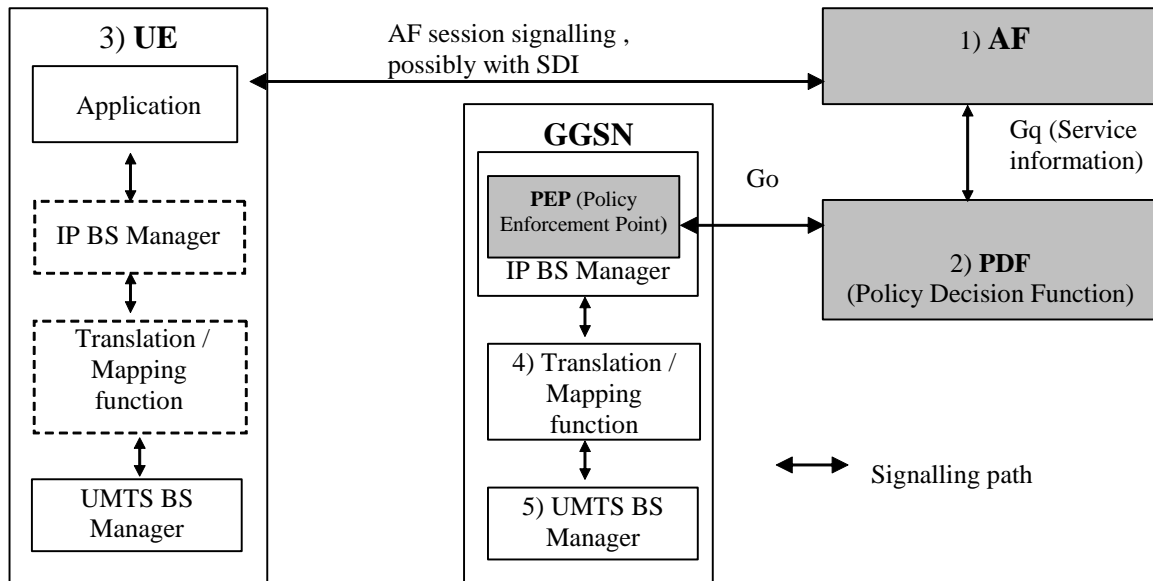
The UE derives the Authorized UMTS QoS parameters in an application specific manner. It should use information from the AF session signalling and SDI for that purpose. If SDP is used as SDI, the UE should apply the mapping rules within this specification. The UE shall use the received authorization token as criterion to decide if SBLP is applied. If the UE contains an IP BS manager, IP QoS parameters are also generated.

Upon receiving the PDP context activation or modification, the GGSN shall compare the UMTS QoS parameters against the Authorized UMTS QoS parameters. If the request lies within the limits authorized by the PDF, the PDP context activation or modification shall be accepted.

Figure 7.0 indicates the network entities where QoS mapping functionality is performed. This mapping is performed by:

1. If SBLP is applied then the AF may map from SDI within the AF session signalling to service information passed to the PDF over the Gq interface. The mapping is application specific. If SDP is used as SDI, the AF should apply the mapping described in Clause 7.1.0. For IMS, the mapping rules in Clause 7.1.0 shall be used at the P-CSCF.
2. The PDF shall map from the service information received over the Gq interface to the Authorized IP QoS parameters that shall be passed to the GGSN via the Go interface. The mapping is performed for each flow identifier. Upon a request from the GGSN, the PDF combines per direction the individual Authorized IP QoS parameters per flow identifier that are identified by the binding information (see clause 7.1.1).
3. The UE derives UMTS QoS parameters and, if an IP BS manager is present, IP QoS parameters from the AF session signalling in an application specific manner for each flow identifier. The IP and UMTS QoS parameters should be generated according to application demands and recommendations for conversational (3GPP TS 26.236 [6]) or streaming applications (3GPP TS 26.234 [5]). If SDP is used as SDI, e.g. for IMS, the UE should apply Clause 7.2.1. If SBLP is applied, i.e. the UE has received an authorization token, and SDP is used as SDI, the UE should also apply mapping rules for the authorised QoS parameters in Clause 7.2.2 to derive the maximum values for the different requested bit rates and traffic classes. In case the UE multiplexes several IP flows onto the same PDP context, it has to combine their IP and UMTS QoS parameters. If an IP BS manager is present, the Translation/Mapping function maps the IP QoS parameters to the corresponding UMTS QoS parameters.
4. The GGSN shall map from the Authorized IP QoS parameters received from PDF to the Authorized UMTS QoS parameters (see clause 7.1.2).
5. The GGSN shall compare the UMTS QoS parameters of the PDP context against the Authorized UMTS QoS parameters (see clause 7.1.3).

The mapping that takes place in the UE and the network should be compatible in order to ensure that the GGSN will be able to correctly authorize the session.



- NOTE 1: The AF may derive the Service information from the AF session signalling.
 NOTE 2: Service Information on Gq interface to Authorized IP QoS parameters mapping.
 NOTE 3: The UE may derive IP QoS parameters, requested UMTS QoS parameters mapping and Authorized UMTS QoS parameters from the AF session signalling.
 NOTE 4: Authorized IP QoS parameters to Authorized UMTS QoS parameters mapping.
 NOTE 5: UMTS QoS parameters with Authorized UMTS QoS parameters comparison.

Figure 7.0: Framework for QoS mapping between AF and GPRS

7.0.1 QoS parameter mapping for IMS

Within the IMS, session establishment and modification involves an end-to-end message-exchange using SIP/SDP with negotiation of media attributes (e.g. Codecs) as defined in 3GPP TS 24.229 [3] and 3GPP TS 24.228 [2]. If the IMS applies Service Based Local Policy (SBLP), as specified in 3GPP TS 29.207 [7], then the P-CSCF shall provide service information derived from the relevant SDP information to the PDF via the Gq interface. The P-CSCF shall apply the mapping rules in Clause 7.1.0 to derive service information from SDP. The SIP/SDP message will also have been passed on to the UE, where the UE will perform its own mapping from the SDP parameters and application demands to some UMTS QoS Parameters in order to populate the requested QoS field within the PDP context activation or modification. If SBLP is applied, i.e. the UE has received an authorization token, then the UE should also derive the Authorized UMTS QoS parameters from the SDP parameters. If the UE contains an IP BS manager IP QoS parameters are also generated.

7.1 QoS parameter mapping between AF and GPRS

7.1.0 SDP parameters to service information mapping in AF

The mapping described in this clause is mandatory for the P-CSCF and should also be applied by other AFs if the SDI is SDP.

When a session is initiated or modified the P-CSCF shall use the mapping rules in table 7.1.0.1 for each SDP media component to derive a Media-Component-Description AVP from the SDP Parameters. Furthermore, the P-CSCF shall map information about the grouping of media lines into resource reservation flows into the Flow-Grouping AVP as specified in table 7.1.0.3.

Table 7.1.0.1: Rules for derivation of service information within Media-Component-Description AVP from SDP media component

service information per Media-Component-Description AVP (NOTE 1; Note 7)	Derivation from SDP Parameters (see NOTE 2)
Media-Component-Number	ordinal number of the position of the "m=" line in the SDP
AF-Application-Identifier	The AF-Application-Identifier AVP may be supplied or omitted, depending on the application. For IMS, if the AF-Application-Identifier AVP is supplied, its value should not demand application specific bandwidth or QoS class handling. However, if an IMS application is capable of handling a QoS downgrading, the AF-Application-Identifier AVP may be used to demand application specific bandwidth or QoS class handling.
Media-Type	The Media Type AVP shall be included with the same value as supplied for the media type in the "m=" line.
Flow-Status	<pre> IF port in m-line = 0 THEN Flow-Status:= REMOVED; ELSE IF a=recvonly THEN IF <SDP direction> = mobile originated THEN Flow-Status := ENABLED_DOWNLINK; (NOTE 4) ELSE /* mobile terminated */ Flow-Status := ENABLED_UPLINK; (NOTE 4) ENDIF; ELSE IF a=sendonly THEN IF <SDP direction> = mobile originated THEN Flow-Status := ENABLED_UPLINK; (NOTE 4) ELSE /* mobile terminated */ Flow-Status := ENABLED_DOWNLINK; (NOTE 4) ENDIF; ELSE IF a=inactive THEN Flow-Status :=DISABLED; ELSE /* a=sendrecv or no direction attribute */ Flow-Status := ENABLED (NOTE 4) ENDIF; ENDIF; ENDIF; ENDIF; (NOTE 5) </pre>
Max-Requested-Bandwidth-UL	<pre> IF <SDP direction> = mobile terminated THEN IF b=AS:<bandwidth> is present THEN Max-Requested-Bandwidth-UL:= <bandwidth> * 1000; /* Unit is bit/s ELSE Max-Requested-Bandwidth-UL:= <Operator specific setting>, or AVP not supplied; ENDIF; ELSE Consider SDP in opposite direction ENDIF </pre>
Max-Requested-Bandwidth-DL	<pre> IF <SDP direction> = mobile originated THEN IF b=AS:<bandwidth> is present THEN Max-Requested-Bandwidth-DL:= <bandwidth> * 1000; /* Unit is bit/s ELSE Max-Requested-Bandwidth-DL:= <Operator specific setting>, or AVP not supplied; ENDIF; ELSE Consider SDP in opposite direction ENDIF </pre>
RR-Bandwidth	<pre> IF b=RR:<bandwidth> is present THEN RR-Bandwidth:= <bandwidth>; ELSE AVP not supplied ENDIF; (NOTE 3; NOTE 6) </pre>
RS-Bandwidth	<pre> IF b=RS:<bandwidth> is present THEN RS-Bandwidth:= <bandwidth>; ELSE AVP not supplied ENDIF; (NOTE 3; NOTE 6) </pre>
Media-Sub-Component	Supply one AVP for each Flow Identifier within the media component. The

	Flow identifiers are derived according to Annex D of 3GPP TS 29.207 [7]. The encoding of the AVP is described in Table 7.1.0.2
NOTE 1:	The encoding of the service information is defined in TS 29.209 [12].
NOTE 2:	The SDP parameters are described in RFC 2327 [9].
NOTE 3:	The 'b=RS:' and 'b=RR:' SDP bandwidth modifiers are defined in RFC 3556 [10].
NOTE 4:	As an operator policy to disable forward and/or backward early media, the Flow-Status may be downgraded before a SIP dialogue is established, i.e. until a 200 OK(INVITE) is received. The Value "DISABLED" may be used instead of the Values "ENABLED_UPLINK" or "ENABLED_DOWNLINK". The Values "DISABLED", "ENABLED_UPLINK" or "ENABLED_DOWNLINK" may be used instead of the Value "ENABLED".
NOTE 5:	If the SDP answer is available when the session information is derived, the direction attributes and port number from the SDP answer shall be used to derive the flow status. However, to enable interoperability with SIP clients that do not understand the inactive SDP attribute, if a=inactive was supplied in the SDP offer, this shall be used to derive the flow status. If the SDP answer is not available when the session information is derived, the direction attributes from the SDP offer shall be used.
NOTE 6:	Information from the SDP answer is applicable, if available.
NOTE 7:	The AVPs may be omitted if they have been supplied in previous service information and have not changed, as detailed in TS 29.209 [12].

