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Technical Specification

**Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
End-to-end Quality of Service (QoS) signalling flows
(3GPP TS 29.208 version 5.3.0 Release 5)**



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Foreword

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1 Scope

The present specification shows 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 relationship between SIP/SDP session level and the bearer level (RSVP and GPRS) in flows is described in 3GPP TS 24.228 [2]. The present specification adds detailed flows of Service Based Local Policy (SBLP) procedures over the Go interface and their relationship with the bearer level signalling flows over the Gn interface.

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".

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 the following apply:

QoS Class: Class of QoS used in Authorized IP QoS parameters as specified in 3GPP TS 29.207 [7].

3.2 Abbreviations

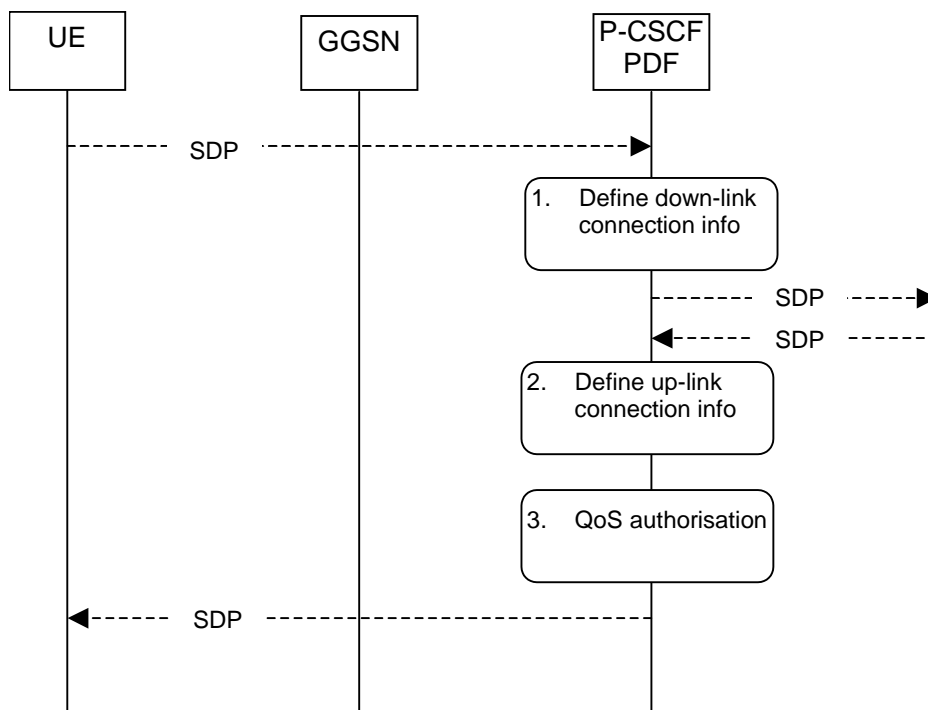
For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply:

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 originating PDF

This clause covers the Authorize QoS resources procedure at the originating PDF.