Table 7.1.0.2: Rules for derivation of Media-Sub-Component AVP from SDP media component

Gq service information per Media-Sub-Component AVP (NOTE 1, NOTE 5)	Derivation from SDP Parameters (see NOTE 2)
Flow-Number	derived according to Annex C of 3GPP TS 29.207 [7]
Flow-Status	AVP not supplied
Max-Requested-Bandwidth-UL	AVP not supplied
Max-Requested-Bandwidth-DL	AVP not supplied
Flow-Description	<p>For uplink and downlink direction, a Flow-Description AVP shall be provided unless no IP Flows in this direction are described within the media component.</p> <p>The SDP direction attribute (NOTE 4) indicates the direction of the media IP flows within the media component as follows:</p> <pre> IF a=recvonly THEN (NOTE 3) IF <SDP direction> = mobile originated THEN Provide only downlink Flow-Description AVP ELSE /* mobile terminated */ Provide only uplink Flow-Description AVP ENDIF; ELSE IF a=sendonly THEN (NOTE 3) IF <SDP direction> = mobile originated THEN Provide only uplink Flow-Description AVP ELSE /* mobile terminated */ Provide only downlink Flow-Description AVP ENDIF; ELSE /* a=sendrecv or a=inactive or no direction attribute */ Provide uplink and downlink Flow-Description AVPs ENDIF; ENDIF; </pre> <p>For RTCP IP flows uplink and downlink Flow-Description AVPs shall be provided irrespective of the SDP direction attribute.</p> <p>The uplink destination address shall be copied from the "c=" line of downlink SDP. (NOTE 6)</p> <p>The uplink destination port shall be derived from the "m=" line of downlink SDP. (NOTE 6)</p> <p>The downlink destination address shall be copied from the "c=" line of uplink SDP. (NOTE 6)</p> <p>The downlink destination port shall be derived from the "m=" line of uplink SDP. (NOTE 6)</p> <p>Uplink and downlink source addresses shall either be derived from the prefix of the destination address or be wildcarded by setting to "any", as specified in TS 29.209 [12]. Source ports shall not be supplied.</p> <p>Proto shall be derived from the transport of the "m=" line. For "RTP/AVP" proto is 17 (UDP).</p>
Flow-Usage	<p>The Flow-Usage AVP shall be supplied with value "RTCP" if the IP flow(s) described in the Media-Sub-Component AVP are used to transport RTCP. Otherwise the Flow-Usage AVP shall not be supplied. RFC 2327 [9] specifies how RTCP flows are described within SDP.</p>
<p>NOTE 1: The encoding of the service information is defined in TS 29.209 [12].</p> <p>NOTE 2: The SDP parameters are described in RFC 2327 [9].</p> <p>NOTE 3: If the SDP direction attribute for the media component negotiated in a previous offer-answer exchange was sendrecv, or if no direction attribute was provided, and the new SDP direction attribute sendonly or recvonly is negotiated in a subsequent SDP offer-answer exchange, uplink and downlink Flow-Description AVPs shall be supplied.</p> <p>NOTE 4: If the SDP answer is available when the session information is derived, the direction attributes from the SDP answer shall be used to derive the flow description. However, to enable interoperability with SIP clients that do not understand the inactive SDP attribute, if a=inactive was supplied in the SDP offer, this shall be used. If the SDP answer is not available when the session information is derived, the direction attributes from the SDP offer shall be used.</p> <p>NOTE 5: The AVPs may be omitted if they have been supplied in previous service information and have not changed, as detailed in TS 29.209 [12].</p> <p>NOTE 6: If the session information is derived from an SDP offer, the required SDP may not yet be available. The corresponding Flow Description AVP shall nevertheless be included and the unavailable fields (possibly all) shall be wildcarded.</p>	

Table 7.1.0.3: Rules for mapping SDP information about the grouping of media lines into resource reservation flows into the Flow Grouping AVP

Flow-Grouping AVP (NOTE1)	Derivation from SDP Parameters (see NOTE 2)
Flow Grouping	For each SDP "a=group:SRF" SDP line, a Flow Grouping AVP shall be generated. (NOTE 3)
Flows	For each identification tag within "a=group:SRF" SDP line, a Flows AVP containing a Media-Component-Number AVP identifying the corresponding m-line shall be generated. (NOTE 3) No Flow-Number AVP shall be supplied within the Flows AVP.
NOTE 1: The encoding of the service information is defined in TS 29.209 [12]. NOTE 2: The SDP parameters are described in RFC 2327 [9]. NOTE 3: The SDP "group" attribute is defined in RFC 3388 [13]. The "SRF" semantics attribute within this grouping framework is defined in RFC 3524 [14].	

7.1.1 Gq service information to Authorized IP QoS parameters mapping in PDF

The QoS authorization is to be based on the parameters Maximum Authorized QoS Class and Maximum Authorized Data Rate UL/DL.

When a session is initiated or modified the PDF shall use the mapping rules in table 7.1.1.1 to derive the Authorized IP QoS parameters Maximum Authorized Data Rate DL/UL and the Maximum Authorized QoS Class from the service information. In the case of forking, the various forked responses may have different QoS requirements for the IP flows of the same media component. Each Authorized IP QoS Parameter shall be set to the highest value requested for the IP flow(s) of that media component by any of the active forked responses. These values are derived by the rules in table 7.1.1.1

Table 7.1.1.1: Rules for derivation of the Maximum Authorized Data Rates and Maximum Authorized QoS Class per flow identifier in the PDF

Authorized IP QoS Parameter per flow identifier	Derivation from service information (see note 4)
Maximum Authorized Data Rate DL (Max_DR_DL) and UL (Max_DR_UL) per flow identifier	<pre> IF AF-Application-Identifier AVP demands application specific data rate handling THEN Max_DR_UL:= as defined by application specific algorithm; Max_DR_DL:= as defined by application specific algorithm; ELSE IF not RTCP flow(s) according to Flow-Usage AVP THEN IF Flow-Status = REMOVED THEN Max_DR_UL:= 0; Max_DR_DL:= 0; ELSE IF uplink Flow Description AVP is supplied THEN IF Max-Requested-Bandwidth-UL is present THEN Max DR UL:= Max-Requested-Bandwidth-UL ; ELSE Max_DR_UL:= as set by the operator; ENDIF ELSE Max_DR_UL:= 0; ENDIF; IF downlink Flow Description AVPs is supplied THEN IF Max-Requested-Bandwidth-DL is present THEN Max DR DL:= Max-Requested-Bandwidth-DL; ELSE Max_DR_DL:= as set by the operator; ENDIF ELSE Max_DR_DL:= 0; ENDIF; ENDIF; ENDIF; ELSE /* RTCP IP flow(s) */ IF RS-Bandwidth is present and RR-Bandwidth is present THEN Max_DR_UL:= (RS-Bandwidth + RR-Bandwidth); Max_DR_DL:= (RS-Bandwidth + RR-Bandwidth); ELSE IF Max-Requested-Bandwidth-UL is present THEN IF RS-Bandwidth is present and RR-Bandwidth is not present THEN Max_DR_UL:= MAX[0.05 * Max-Requested-Bandwidth-UL, RS-Bandwidth]; ENDIF; IF RS-Bandwidth is not present and RR-Bandwidth is present THEN Max_DR_UL:= MAX[0.05 * Max-Requested-Bandwidth UL, RR-Bandwidth]; ENDIF; IF RS-Bandwidth and RR-Bandwidth is not present THEN Max_DR_UL:= 0.05 * Max-Requested-Bandwidth_UL ; ENDIF; ELSE Max DR UL:= as set by the operator; ENDIF; IF Max-Requested-Bandwidth-DL is present THEN IF RS-Bandwidth is present and RR-Bandwidth is not present THEN Max_DR_DL:= MAX[0.05 * Max-Requested-Bandwidth-DL, RS-Bandwidth]; ENDIF; IF RS-Bandwidth is not present and RR-Bandwidth is present THEN Max DR DL:= MAX[0.05 * Max-Requested-Bandwidth-DL, RR-Bandwidth]; ENDIF; IF RS-Bandwidth and RR-Bandwidth is not present THEN Max_DR_DL:= 0.05 * Max-Requested-Bandwidth-DL; ENDIF; ENDIF; ENDIF; </pre>

	<pre> ELSE Max_DR_DL:= as set by the operator; ENDIF; ENDIF; ENDIF; ENDIF; IF SIP-Forking-Indication AVP indicates SEVERAL_DIALOGUES THEN Max_DR_UL = MAX[Max_DR_UL, previous Max_DR_UL] Max_DR_DL = MAX[Max_DR_DL, previous Max_DR_DL] ENDIF; </pre>
<p>Maximum Authorized QoS Class [MaxClass] per flow identifier (see notes 1, 2 and 3)</p>	<pre> IF AF-Application-Identifier AVP demands application specific QoS Class handling THEN MaxClass:= as defined by application specific algorithm; ELSE IF Media-Type is present THEN IF (only uplink Flow Description AVPs are supplied for all IP flows of the AF session, which have media type "audio" or "video" and no flow usage "RTCP", or only downlink Flow Description AVPs are supplied for all IP flows of the AF session, which have media type "audio" or "video" and no flow usage "RTCP") THEN MaxClassDerivation:=B; /*streaming*/ ELSE MaxClassDerivation:=A; /*conversational*/ ENDIF; CASE Media-Type OF "audio": MaxClass:= MaxClassDerivation "video": MaxClass:= MaxClassDerivation "application": MaxClass:=A; /*conversational*/ "data": MaxClass:=E; /*interactive with priority 3*/ "control": MaxClass:=C; /*interactive with priority 1*/ /*new media type*/ OTHERWISE: MaxClass:=F; /*background*/ END; ELSE MaxClass:= as defined by by operator; ENDIF; ENDIF; IF SIP-Forking-Indication AVP indicates SEVERAL_DIALOGUES THEN MaxClass = MAX[MaxClass, previous MaxClass] ENDIF; </pre>
<p>NOTE 1: The Maximum Authorized QoS Class for a RTCP IP flow is the same as for the corresponding RTP media IP flow.</p> <p>NOTE 2: When audio or video IP flow (s) are removed from a session, the parameter MaxClassDerivation shall keep the originally assigned value.</p> <p>NOTE 3: When audio or video IP flow(s) are added to a session, the PDF shall derive the parameter MaxClassDerivation taking into account the already existing media IP flow(s) within the session.</p> <p>NOTE 4: The encoding of the service information is defined in TS 29.209 [12]. If AVPs are omitted within a Media-Component-Description AVP or Media-Sub-Component AVP of the service information, the corresponding information from previous service information shall be used, as specified in TS 29.209 [12].</p>	

The PDF shall per ongoing session store the Authorized IP QoS parameters per flow identifier.

When the GGSN requests the Authorized UMTS QoS parameters for an activated/modified PDP Context carrying IP flows of media component(s), the PDF shall use the rules in table 7.1.1.2 to calculate the Authorized IP QoS parameters per Client Handle.

Table 7.1.1.2: Rules for calculating the Maximum Authorized Data Rates and Maximum Authorized QoS Class per Client Handle in the PDF

Authorized IP QoS Parameter per Client Handle	Calculation Rule
Maximum Authorized Data Rate DL and UL per Client Handle	<p>Maximum Authorized Data Rate DL/UL per Client Handle is the sum of all Maximum Authorized Data Rate DL/UL for all the flow identifiers associated with that Client Handle.</p> <p>IF Maximum Authorized Data Rate DL/UL per Client Handle > 16000 kbps THEN Maximum Authorized Data Rate DL/UL per Client Handle = 16000 kbps /* See 3GPP TS 23.107 [8] */</p> <p>END;</p>
Maximum Authorized QoS Class per Client Handle	<p>Maximum Authorized QoS Class per Client Handle = MAX [Maximum Authorized QoS Class per flow identifier among all the flow identifiers associated with that Client Handle.</p> <p>(The MAX function ranks the possible Maximum Authorized QoS Class values as follows: "A" > "B" > "C" > "D" > "E" > "F") /* See 3GPP TS 29.207 [7] */</p>

7.1.2 Authorized IP QoS parameters to Authorized UMTS QoS parameters mapping in GGSN

The Translation/Mapping function in the GGSN shall derive the Authorized UMTS QoS parameters from the Authorized IP QoS parameters received from the PDF according to the rules in table 7.1.2.