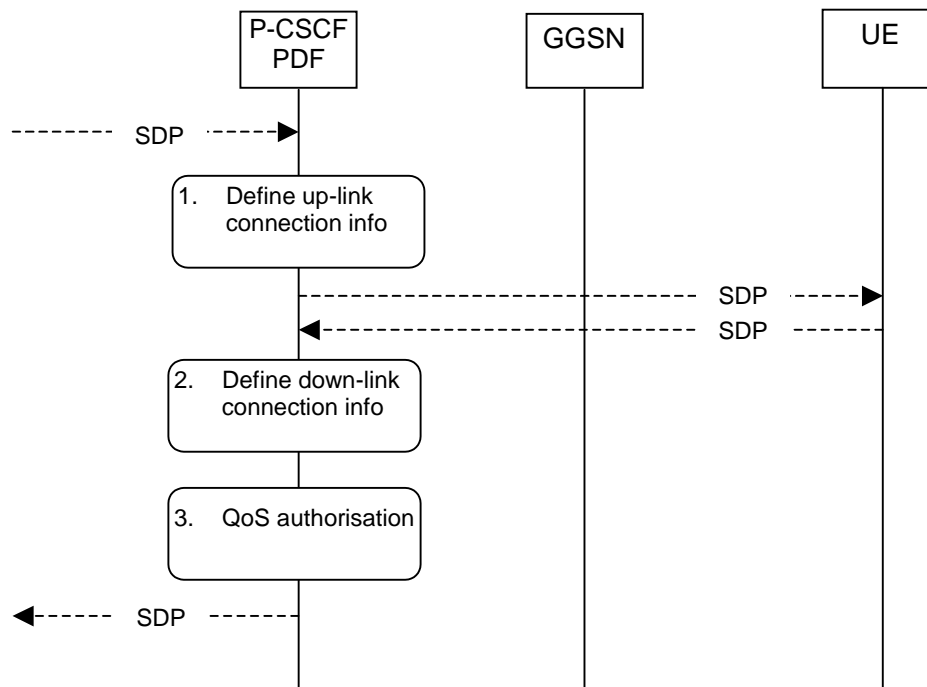


1. The P-CSCF(PDF) gets the SDP parameters defined by the originator and identifies the connection information needed (IP address of the down link IP flow(s), port numbers to be used etc...).
2. The P-CSCF(PDF) gets the negotiated SDP parameters from the terminating side through SIP signalling interaction. The P-CSCF(PDF) identifies the connection information needed (IP address of the up-link media IP flow(s), port numbers to be used etc...).
3. The P-CSCF(PDF) uses the SDP parameters in order to define the QoS resource authorisation. The PDF authorises every component negotiated for the session. The authorization shall be expressed in terms of IP QoS parameters. An authorization token is generated by the PDF and sent to the UE.

Figure 4.1: Authorize QoS resources at originating PDF

4.2 Authorize QoS resources at terminating PDF

This clause covers the Authorize QoS resources procedure at the terminating PDF.



1. The P-CSCF(PDF) gets the SDP parameters defined by the originator and identifies the connection information needed (IP address of the up-link IP flow(s), port numbers to be used etc...). An authorization token is generated by the PDF and sent to the UE.
2. The P-CSCF(PDF) receives the negotiated SDP parameters from the UE. The P-CSCF(PDF) identifies the connection information needed (IP address of the down-link IP flow(s), port numbers to be used etc...).
3. The P-CSCF(PDF) uses the SDP parameters in order to define the QoS resource authorisation. The PDF authorises every media component negotiated for the session. The authorization shall be expressed in terms of IP QoS parameters.

Figure 4.2: Authorize QoS resources at terminating PDF

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 interface. The Go interface allows the service based local policy and QoS interworking information to be requested by the GGSN from a PDF.

Figure 5.1 presents the "Resource Reservation" procedure at PDP context activation to both the Mobile Originating (MO) side and Mobile Terminating (MT) side.

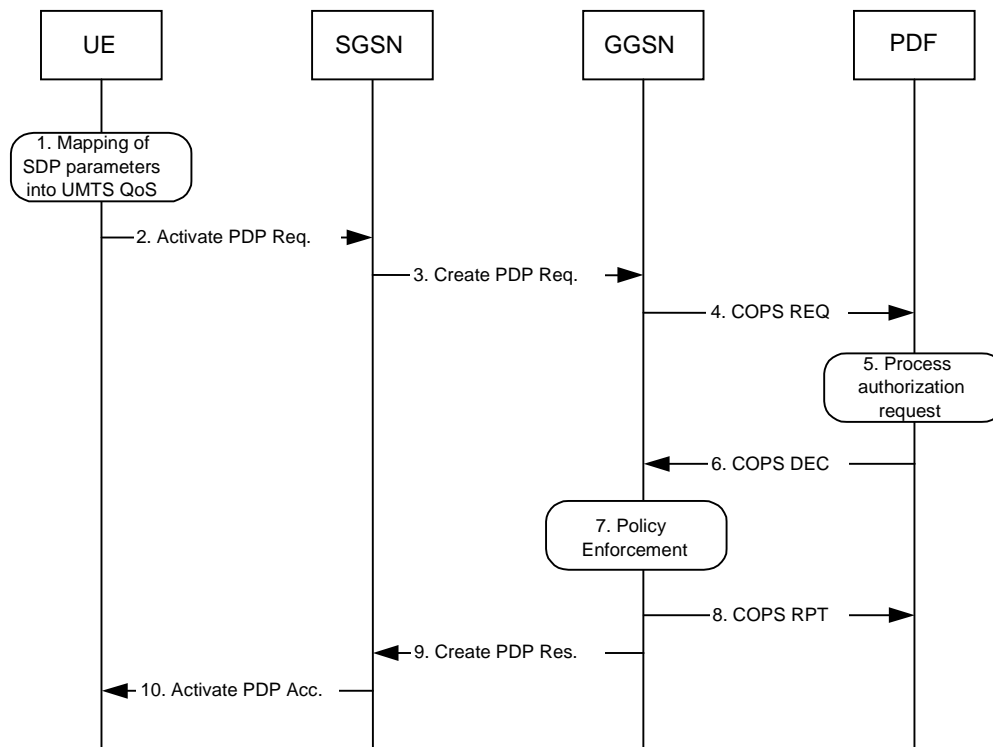


Figure 5.1: Resource reservation flow with service based local policy

1. Mapping from SDP to UMTS QoS parameters

The UE uses the SDP parameters in order to define the UMTS QoS parameter needed to request a PDP context. The QoS parameter mapping mechanism is described in clause 7.2.