Table 7.1.2: Rules for derivation of the Authorized UMTS QoS Parameters per PDP context from the Authorized IP QoS Parameters per Client Handle in GGSN

Authorized UMTS QoS Parameter per PDP context	Derivation from Authorized IP QoS Parameters
Maximum Authorized Bandwidth DL and UL per PDP context	Maximum Authorized Bandwidth DL/UL per PDP context = Maximum Authorized Data Rate DL/UL per Client Handle
Maximum Authorized Traffic Class per PDP context	<p>IF Maximum Authorized QoS Class = "A" THEN Maximum Authorized Traffic Class = "Conversational"</p> <p>ELSEIF Maximum Authorized QoS Class = "B" THEN Maximum Authorized Traffic Class = "Streaming"</p> <p>ELSEIF Maximum Authorized QoS Class = "C" THEN Maximum Authorized Traffic Class = "Interactive"; Maximum Authorized Traffic Handling Priority = "1";</p> <p>ELSEIF Maximum Authorized QoS Class = "D" THEN Maximum Authorized Traffic Class = "Interactive"; Maximum Authorized Traffic Handling Priority = "2";</p> <p>ELSEIF Maximum Authorized QoS Class = "E" THEN Maximum Authorized Traffic Class = "Interactive"; Maximum Authorized Traffic Handling Priority = "3";</p> <p>ELSE Maximum Authorized Traffic Class = "Background"</p> <p>ENDIF ;</p>

7.1.3 Comparing UMTS QoS Parameters against the Authorized UMTS QoS parameters in GGSN

Upon receiving a PDP context activation containing binding information, the GGSN requests the Authorized QoS information from the PDF, and may request the Authorized UMTS information if a PDP context containing binding

information is modified (see 3GPP TS 29.207 [7] for details). The GGSN compares the requested UMTS QoS parameters against the corresponding Authorized UMTS QoS parameters received via the translation/mapping function. If all the requested parameters lie within the limits, the PDP context activation or modification shall be accepted. I.e. the following criteria shall be fulfilled:

- the requested Guaranteed Bitrate DL/UL (if the requested Traffic Class is Conversational or Streaming) or Maximum Bitrate DL/UL (if the requested Traffic Class is Interactive or Background) is less than or equal to Maximum Authorized data rate DL/UL; and
- the requested Traffic Class is less than or equal to Maximum Authorized Traffic Class.

If any of the requested parameters do not lie within their respective limit, the GGSN shall downgrade the requested UMTS QoS parameters.

7.2 QoS parameter mapping in the UE

Figure 7.2 indicates the entities participating in the generation of the requested QoS parameters when activate or modify a PDP Context in the UE. The steps are:

1. The Application provides the UMTS BS Manager, possibly via the IP BS Manager and the Translation/Mapping function, with relevant information to perform step 2 or step 4. (Not subject to standardization within 3GPP).
2. If needed, information from step 1 is used to access a proper set of UMTS QoS Parameters. See 3GPP TS 26.236 [6] for Conversational Codec Applications and 3GPP TS 26.234 [5] for Streaming Codec Applications.
3. If SDP is available then the SDP Parameters should give guidance for the UMTS BS Manager (possibly via the IP Manager and the Translation/Mapping function), according to the rules in clause 7.2.1, to set the Maximum Bitrate UL/DL and the Guaranteed Bitrate UL/DL. Furthermore if the SDP Parameters are received in an IMS context in which SBLP is applied, i.e. an authorization token has been received, the Maximum Authorized Bandwidth UL/DL and Maximum Authorized Traffic Class should be derived according to the rules in clause 7.2.2.
4. A set of UMTS QoS Parameters values from step 2 (or directly from step 1) is possibly merged together with the Maximum Bitrate UL/DL and the Guaranteed Bitrate UL/DL from step 3. The result should constitute the requested UMTS QoS Parameters. If the PDP Context is activated or modified in an IMS context in which SBLP is applied, the UE should check that the requested Guaranteed Bitrate UL/DL or requested Maximum Bitrate UL/DL (depending on the requested Traffic Class) does not exceed the Maximum Authorized Bandwidth UL/DL derived in step 3. Furthermore, if the UE has implemented the mapping rule for Maximum Authorized Traffic Class, as defined in clause 7.2.2, the UE should check that the requested Traffic Class does not exceed the Maximum Authorized Traffic Class derived in step 3.

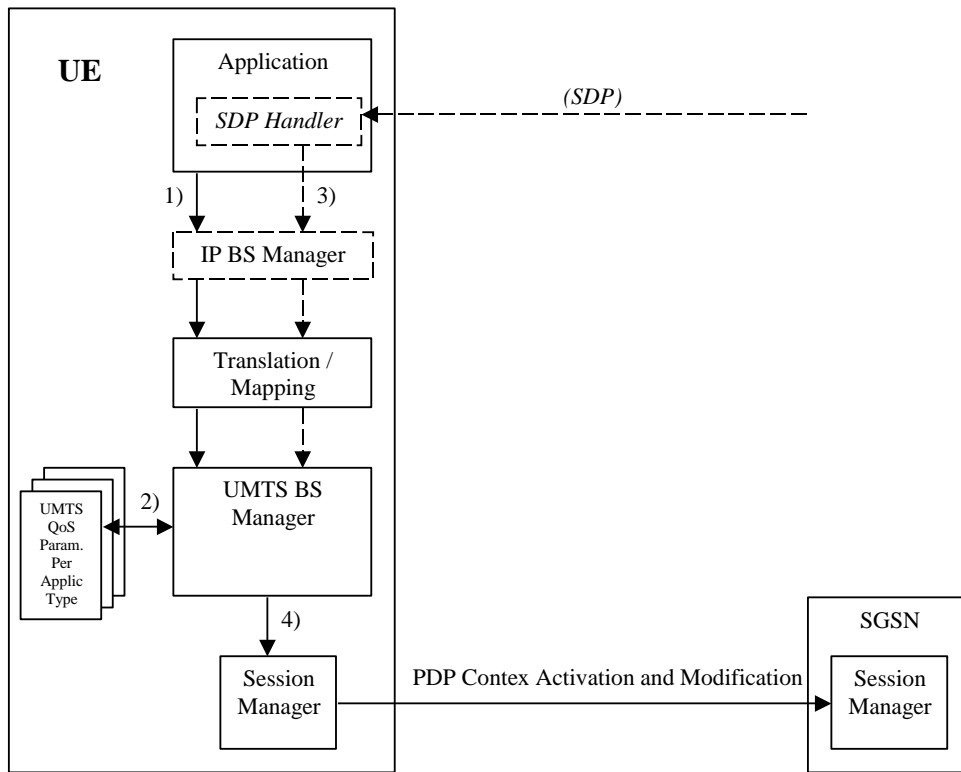


Figure 7.2: Framework for generating requested QoS parameters in the UE

7.2.1 SDP to UMTS QoS parameter mapping in UE

If SDP Parameters are available, then before activating or modifying a PDP Context the UE should check if the SDP Parameters give guidance for setting the requested UMTS QoS Parameters. The UE should use the mapping rule in table 7.2.1 to derive the Maximum and Guaranteed Bitrate DL/UL from the SDP Parameters.

Table 7.2.1: Recommended rules for derivation of the requested Maximum and Guaranteed Bitrate DL/UL per media component in the UE

UMTS QoS Parameter per media component	Derivation from SDP Parameters
Maximum Bitrate DL/UL and Guaranteed Bitrate DL/UL per media component	<pre> /* Check if the media use codec(s) */ IF [(<media> = ("audio" or "video")) and (<transport> = "RTP/AVP")] THEN /* Check if Streaming */ IF a= ("sendonly" or "recvonly") THEN Maximum Bitrate DL/UL and Guaranteed Bitrate DL/UL per media component as specified in reference [5] ; /* Conversational as default !*/ ELSE Maximum Bitrate DL/UL and Guaranteed Bitrate DL/UL per media component as specified in reference [6] ; ENDIF ; /* Check for presence of bandwidth attribute for each media component */ ELSEIF b=AS:<bandwidth-value> is present THEN IF media stream only downlink THEN Maximum Bitrate DL = Guaranteed Bitrate DL =<bandwidth-value >; ELSEIF mediastream only uplink THEN Maximum Bitrate UL = Guaranteed Bitrate UL =<bandwidth-value >; ELSEIF mediastreams both downlink and uplink THEN Maximum Bitrate DL = Guaranteed Bitrate DL =<bandwidth-value >; Maximum Bitrate UL = Guaranteed Bitrate UL =<bandwidth-value >; ENDIF; ELSE /* SDP does not give any guidance ! */ Maximum Bitrate DL/UL and Guaranteed Bitrate DL/UL per media component as specified by the UE manufacturer; ENDIF ; </pre>

7.2.2 SDP parameters to Authorized UMTS QoS parameters mapping in UE

If the PDP Context is activated or modified and SBLP is applied, i.e. an authorization token has been received, then the UE should use the mapping rules in table 7.2.2.1 for all applications using SDP to derive the Maximum Authorized Bandwidth UL/DL per flow identifier.

Table 7.2.2.1 also has a mapping rule for derivation of Maximum Authorized Traffic Class per flow identifier which applies for session initiation and modification.

In future releases this mapping rule may change.

In the case of forking, the various forked responses may have different QoS requirements for the same IP flows of a media component. When the Authorized UMTS QoS Parameters are used by the UE, they shall be set equal to the highest values requested for the IP flows of that media component by any of the active forked responses. The UE should use the mapping rule in table 7.2.2.1 for each forked response.

Table 7.2.2.1: Rules for derivation of the Maximum Authorized Bandwidth DL/UL and the Maximum Authorized Traffic Class per flow identifier in the UE

Authorized UMTS QoS Parameter per flow identifier	Derivation from SDP Parameters (see note 4)
Maximum Authorized Bandwidth DL (Max_BW_DL) and UL (Max_BW_UL) per flow identifier (see note 5)	<pre> IF SBLP is applied THEN /* The Direction of the IP flow(s) identified by the flow identifier */ IF a=recvonly THEN IF <SDP direction> = mobile originated THEN Direction:= downlink; ELSE /* mobile terminated */ Direction:= uplink; ENDIF; ELSE; IF a=sendonly THEN IF <SDP direction> = mobile originated THEN Direction:= uplink; ELSE /* mobile terminated */ Direction:= downlink; ENDIF; ELSE /*sendrecv, inactive or no direction attribute*/ Direction:=both; ENDIF; ENDIF; /* Max_BW_UL and Max_BW_DL */ IF media IP flow(s) THEN IF b_{AS}=AS:<bandwidth> is present THEN IF Direction=downlink THEN Max_BW_UL:= 0; Max_BW_DL:= b_{AS}; ELSE IF Direction=uplink THEN Max_BW_UL:= b_{AS}; Max_BW_DL:= 0; ELSE /*Direction=both*/ Max_BW_UL:= b_{AS}; Max_BW_DL:= b_{AS}; ENDIF; ENDIF; ELSE bw:= as set by the UE manufacturer; IF Direction=downlink THEN Max_BW_UL:= 0; Max_BW_DL:= bw; ELSE IF Direction=uplink THEN Max_BW_UL:= bw; Max_BW_DL:= 0; ELSE /*Direction=both*/ Max_BW_UL:= bw; Max_BW_DL:= bw; ENDIF; ENDIF; ENDIF; ELSE /* RTCP IP flow(s) */ IF b_{RS}=RS:<bandwidth> and b_{RR}=RR:<bandwidth> is present THEN Max_BW_UL:= (b_{RS} + b_{RR}) / 1000; Max_BW_DL:= (b_{RS} + b_{RR}) / 1000; ELSE IF b_{AS}=AS:<bandwidth> is present THEN IF b_{RS}=RS:<bandwidth> is present and b_{RR}=RR:<bandwidth> is not present THEN Max_BW_UL:= MAX[0.05 * b_{AS}, b_{RS} / 1000]; Max_BW_DL:= MAX[0.05 * b_{AS}, b_{RS} / 1000]; ENDIF; IF b_{RS}=RS:<bandwidth> is not present and b_{RR}=RR:<bandwidth> is present THEN Max_BW_UL:= MAX[0.05 * b_{AS}, b_{RR} / 1000]; Max_BW_DL:= MAX[0.05 * b_{AS}, b_{RR} / 1000]; ENDIF; IF b_{RS}=RS:<bandwidth> and b_{RR}=RR:<bandwidth> is not present THEN Max_BW_UL:= 0.05 * b_{AS}; ENDIF; ENDIF; ENDIF; </pre>

Authorized UMTS QoS Parameter per flow identifier	Derivation from SDP Parameters (see note 4)
	<pre> Max_BW_DL:= 0.05 * b_{AS}; ENDIF; ELSE Max_BW_UL:= as set by the UE manufacture; Max_BW_DL:= as set by the UE manufacture; ENDIF; ENDIF; ENDIF; ELSE No authorization is done ; ENDIF ; </pre>
Maximum Authorized Traffic Class [MaxTrafficClass] per flow identifier (see NOTE 1, 2 and3)	<pre> IF SBLP is applied THEN IF (all media IP flows of media type "audio" or "video" for the session are unidirectional and have the same direction) THEN MaxService:= streaming; ELSE MaxService:= conversational; ENDIF; CASE <media> OF "audio": MaxTrafficClass:= MaxService; "video": MaxTrafficClass:= MaxService; "application": MaxTrafficClass:=conversational; "data": MaxTrafficClass:=interactive with priority 3; "control": MaxTrafficClass:=interactive with priority 1; /*new media type*/ OTHERWISE: MaxTrafficClass:=background; END; ELSE No authorization is done ; ENDIF ; </pre>
<p>NOTE 1: The Maximum Authorized Traffic Class for a RTCP IP flow is the same as for the corresponding RTP media IP flow.</p> <p>NOTE 2: When audio or video IP flow(s) are removed from a session, the parameter MaxService shall keep the originally assigned value.</p> <p>NOTE 3: When audio or video IP flow(s) are added to a session, the UE shall derive the parameter MaxService taking into account the already existing media IP flows within the session</p> <p>NOTE 4: The SDP parameters are described in RFC 2327 [9].</p> <p>NOTE 5: The 'b=RS:' and 'b=RR:' SDP bandwidth modifiers are defined in RFC 3556 [10].</p>	

The UE should per ongoing session store the Authorized UMTS QoS parameters per flow identifier.

Before activate or modify a PDP context the UE should check that the requested Guaranteed Bitrate UL/DL (if the Traffic Class is Conversational or Streaming) or the requested Maximum Bitrate UL/DL (if the Traffic Class is Interactive or Background) does not exceed the Maximum Authorized Bandwidth UL/DL per PDP context (calculated according to the rule in table 7.2.2.2). If the requested Guaranteed Bitrate UL/DL or the requested Maximum Bitrate UL/DL exceeds the Maximum Authorized Bandwidth UL/DL per PDP context, the UE should reduce the the requested Guaranteed Bitrate UL/DL or the requested Maximum Bitrate UL/DL to the Maximum Authorized Bandwidth UL/DL per PDP context. Furthermore, if the rule in table 7.2.2.1 for calculating Traffic Class per flow identifier is implemented, the UE should check that the requested UMTS QoS parameter Traffic Class does not exceed the Maximum Authorized Traffic Class per PDP context (calculated according to the rule in table 7.2.2.2). If the requested UMTS QoS parameter Traffic Class exceeds the Maximum Authorized Traffic Class per PDP context, the UE should reduce the the requested UMTS QoS parameter Traffic Class to the Maximum Authorized Traffic Class per PDP context.

Table 7.2.2.2: Rules for calculating the Maximum Authorized Bandwidths and Maximum Authorized Traffic Class per PDP Context in the UE

Authorized UMTS QoS Parameter per PDP Context	Calculation Rule
Maximum Authorized Bandwidth DL and UL per PDP Context	<pre> IF SBLP is applied THEN Maximum Authorized Bandwidth DL/UL per PDP Context is the sum of all Maximum Authorized Bandwidth DL/UL for all the flow identifiers associated with that PDP Context ; IF Maximum Authorized Bandwidth DL/UL per PDP Context > 16000 kbps THEN Maximum Authorized Bandwidth DL/UL per PDP Context = 16000 kbps /* See ref [8] */ END; ELSE No authorization is done ; ENDIF ; </pre>
Maximum Authorized Traffic Class per PDP Context	<pre> IF SBLP is applied THEN Maximum Authorised Traffic Class per PDP Context = MAX [Maximum Authorised Traffic Class per flow identifier among all the flow identifiers associated with that PDP Context] ; ELSE No authorization is done ; ENDIF ; (The MAX function ranks the possible Maximum Authorised Traffic Class values as follows: Conversational > Streaming > Interactive with priority 1 > Interactive with priority 2 > Interactive with priority 3 > Background) </pre>

Annex A (informative): Examples of deriving the Maximum Authorized parameters from the SDP parameters

A.1 Example 1

The relevant SDP parameters (i.e. from which the Maximum Authorized IP QoS and Maximum UMTS QoS Parameters are derived) in the downlink direction are assigned the following values:

Table A.1.1: Values of the relevant SDP parameters in example 1.

```
V=0
o=ecsreid 3262464865 3262464868 IN IP6 2001:0646:00F1:0045:02D0:59FF:FE14:F33A
s=MM01
i=Two unidirectional audio and video media and one bidirectional application media
t=3262377600 3262809600
m=video 51372 RTP/A VP 31
c=IN IP6 2001:0646:000A:03A7:02D0:59FF:FE40:2014
b=AS:128
b=RR:2300
b=RS:3000
a=sendonly
m=audio 49170 RTP/A VP 0
c=IN IP6 2001:0646:000A:03A7:02D0:59FF:FE40:2014
b=AS:64
a=sendonly
m=application 32416 udp wb
c=IN IP6 2001:0646:000A:03A7:0250:DAFF:FE0E:C6F2
b=AS:32
a=landscape
a=sendrecv
```

The IP flows of the session are identified by 5 flow identifiers (see 3GPP TS 29.207 [7] for the definition of a flow identifier):

- Flow identifier <1,1> identifies the video media IP flows downlink and flow identifier <1,2> identifies the RTCP IP flows uplink and downlink associated with the video media IP flows.
- Flow identifier <2,1> identifies the audio media IP flows downlink and flow identifier <2,2> identifies the RTCP IP flows uplink and downlink associated with the audio media IP flows.
- Flow identifier <3,1> identifies the application media IP flows uplink and downlink.

In the PDF, the Maximum Authorized IP QoS parameters per flow identifier are assigned the values, according to table 7.1.1.1, as shown in table A.1.2:

Table A.1.2: The values of the Maximum Authorized IP QoS parameters per flow identifier as calculated by the PDF.

		Flow Identifier				
		<1,1>	<1,2>	<2,1>	<2,2>	<3,1>
Max_DR_DL	(kbps)	128	5.3	64	3.2	32
Max_DR_UL	(kbps)	0	5.3	0	3.2	32
MaxClass		B	B	B	B	A

In the UE, the Maximum Authorized UMTS QoS parameters per flow identifier are assigned the values, according to table 7.2.2.1, as shown in table A.1.3:

Table A.1.3: The values of the Maximum Authorized UMTS QoS parameters per flow identifier as calculated by the UE.

		Flow Identifier				
		<1,1>	<1,2>	<2,1>	<2,2>	<3,1>
Max_BW_DL	(kbps)	128	5.3	64	3.2	32
Max_BW_UL	(kbps)	0	5.3	0	3.2	32
MaxTrafficClass		streaming	streaming	streaming	streaming	conversational

Each pack of IP flow(s) described by a media component must all be carried on the same PDP context. If the UE decides to put each media IP flow(s) and its associated RTCP IP flow on dedicated PDP contexts (three PDP contexts are needed!), then the UE will calculate the values of the Maximum Authorized Bandwidths per PDP context and the Maximum Traffic Class per PDP context, according to table 7.2.2.2, as shown in table A.1.4:

Table A.1.4: The values of the Maximum Authorized UMTS QoS parameters per PDP Context as calculated by the UE.

	PDP context #		
	1	2	3
Maximum Authorized Bandwidth DL (kbps)	133.3	67.2	32
Maximum Authorized Bandwidth UL (kbps)	5.3	3.2	32
Maximum Authorized Traffic Class	streaming	streaming	conversational

For each of the three PDP context activation requests the GGSN will assign a Client Handle to the PDP context activation request and send an Authorization Request message to the PDF containing the Binding Information received in the PDP context activation request message. The PDF calculates the values of the Maximum Authorized Data Rate per Client Handle and a Maximum Authorized QoS Class per Client Handle, according to table 7.1.1.2, as shown in table A.1.5:

Table A.1.5: The values of the Maximum Authorized IP QoS parameters per Client Handle as calculated by the PDF.

	Client Handle corresponding to PDP context #		
	1	2	3
Maximum Authorized Data Rate DL (kbps)	133.3	67.2	32
Maximum Authorized Data Rate UL (kbps)	5.3	3.2	32
Maximum Authorized QoS Class	B	B	A

For each of the three Client Handles the PDF sends these Maximum Authorized IP QoS parameters per Client Handle in an Authorization Decision message to the GGSN. The GGSN derives the values of the Maximum Authorized Bandwidths per PDP context and the Maximum Traffic Class per PDP context, according to table 7.1.2, as shown in table A.1.6:

Table A.1.6: The values of the Maximum Authorized UMTS QoS parameters per PDP context as calculated by the GGSN.

	PDP context #		
	1	2	3
Maximum Authorized Bandwidth DL (kbps)	133.3	67.2	32
Maximum Authorized Bandwidth UL (kbps)	5.3	3.2	32
Maximum Authorized Traffic Class	streaming	streaming	conversational

A.2 Example 2

The relevant SDP parameters in the downlink direction are assigned the following values:

Table A.2.1: Values of the relevant SDP parameters in example 2.

```
V=0
o=ecsreid 3262464321 3262464325 IN IP6 2001:0646:00F1:0045:02D0:59FF:FE14:F33A
s=MM02
i=Two unidirectional audio streams described by one media component
t=3262377600 3262809600
m=audio 49170/2 RTP/A VP 0
c=IN IP6 2001:0646:000A:03A7:02D0:59FF:FE40:2014
b=AS:64
b=RR:2000
b=RS:1000
a=sendonly
```

The IP flows of the session are identified by 4 flow identifiers (see 3GPP TS 29.207 [7] for the definition of a flow identifier):

- Flow identifier <1,1> identifies the audio media IP flows downlink and flow identifier <1,2> identifies the RTCP IP flows uplink and downlink associated with these audio media IP flows.
- Flow identifier <1,3> identifies the other audio media IP flows downlink and flow identifier <1,4> identifies the RTCP IP flows uplink and downlink associated with these audio media IP flows.