2. GPRS: Activate PDP Context Request (UE to SGSN)

The UE sends an Activate PDP Context Request message to the SGSN with the UMTS QoS parameters. The UE shall include binding information in the PDP context activation messages to associate the PDP context bearer with policy information. The authorization token is sent by the P-CSCF to the UE during SIP signalling.

3. GPRS: Create PDP Context Request (SGSN to GGSN)

The SGSN carries out the procedures identified in 3GPP TS 23.060 [4] related to the PDP context activation.

4. COPS: REQ (GGSN to PDF)

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. Process Resource Request (PDF)

The PDF receives the information sent by the GGSN. The PDF identifies the multimedia session by using the binding information. The PDF performs an authorization decision.

6. COPS: DEC (PDF to GGSN)

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. Policy Enforcement (GGSN)

The GGSN enforces the PDF policy decision based on the received authorization information from the PDF for the media components carried by the PDP context.

8. COPS: RPT (GGSN to PDF)

The GGSN sends COPS RPT message back to the PDF and reports its success or failure in carrying out the PDF decision.

9. GPRS: Create PDP Context Response (GGSN to SGSN)

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.

10. GPRS: Activate PDP Context Accept (SGSN to UE)

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 successfully for both downlink and uplink.

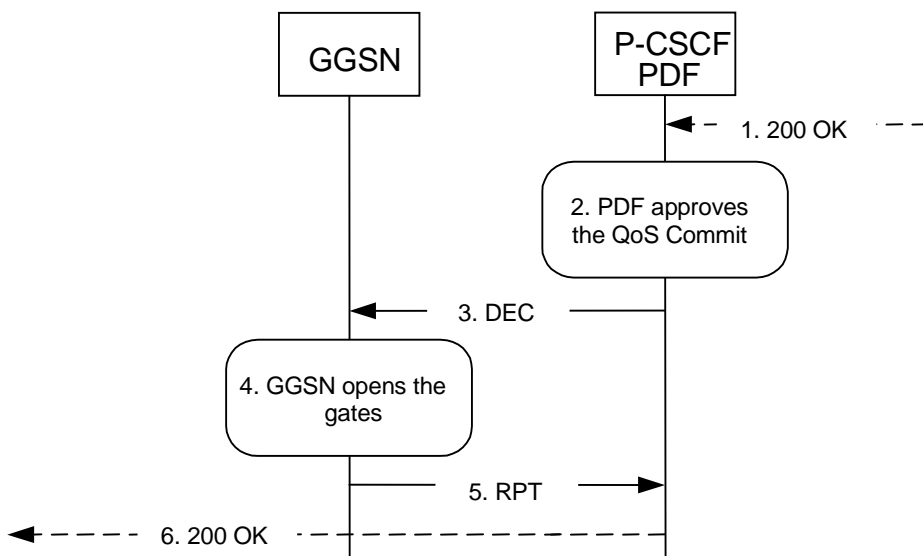
6 Other flows over Go interface

6.1 Approval of QoS commit

Through Approval of QoS Commit the PDF makes a final decision to enable the allocated QoS resource for the authorized media stream(s) if the QoS resources are not enable at the time they are authorized by the PDF or if the authorized media stream previously placed on hold is resumed i.e. the media stream that was previously inactive 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 message.

Figure 6.1 is applicable to the Mobile Originating (MO) side and the Mobile Terminating (MT) side.



1. P-CSCF receives the 200 OK message.
2. PDF approves the QoS Commit.
3. PDF sends COPS DEC message(s) to the GGSN to open the 'gates' e.g. enable the use of the authorised QoS resources.
4. GGSN receives the COPS DEC message(s) and opens the 'gates' e.g. enables the use of the authorised QoS resources.
5. GGSN sends COPS RPT message(s) back to the PDF.
6. P-CSCF forwards the 200 OK message.

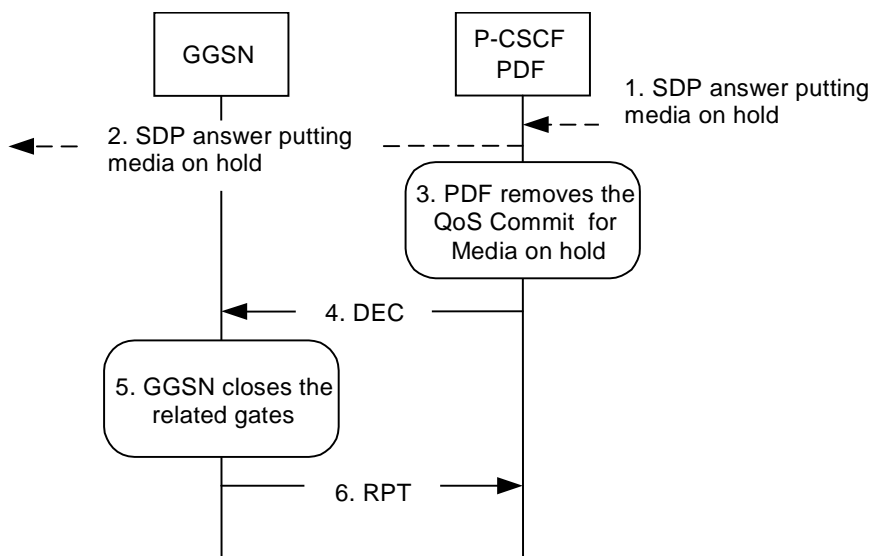
Figure 6.1: Approval of QoS Commit to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

6.2 Removal of QoS commit

The "Removal of QoS commit" procedure is used e.g. when a media component of a session is 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.

6.2.1 Removal of QoS commit at Session on Hold

Figure 6.2.1 presents the "Removal of QoS commit" procedure at session on hold to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.

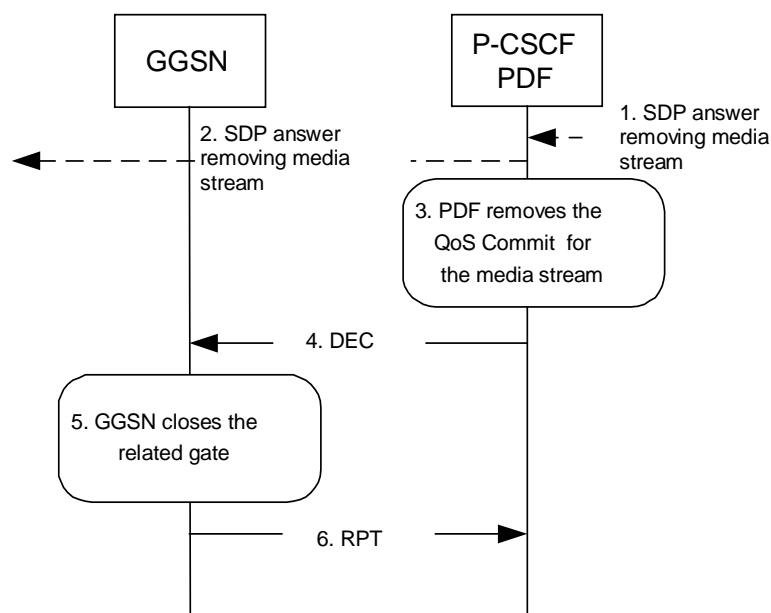


1. P-CSCF receives an SDP answer putting media on hold within a SIP message i.e. the media is set to "inactive".
2. P-CSCF forwards an SDP answer putting media on hold within a SIP message.
3. PDF removes the QoS commit for the media on hold.
4. PDF sends COPS DEC message(s) to the GGSN to close the related 'gates'.
5. GGSN receives the COPS DEC message(s), closes the 'gates'.
6. GGSN sends COPS RPT message(s) back to the PDF.

Figure 6.2.1: Removal of QoS commit at Session on Hold to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

6.2.2 Removal of QoS commit at media stream remove

Figure 6.2.2 presents the "Removal of QoS commit" procedure at media stream remove to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.



1. P-CSCF receives an SDP answer removing media stream.
2. P-CSCF forwards the SDP answer removing media stream.
3. PDF removes the QoS commit for the related media stream.
4. PDF sends a COPS DEC message to the GGSN to close the related 'gate'.
5. GGSN receives the COPS DEC message, closes the 'gate'.
6. GGSN sends a COPS RPT message back to the PDF.