The PDF calculates the values of the Maximum Authorized IP QoS parameters per flow identifier, according to table 7.1.1.1, as shown in table A.2.2:

Table A.2.2: The values of the Maximum Authorized IP QoS parameters per flow identifier as calculated by the PDF.

	Flow Identifier			
	<1,1>	<1,2>	<1,3>	<1,4>
Max_DR_DL (kbps)	64	3.0	64	3.0
Max_DR_UL (kbps)	0	3.0	0	3.0
MaxClass	B	B	B	B

The UE calculates the values of the Maximum Authorized UMTS QoS parameters per flow identifier, according to table 7.2.2.1, as shown in table A.2.3:

Table A.2.3: The values of the Maximum Authorized UMTS QoS parameters per flow identifier as calculated by the UE.

	Flow Identifier			
	<1,1>	<1,2>	<1,3>	<1,4>
Max_BW_DL (kbps)	64	3.0	64	3.0
Max_BW_UL (kbps)	0	3.0	0	3.0
MaxTrafficClass	streaming	streaming	streaming	streaming

As all IP flows are described by the same media component the UE must let all IP flows be carried on one PDP context. The UE will calculate the values of the Maximum Authorized Bandwidths per PDP Context and the Maximum Traffic Class per PDP Context, according to table 7.2.2.2, as shown in table A.2.4:

Table A.2.4: The values of the Maximum Authorized UMTS QoS parameters per PDP Context as calculated by the UE.

	PDP context #
	1
Maximum Authorized Bandwidth DL (kbps)	134.0
Maximum Authorized Bandwidth UL (kbps)	6.0
Maximum Authorized Traffic Class	streaming

The PDF calculates the values of the Maximum Authorized Data Rate per Client Handle and the Maximum Authorized QoS Class per Client Handle, according to table 7.1.1.2, as shown in table A.2.5:

Table A.2.5: The values of the Maximum Authorized IP QoS parameters per Client Handle as calculated by the PDF.

	Client Handle corresponding to PDP context #
	1
Maximum Authorized Data Rate DL (kbps)	134.0
Maximum Authorized Data Rate UL (kbps)	6.0
Maximum Authorized QoS Class	B

The GGSN derives the values of the Maximum Authorized Bandwidths per PDP context and the Traffic Class per PDP context, according to table 7.1.2, as shown in table A.2.6:

Table A.2.6: The values of the Maximum Authorized UMTS QoS parameters per PDP context as calculated by the GGSN.

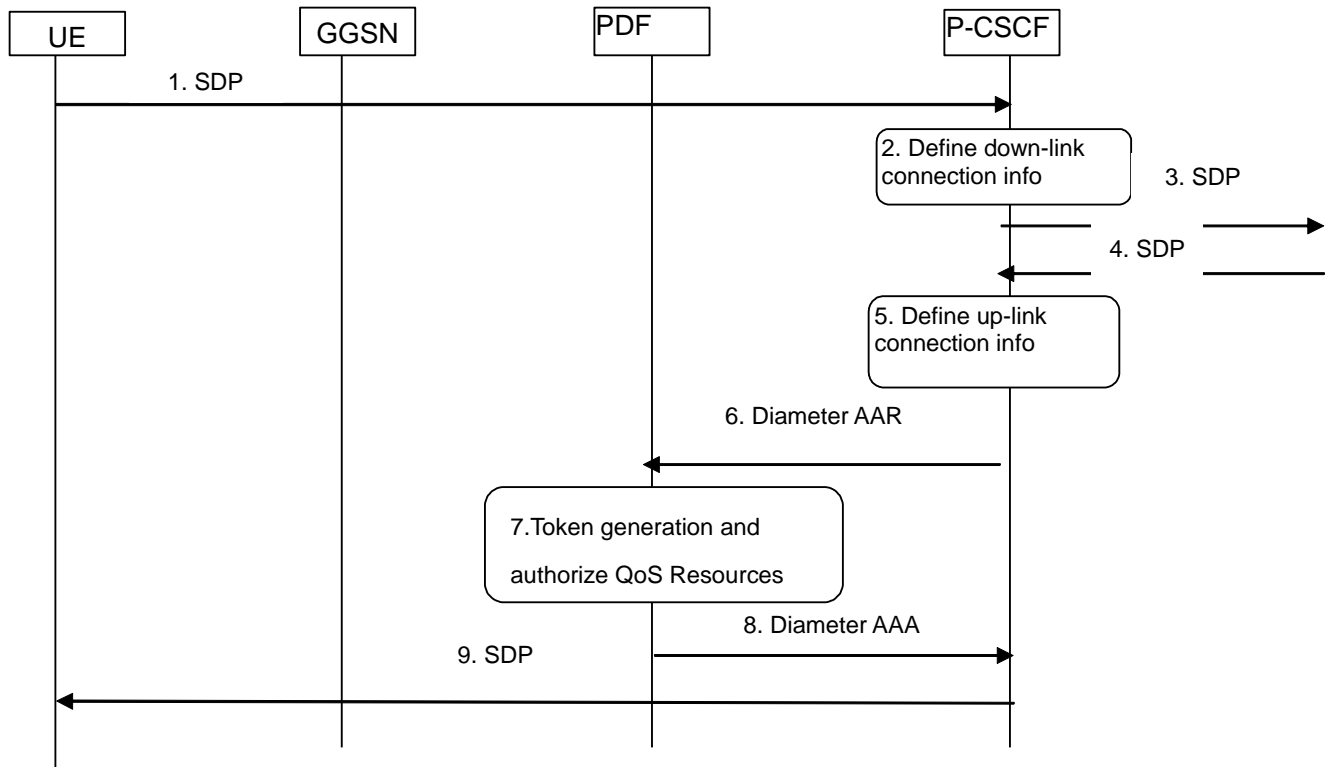
	PDP context #
	1
Maximum Authorized Bandwidth DL (kbps)	134.0
Maximum Authorized Bandwidth UL (kbps)	6.0
Maximum Authorized Traffic Class	streaming

Annex B (normative): Signalling Flows for IMS

B.1 Authorize QoS resources

B.1.1 Authorize QoS resources at originating P-CSCF and PDF at IMS session establishment

This clause covers the Authorize QoS resources procedure at the originating P-CSCF and PDF at IMS session establishment.



Legend:

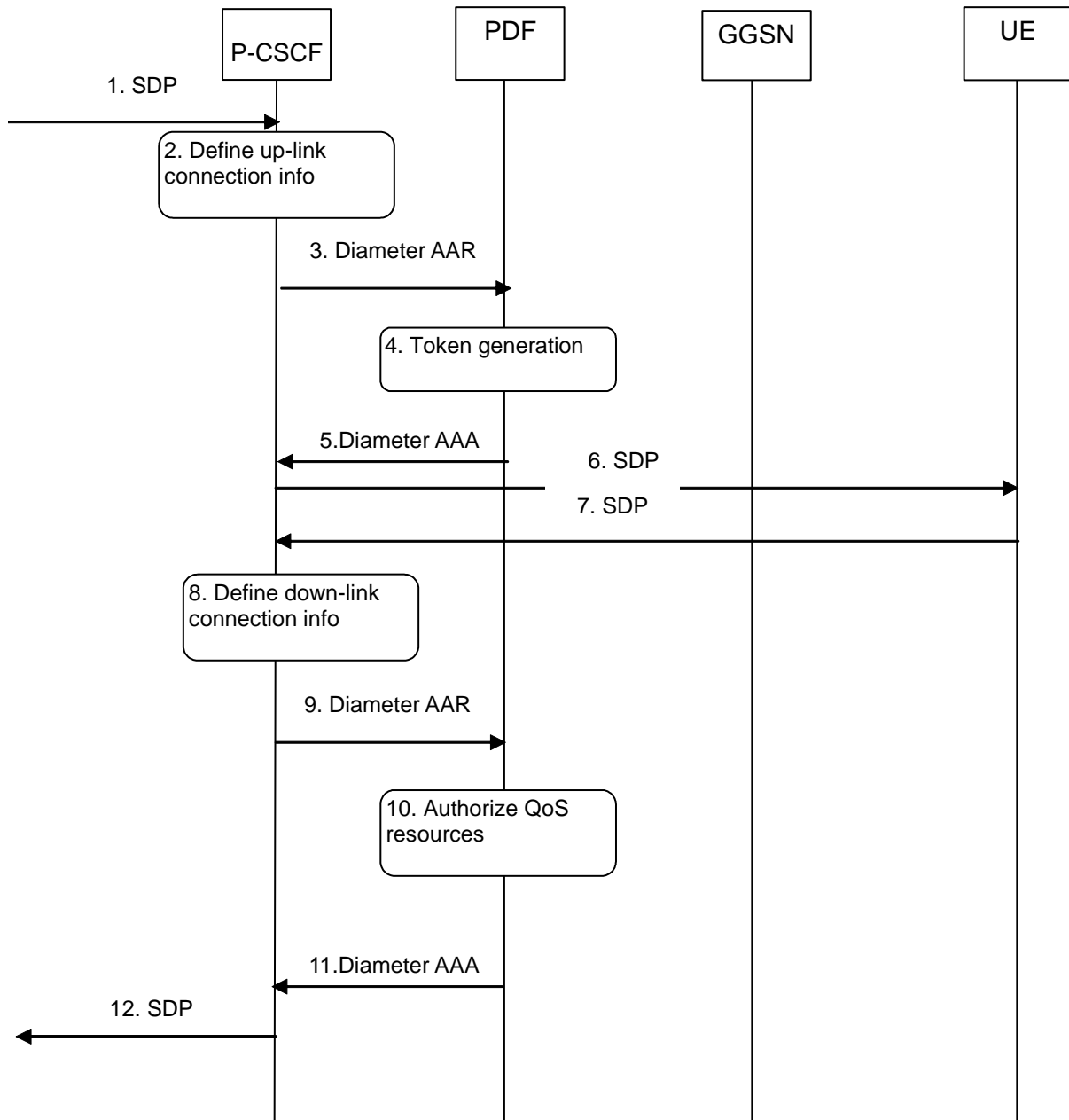
→ Mandatory

1. The P-CSCF receives the SDP parameters defined by the originator within an SDP offer in SIP signalling.
2. The P-CSCF identifies the connection information needed (IP address of the down link IP flow(s), port numbers to be used etc...).
3. The P-CSCF forwards the SDP offer in SIP signalling.
4. The P-CSCF gets the negotiated SDP parameters from the terminating side through SIP signalling interaction.
5. The P-CSCF identifies the connection information needed (IP address of the up-link media IP flow(s), port numbers to be used etc...).
6. The P-CSCF forwards the derived session information to the PDF and requests an authorization token by sending a Diameter AAR for a new Diameter session.
7. The PDF authorizes every component negotiated for the session. An authorization token is generated by the PDF.
8. The PDF sends the authorization token to the P-CSCF.
9. Upon successful authorization of the session the SDP parameters and the Authorization token are passed to the UE in SIP signalling.