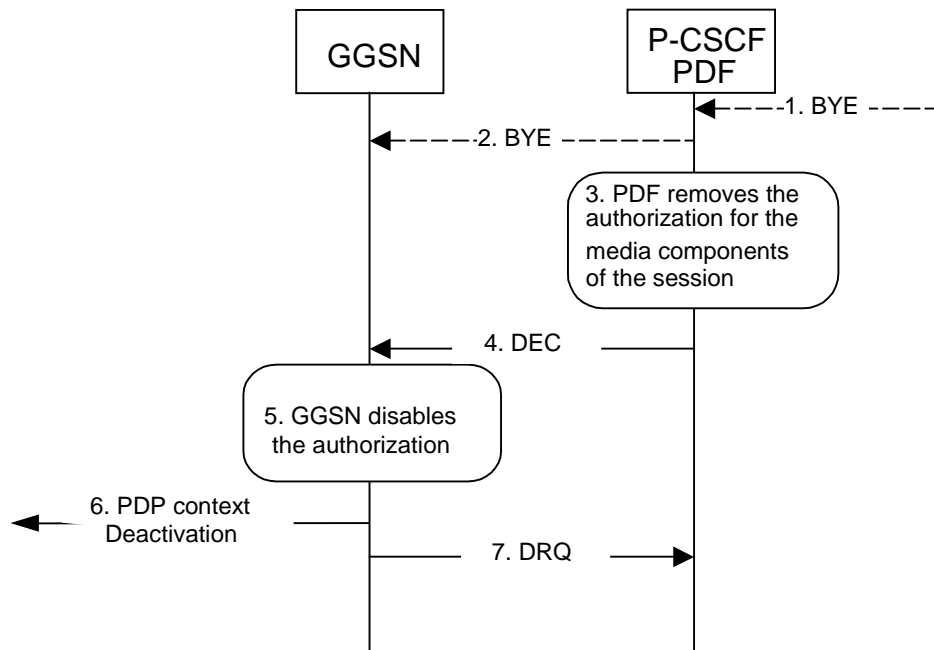
Figure 6.2.2: Removal of QoS commit at media stream remove to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

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. The PDF decision of "Revoke Authorization for UMTS and IP Resources" shall be sent as a separate decision to the GGSN corresponding to the previous "Authorize QoS Resources" request.

6.3.1 Mobile initiated session release / Network initiated session release

Figure 6.3.1 presents the "Revoke Authorization for UMTS and IP Resources" at upon Mobile initiated session release / Network initiated session release to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.



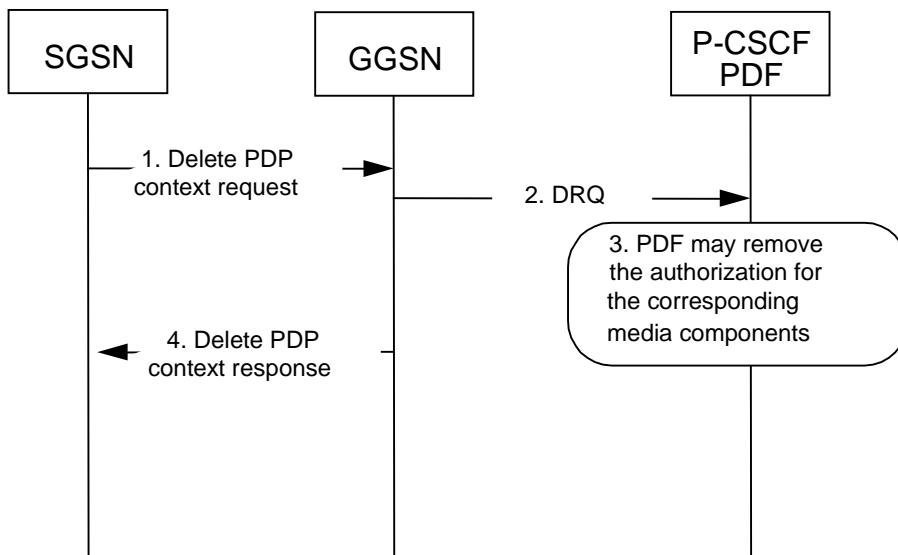
1. One mobile party hangs up or the P-CSCF or S-CSCF initiates BYE message.
2. P-CSCF forwards the BYE message.
3. PDF removes the authorisation for the media component(s) of this session.
4. PDF sends COPS DEC message(s) to the GGSN including client handle(s), which identifies the PDP context(s) to be deactivated.
5. GGSN receives the COPS DEC message, and disables the use of the authorized QoS resources.
6. GGSN initiates deactivation of the PDP context(s) used for the IP multimedia session, in case the UE has not done it before.
7. GGSN sends COPS DRQ message(s) back to the PDF.

Figure 6.3.1: Revoke authorization for GPRS and IP resources - Mobile initiated session release / Network initiated session release to both Mobile Originating (MO) and Mobile termination side

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.

Figure 6.4.1 presents the "Indication of PDP Context Release" to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.

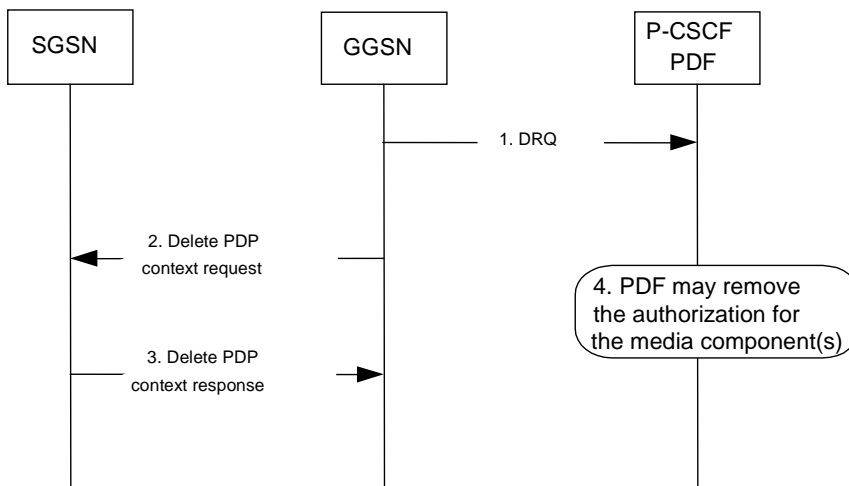


1. SGSN deactivates the PDP context carrying the media component(s) by sending the Delete PDP Context Request message to the GGSN.
2. GGSN sends a COPS DRQ message to the P-CSCF(PDF).
3. P-CSCF(PDF) receives the COPS DRQ message and PDF may remove the authorization for the media component(s) with the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

NOTE: Step 4 may also occur at the same time or before Step 3.

Figure 6.4.1: Indication of PDP Context Release to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

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

NOTE: Step 4 may also occur at the same time or before Step 2 and Step 3.

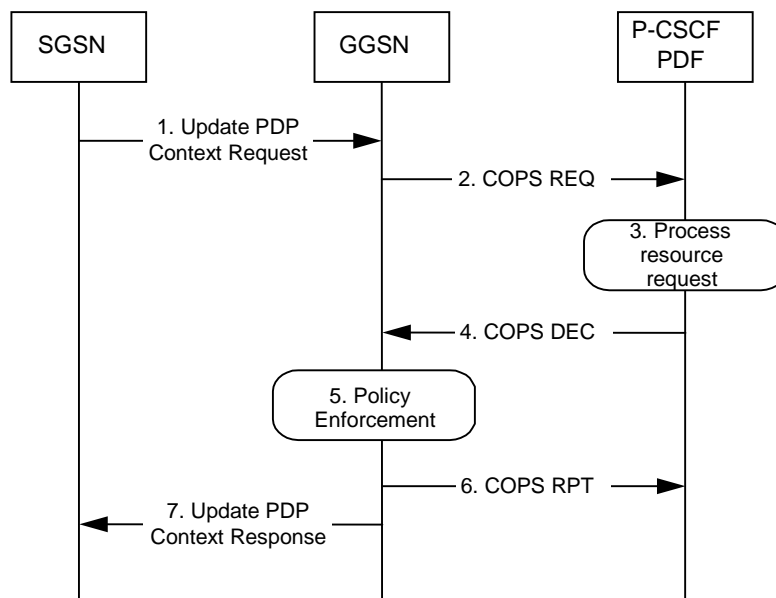
Figure 6.4.2: Indication of GGSN-initiated PDP Context Release to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

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" procedure to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side when the UMTS QoS which were authorized at PDP context activation (or last modification) has been changed by UE.

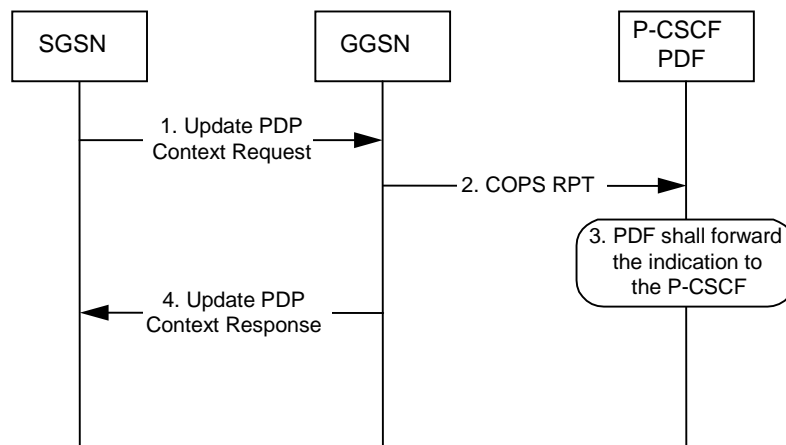


1. A request to modify the PDP context related to the media component(s), of which at least one may have been modified or removed, is indicated by sending the Update PDP Context Request message to the GGSN with the changed UMTS QoS parameters.
2. If the GGSN supports a Local Policy Decision Point(LPDP), 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 5. Otherwise, the GGSN sends a COPS REQ message to the PDF.
3. The PDF receives the COPS REQ message and performs an authorization decision according to the requested modification.
4. 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.
5. The GGSN enforces the policy decision based on the authorization information cached on the GGSN LPDP or received from the PDF for the media component(s) carried by the PDP context.
6. 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.
7. 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 to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

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.