Figure B.1.1: Authorize QoS resources at originating PDF

B.1.2 Authorize QoS resources at terminating P-CSCF and PDF at IMS session establishment

This clause covers the Authorize QoS resources procedure at the terminating P-CSCF and PDF at IMS session establishment.

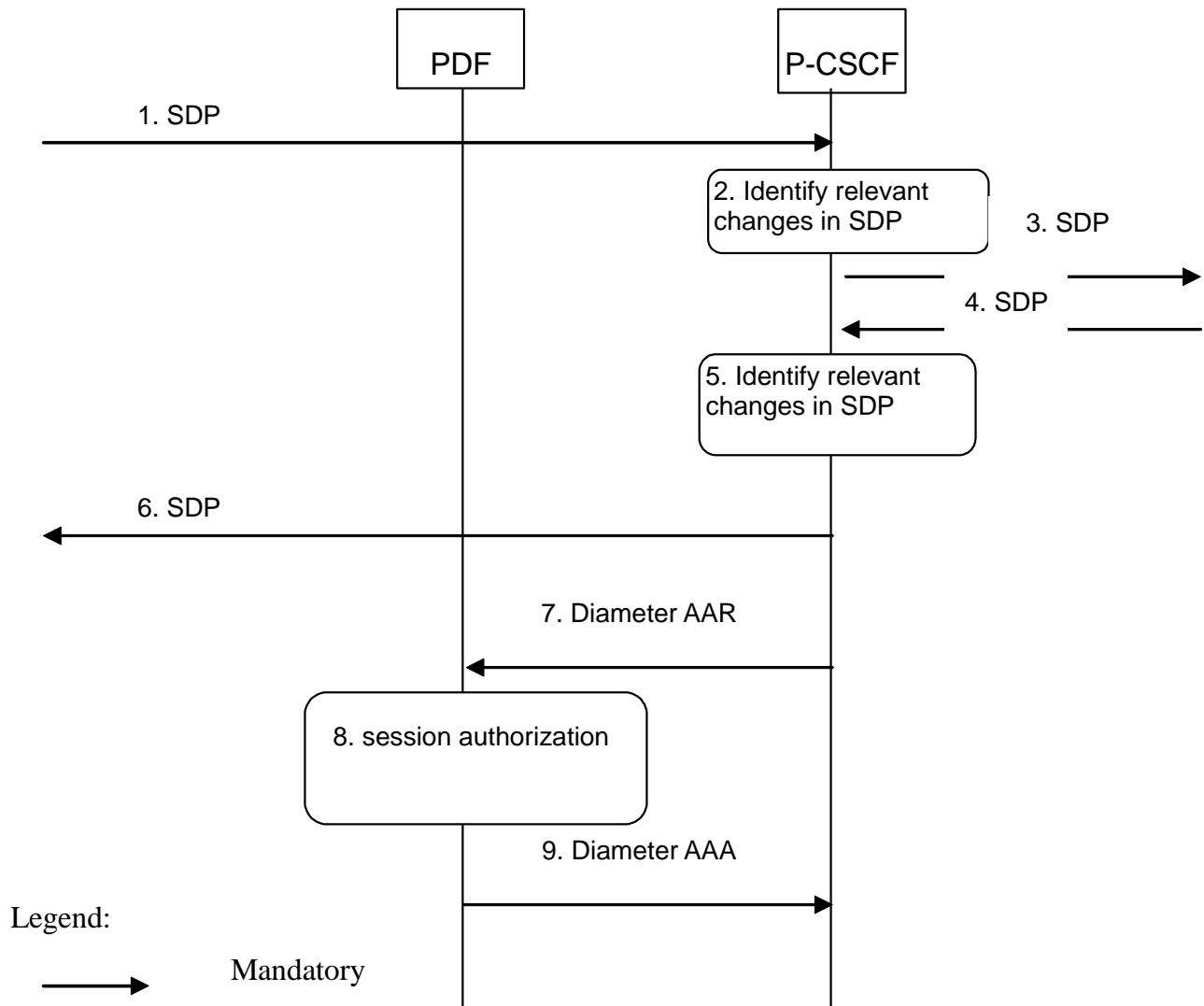


1. The P-CSCF receives the SDP parameters defined by the originator.
2. The P-CSCF identifies the connection information needed (IP address of the up-link IP flow(s), port numbers to be used etc...).
3. The P-CSCF requests the Authorisation Token from the PDF by sending a Diameter AAR for a new Diameter session.
4. An authorization token is generated by the PDF.
5. The PDF sends the authorization token to the P-CSCF.
6. The P-CSCF sends the SDP offer and the authorization token to the UE-
7. The P-CSCF receives the negotiated SDP parameters from the UE.
8. The P-CSCF identifies the connection information needed (IP address of the down-link IP flow(s), port numbers to be used etc...).
9. The P-CSCF forwards the derived service information to the PDF by sending a Diameter AAR for the existing Diameter session.
10. The PDF authorizes every component negotiated for the session.
11. The PDF sends an Diameter AAA to the P-CSCF.
12. Upon successful authorization of the session the SDP parameters in the SDP answer are passed to the originator.

Figure B.1.2: Authorize QoS resources at terminating PDF

B.1.3 Authorize QoS resources at IMS session modification

This clause covers the Authorize QoS resources procedure at IMS session modification both at the originating and terminating side.



1. The P-CSCF receives the SDP parameters defined by the originator within an SDP offer in SIP signalling.
2. The P-CSCF identifies the relevant changes in the SDP.
3. The P-CSCF forwards the SDP offer in SIP signalling.
4. The P-CSCF gets the negotiated SDP parameters from the terminating side through SIP signalling interaction.
5. The P-CSCF identifies the relevant changes in the SDP.
6. The P-CSCF forwards the SDP answer in SIP signalling.
7. The P-CSCF sends a Diameter AAR for an existing Diameter session and includes the derived updated service information.
8. The PDF authorizes the received service information. The PDF may need to approve or remove the QoS commit (see Clauses B.3 and B.4, respectively), revoke the authorization for GPRS and IP resources at media component removal (see Clause B.5.2), or perform a Session modification initiated SBLP authorization decision (see Clause B.8) due to the updated service information.
9. The PDF answers with a Diameter AAA.

Figure B.1.3: Authorize QoS resources at IMS session modification

B.2 Resource reservation flow with Service-based local policy

Clause 5 applies.

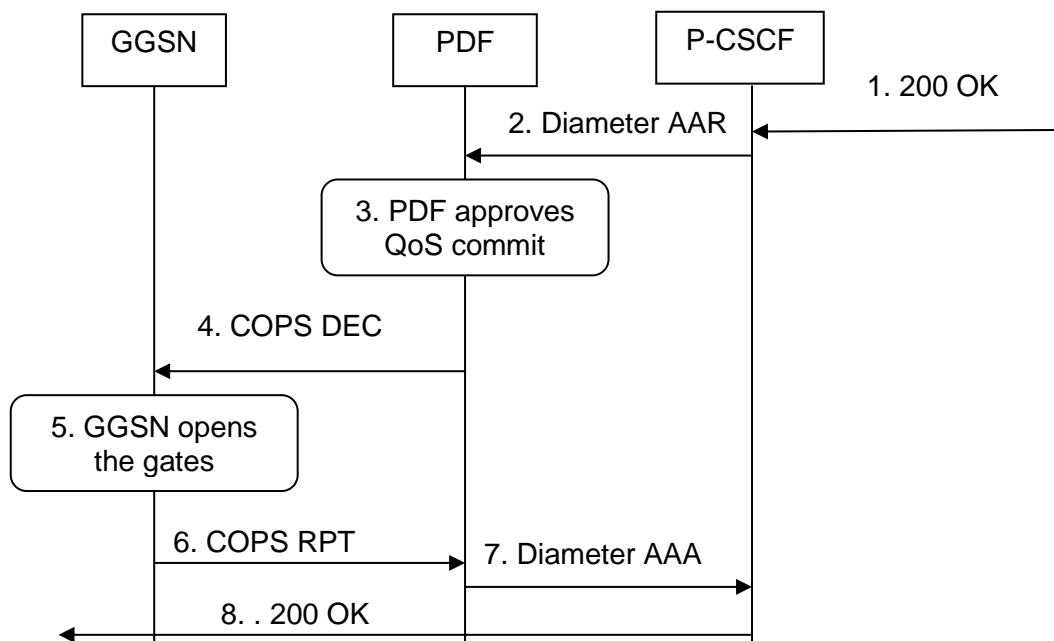
B.3 Approval of QoS commit

Through Approval of QoS Commit the PDF makes a final decision to enable the allocated QoS resource for the authorized IP flows of the media component (s) if the QoS resources are not enabled at the time they are authorized by the PDF or if the media IP flow(s) previously placed on hold are resumed, i.e. the media IP flow(s) of the media component that was placed on hold at the time of the resource authorization or at a later stage is reactivated (with SDP direction sendrecv, sendonly, recvonly or none direction).

The Approval of QoS Commit procedure is triggered by the P-CSCF receiving a 200 OK response to an INVITE request or a 200 OK response to an UPDATE request within a confirmed dialogue. When receiving those 200 OK responses, the PDF shall take the SDP direction attribute in the latest received SDP (either within the 200 OK or a previous SIP message) into account when deciding, which gates shall be opened:

- For a unidirectional SDP media component, the Approval of QoS Commit procedure shall not be triggered for the possible media IP flows in the opposite direction.
- For an inactive SDP media component, the Approval of QoS Commit procedure shall not be triggered for the media IP flows.

Figure B.3.1.1 is applicable to the Mobile Originating (MO) side and the Mobile Terminating (MT) side.



Legend:

→ Mandatory

1. The P-CSCF receives the 200 OK message complying with the conditions specified in the paragraphs above.
2. The P-CSCF sends a Diameter AAR message to the PDF, requesting that gates shall be opened.
3. The PDF approves the QoS Commit.
4. The PDF sends COPS DEC message(s) to the GGSN to open the 'gates' e.g. enable the use of the authorised QoS resources.
5. The GGSN receives the COPS DEC message(s) and opens the 'gates' e.g. enables the use of the authorised QoS resources.
6. The GGSN sends COPS RPT message(s) back to the PDF.
7. The PDF sends a Diameter AAA to the P-CSCF.
8. The P-CSCF forwards the 200 OK message.

Figure B.3.1.1: Approval of QoS Commit to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

B.4 Removal of QoS commit

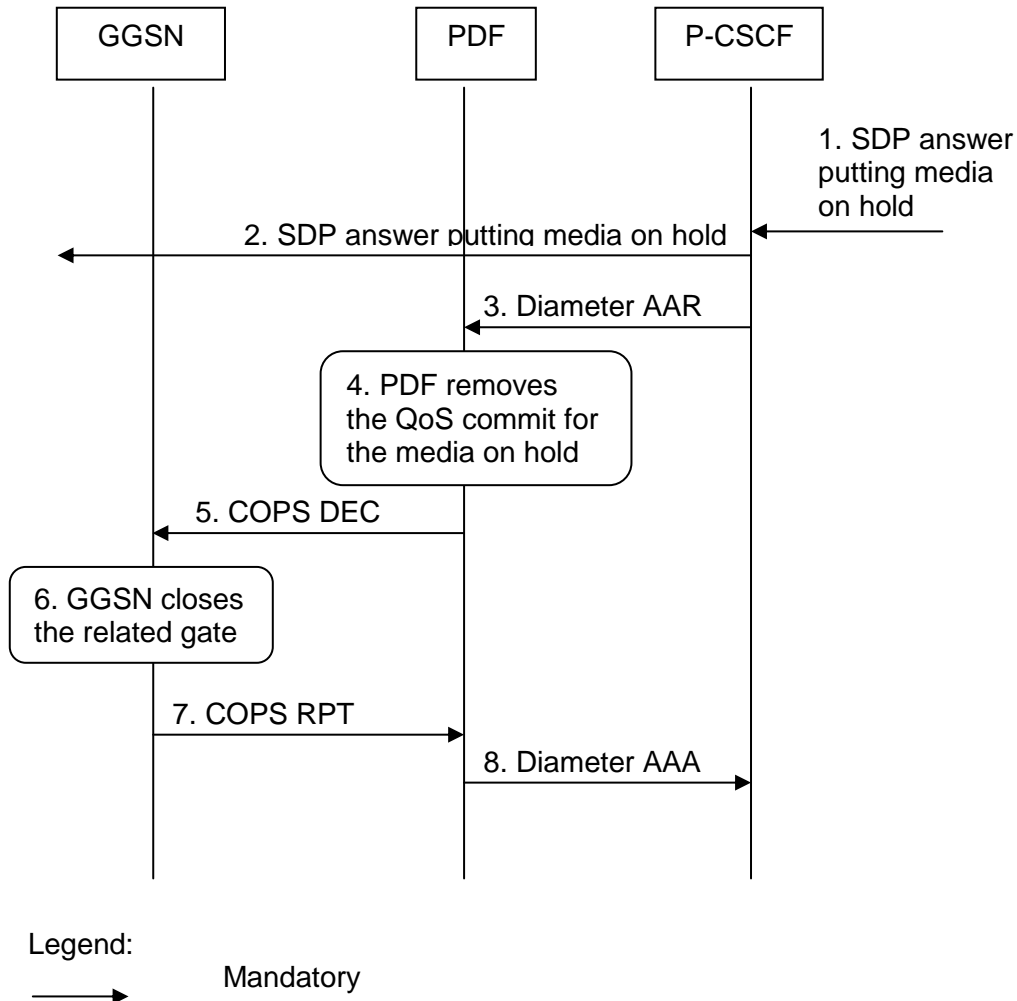
The "Removal of QoS commit" procedure is used e.g. when a session is released and the related IP flows are removed from a PDP context that multiplexes IP flows from several sessions, or when media IP flow(s) of a session are put on hold (e.g. in case of a media re-negotiation or call hold). The PDF decision of "Removal of QoS commit" shall be sent as a separate decision to the GGSN corresponding to the previous "Authorize QoS Resources" request.

B.4.1 Removal of QoS commit at Media on Hold

Media is placed on hold as specified in RFC 3264 [11]. Media modified to become inactive (SDP direction attribute) shall also be considered to be put on hold.

If a bidirectional media component is placed on hold by making it unidirectional, the QoS Commit shall only be removed in the deactivated direction. If a media component is placed on hold by making it inactive, the QoS Commit shall be removed in both directions.

Figure B.4.1.1 presents the "Removal of QoS commit" procedure at media on hold to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.



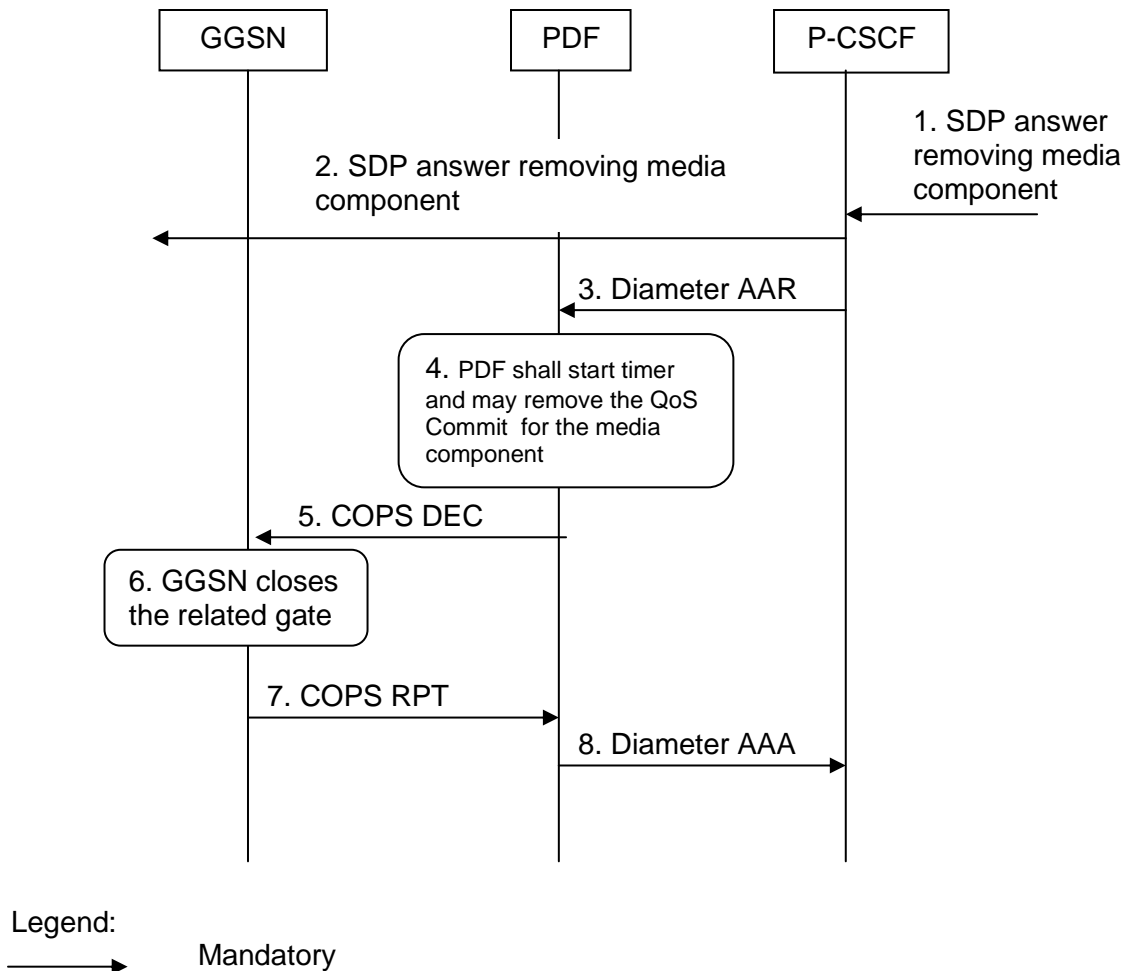
1. The P-CSCF receives an SDP answer putting media on hold within a SIP message. (NOTE 1)
2. The P-CSCF forwards the SDP answer putting media on hold within a SIP message.
3. The P-CSCF sends a Diameter AAR request to the PDF, requesting that gates shall be closed.
4. The PDF removes the QoS commit for the media on hold.
5. The PDF sends the COPS DEC message(s) to the GGSN to close the relevant media IP flow gate(s), leaving the possible related RTCP gate(s) open to keep the connection alive.
6. The GGSN receives the COPS DEC message(s) and closes the requested gate(s).
7. The GGSN sends the COPS RPT message(s) back to the PDF.
8. The PDF sends a Diameter AAA message back to the P-CSCF.

NOTE 1: This procedure occurs whenever a bidirectional media is made unidirectional or when a media is changed to inactive.

Figure B.4.1.1: Removal of QoS commit at Media on Hold to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

B.4.2 Removal of QoS commit at media component removal

Figure B.4.2.1 presents the "Removal of QoS commit" procedure at media component removal for both the Mobile Originating (MO) side and the Mobile Terminating (MT) side. This procedure is optional. In addition, the procedure in Clause B.5.2 applies in this situation after timer expiry.



1. The P-CSCF receives an SDP answer removing media component.
2. The P-CSCF forwards the SDP answer removing media component.
3. The P-CSCF sends a Diameter AAR to the PDF, requesting that corresponding gates shall be closed.
4. The PDF shall start timer and may remove the QoS commit for the related IP flow(s) of the media component. After timer expiry, Figure B.5.1.1 applies.
5. The PDF sends a COPS DEC message to the GGSN to close the related 'gate(s)'.
6. The GGSN receives the COPS DEC message and closes the 'gate(s)'.
7. The GGSN sends a COPS RPT message back to the PDF.
8. The PDF sends a Diameter AAA message back to the P-CSCF.

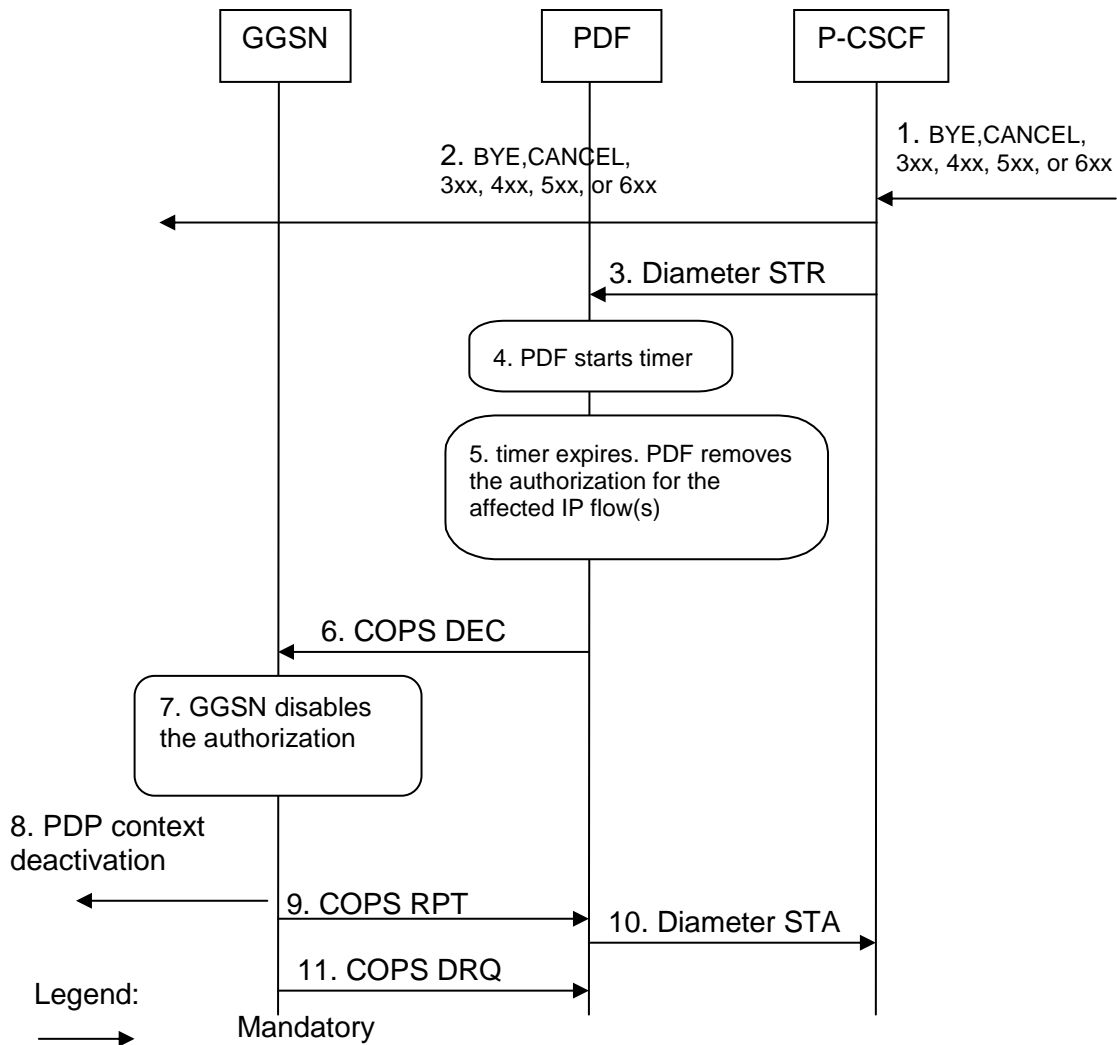
Figure B.4.2.1: Removal of QoS commit at media component removal for both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

B.5 Revoke authorization for GPRS and IP resources

The "Revoke Authorization for GPRS and IP resources" procedure is used e.g. upon session release or upon session redirection of the only or last session of a given client handle (PDP context) or upon SIP final error response initiated after bearer establishment. The PDF decision of "Revoke Authorization for GPRS and IP Resources" shall be sent as a separate decision to the GGSN corresponding to the previous "Authorize QoS Resources" request.