1. SGSN modifies the PDP context related to the media component(s) by sending the Update PDP Context Request message to the GGSN.
2. GGSN sends a COPS RPT message to the PDF notifying the PDP context modification.
3. PDF receives the COPS RPT message and forwards the indication to the P-CSCF. At this point the authorization may be kept or removed depending on operators policies.
4. GGSN sends the Update PDP Context Response message to the SGSN to acknowledge the PDP context modification.

NOTE: Step 4 may also occur at the same time or before Step 3.

Figure 6.5.2: Indication of PDP Context Modification to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side

7 QoS parameter mapping

7.1 QoS parameter mapping between IMS and GPRS

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 forward the relevant SDP information to the PDF together with an indication of the originator. The PDF notes and authorises the chosen media components and their attributes by mapping from SDP parameters 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 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. 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 authorised by the PDF, the PDP context activation or modification shall be accepted.

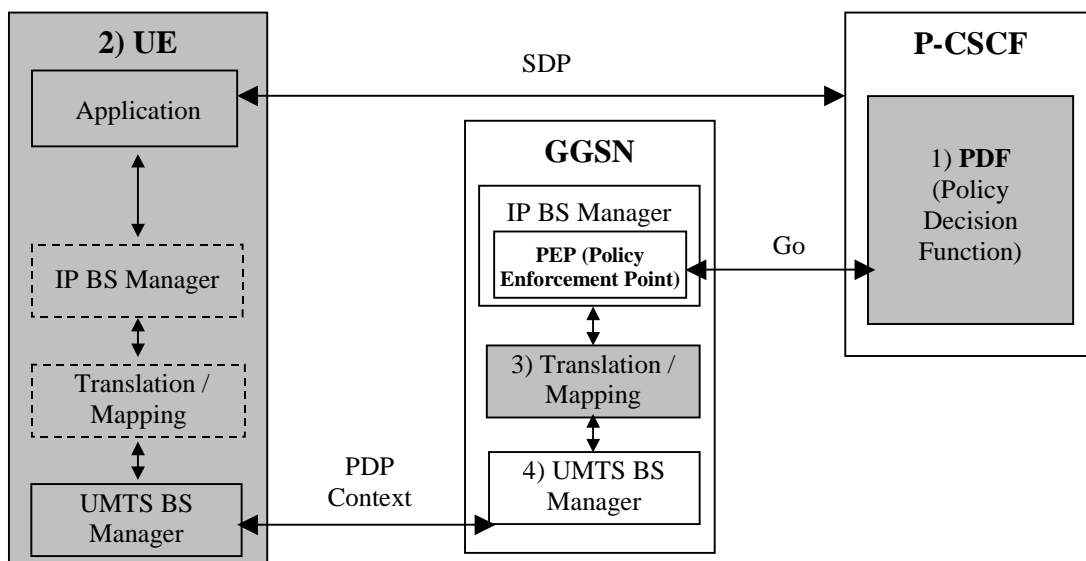
Figure 7.1 indicates the network entities where QoS mapping functionality is required. This mapping is performed by:

1. If SBLP is applied then the PDF maps from the SDP parameters determined from the SIP signalling to the Authorized IP QoS parameters that shall be passed to the GGSN via the Go interface. The mapping is performed for each IP flow of each media component. Upon a request from the GGSN, the PDF combines per direction the individual Authorised IP QoS parameters of the IP flows that are identified by the binding information (see clause 7.1.1).
2. The UE maps from the SDP parameters to IP QoS parameters (if an IP BS manager is present) and to UMTS QoS parameters. This mapping is performed for each IP flow of each media component. 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]) (see clause 7.2.1). If SBLP is applied, i.e. the UE has received an authorization token, then the mapping rules for the authorised QoS parameters should be taken into consideration because they define the maximum values for the different requested bit rates and traffic

classes (see clause 7.2.2). 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.

- 3 The GGSN maps from the Authorized IP QoS parameters received from PDF to the Authorized UMTS QoS parameters (see clause 7.1.2).
- 4 The GGSN compares then 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 shall be compatible in order to ensure that the GGSN will be able to correctly authorise the session.



NOTE 1: If SBLP is applied then SDP parameters to Authorized IP QoS parameters mapping.