B.5.1 Mobile initiated session release / Network initiated session release

Figure B.5.1.1 presents the "Revoke Authorization for GPRS and IP Resources" at Mobile initiated session release / Network initiated session release (of the only or last session of a given client handle) for both the Mobile Originating (MO) side and the Mobile Terminating (MT) side. The session release may be signalled by a SIP BYE message, by a SIP CANCEL request, or any SIP 3xx redirect response, or any 4xx, 5xx, or 6xx SIP final error response.

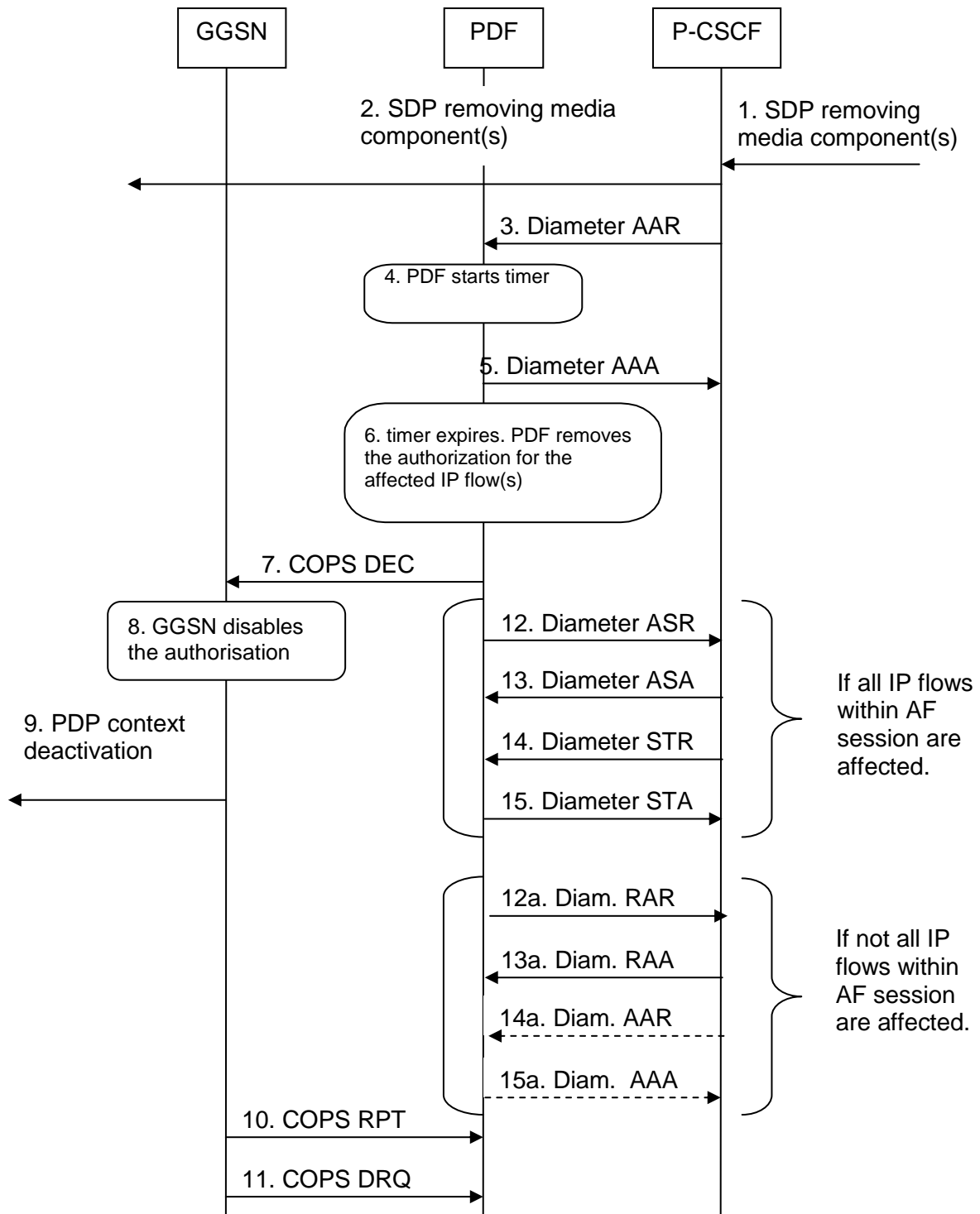


1. SIP BYE message, a SIP CANCEL request, a SIP 3xx redirect response, or any 4xx, 5xx, or 6xx SIP final error response is received by the P-CSCF.
2. P-CSCF forwards the BYE message, or the SIP 3xx redirect response, a SIP CANCEL request, or any 4xx, 5xx, or 6xx SIP final error response.
3. The P-CSCF sends a session termination request to the PDF to initiate the revocation of the authorization
4. PDF starts timer.
5. The timer expires, but the PDF has not been notified that the affected PDP context(s) have been modified or deactivated to match the revoked authorization. The PDF removes the authorization for the IP flow(s) of this session, which it authorized previously.
6. If step 5 occurs, the PDF sends the COPS DEC message(s) to the GGSN including the client handle(s), which identifies the PDP context(s) to be deactivated.
7. The GGSN receives the COPS DEC message, and disables the use of the authorized QoS resources.
8. The GGSN initiates the deactivation of the PDP context(s) used for the IP multimedia session, in case the UE has not done it before.
9. The GGSN sends the COPS RPT message(s) back to the PDF.
10. The PDF indicates the result of the authorization revocation by sending a Diameter session termination answer to the P-CSCF
11. The GGSN sends the COPS DRQ message(s) to the PDF.

Figure B.5.1.1: Revoke authorization for GPRS and IP resources - Mobile initiated session release / Network initiated session release for both Mobile Originating (MO) and Mobile termination side

B.5.2 Media component removal

Figure B.5.2.1 presents the "Revoke Authorization for GPRS and IP Resources" at the removal of media component(s) from an IMS session which is not being released for both the Mobile Originating (MO) side and the Mobile Terminating (MT) side. In addition, the procedure in Clause B.4.2 may have been applied before the PDF removes the authorization for the affected IP flow(s).



1. A SIP message containing SDP indicating the removal of media component(s) is received by the P-CSCF.
2. The P-CSCF forwards the SIP message.
3. The P-CSCF sends Diameter AAR to the PDF with modified service information.
4. PDF starts timer.
5. The PDF send Diameter AAA to P-CSCF
6. The timer expires, but the PDF has not been notified that the affected PDP context(s) have been modified or deactivated to match the revoked authorization. The PDF removes the authorization for the affected IP flow(s), which it authorized previously.
7. If step 6 occurs, the PDF sends the COPS DEC message(s) to the GGSN including the client handle(s), which identifies the PDP context(s) to be deactivated.
8. The GGSN receives the COPS DEC message, and disables the use of the authorized QoS resources.
9. The GGSN initiates the deactivation of the PDP context(s), in case the UE has not done it before.
10. The GGSN sends the COPS RPT message(s) back to the PDF.
11. The GGSN sends the COPS DRQ message(s) to the PDF.

If step 6 occurs and all IP flows within AF session are affected by PDP context release:

12. The PDF indicates the bearer removal to the P-CSCF by sending an abort session request to the P-CSCF.
13. The P-CSCF responds by sending an abort session answer to the PDF.
14. The P-CSCF sends session termination request to the PDF to indicate that the session has been terminated
15. The PDF responds by sending a session termination answer to the P-CSCF.

If step 6 occurs and not all IP flows within AF session are affected by PDP context release:

- 12a. The PDF indicates the PDP context release to the P-CSCF by sending an RAR.
- 13a. The P-CSCF responds by sending an RAA to the PDF.
- 14a. The P-CSCF may send an AAR to the PDF to update the session information.
- 15a. If step 14a occurs, the PDF responds by sending a AAA to the P-CSCF.

**Figure B.5.2.1: Revoke authorization for GPRS and IP resources -
media component removal
for both Mobile Originating (MO) and Mobile Terminating (MT) side**

B.6 Indication of PDP Context Release

Clause 6.4 applies.

B.7 Modification of PDP Context

Clause 6.5 applies.

B.8 Session modification initiated SBLP authorization decision

The GGSN receives an unsolicited authorization decision from the PDF, when a session is modified without adding or removing media lines from SDP (refer to 3GPP TS 29.207 [7]). The procedures in Clause 6.6 apply.

Annex C (informative): Change history

Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
2004-06	NP#24	NP-040247	069		Multiple IMS sessions using the same PDP context	5.8.0	6.0.0
2004-09	NP#25	NP-040338	073		Accumulated CR on Gq impacts	6.0.0	6.1.0
2004-12	NP#26	NP-040555	090	1	Modification of PDP contexts	6.1.0	6.2.0
2004-12	NP#26	NP-040555	082	3	Removal of QoS commit for session modification	6.1.0	6.2.0
2004-12	NP#26	NP-040586	075	2	Clarification on Mapping Table 7.1.1.1	6.1.0	6.2.0
2004-12	NP#26	NP-040586	076	3	Allowing the use of Application identifier for IMS	6.1.0	6.2.0
2004-12	NP#26	NP-040586	074	3	Correcting Mapping Table[Update to existing CR 074 against 29.208]	6.1.0	6.2.0
2004-12	NP#26				MCC make editorial change to correct mis-implemented CR	6.2.0	6.2.1
2005-03	NP#27	NP-050103	095	1	Essential clarification of the scope for call flows	6.2.1	6.3.0
2005-03	NP#27	NP-050103	097	1	Change of port number	6.2.1	6.3.0
2005-06	CP#28	CP-050245	098	4	Various Corrections	6.3.0	6.4.0
2005-06	CP#28	CP-050034	100	1	UE QoS Mapping	6.3.0	6.4.0
2005-09	CP#29	CP-050378	102	1	Mapping of SDP offer	6.4.0	6.5.0
2005-09	CP#29	CP-050378	103	1	Correction of network entities names	6.4.0	6.5.0
2005-12	CP#30	CP-050508	104	2	Correction and clarification of the identity of the radio access network	6.5.0	6.6.0
2006-03	CP#31				MCC make editorial change to correct missing header for §7.1.	6.6.0	6.6.1
2007-06	CT#36	CP-070417	105		QoS mapping clarifications for forking	6.6.1	6.7.0