NOTE 2: SDP parameters to (IP QoS parameters and) requested UMTS QoS parameters mapping and, if SBLP is applied, also SDP parameters to Authorized UMTS QoS parameters mapping.

NOTE 3: Authorized IP QoS parameters to Authorized UMTS QoS parameters mapping.

NOTE 4: UMTS QoS parameters with Authorized UMTS QoS parameters comparison.

Figure 7.1: Framework for QoS mapping between IMS and GPRS

7.1.1 SDP parameters 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 SDP Parameters. In the case of forking, the various forked responses may have different QoS requirements for the same media component. Each Authorized IP QoS Parameter shall be set to the highest value requested for 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 media component in the PDF

Authorized IP QoS Parameter per media component	Derivation from SDP Parameters
Maximum Authorized Data Rate DL (Max_DR_DL) and UL (Max_DR_UL) per media component (see note 1)	<pre> 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; IF b=AS:<bandwidth> is present THEN IF Direction=downlink THEN IF <transport>="RTP/AVP" then Max_DR_UL:=0.025 * <bandwidth>; Max_DR_DL:=1.025 * <bandwidth>; ELSE Max_DR_UL:=0; Max_DR_DL:=<bandwidth>; ENDIF; ELSE IF Direction=uplink THEN IF <transport>="RTP/AVP" then Max_DR_UL:= 1.025 * <bandwidth>; Max_DR_DL:=0.025 * <bandwidth>; ELSE Max_DR_UL:=<bandwidth>; Max_DR_DL:=0; ENDIF; ELSE /*Direction=both*/ Max_DR_UL:= 1.025 * <bandwidth>; Max_DR_DL:= 1.025 * <bandwidth>; ENDIF; ENDIF; ELSE bw:= as set by the operator; IF Direction=downlink THEN Max_DR_UL:=0; Max_DR_DL:=bw; ELSE IF Direction=uplink THEN Max_DR_UL:=bw; Max_DR_DL:=0; ELSE /*Direction=both*/ Max_DR_UL:=bw; Max_DR_DL:=bw; ENDIF; ENDIF; ENDIF; </pre>

<p>Maximum Authorized QoS Class [MaxClass] per media component (see notes 2, 3 and 4)</p>	<pre> IF (all media components of media type "audio" or "video" for the session are unidirectional and have the same direction) THEN MaxClassDerivation:=B; /*streaming*/ ELSE MaxClassDerivation:=A; /*conversational*/ ENDIF; CASE <media> 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;</pre>
<p>NOTE 1: For a RTP media component the Maximum Authorized Data Rates DL/UL are the sum of the Maximum Authorized Data Rates DL/UL for the RTP media streams and the associated RTCP IP flows DL/UL.</p> <p>NOTE 2: The Maximum Authorized QoS Class for a RTCP IP flow is the same as for the corresponding RTP media stream.</p> <p>NOTE 3: When an audio or video stream is removed from a session, the remaining media streams in the session shall keep the originally assigned maximum Authorized QoS classes.</p> <p>NOTE 4: When an audio or video stream is added to a session, the PDF shall derive the maximum Authorized QoS Class taking into account the already existing media streams within the session.</p>	

The PDF shall per ongoing session store the Authorized IP QoS parameters per media component.

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

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
<p>Maximum Authorized Data Rate DL and UL per Binding Information</p>	<p>Maximum Authorized Data Rate DL/UL per Client Handle is the sum of all Maximum Authorized Data Rate DL/UL per media component for all the media components associated with that Client Handle.</p> <p>IF Maximum Authorized Data Rate DL/UL per Client Handle > 2 047 kbps THEN Maximum Authorized Data Rate DL/UL per Client Handle = 2 047 kbps /* See 3GPP TS 23.107 [8] */</p> <p>END;</p>
<p>Maximum Authorized QoS Class per Client Handle</p>	<p>Maximum Authorized QoS Class per Client Handle = MAX [Maximum Authorized QoS Class per Client Handle among all the media components 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	<pre> IF Maximum Authorized QoS Class = "A" THEN Maximum Authorized Traffic Class = "Conversational" ELSEIF Maximum Authorized QoS Class = "B" THEN Maximum Authorized Traffic Class = "Streaming" ELSEIF Maximum Authorized QoS Class = "C" THEN Maximum Authorized Traffic Class = "Interactive" ELSEIF Maximum Authorized QoS Class = "D" THEN Maximum Authorized Traffic Class = "Interactive" ELSEIF Maximum Authorized QoS Class = "E" THEN Maximum Authorized Traffic Class = "Interactive" ELSE Maximum Authorized Traffic Class = "Background" ENDIF ; </pre>

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 Authorised 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.

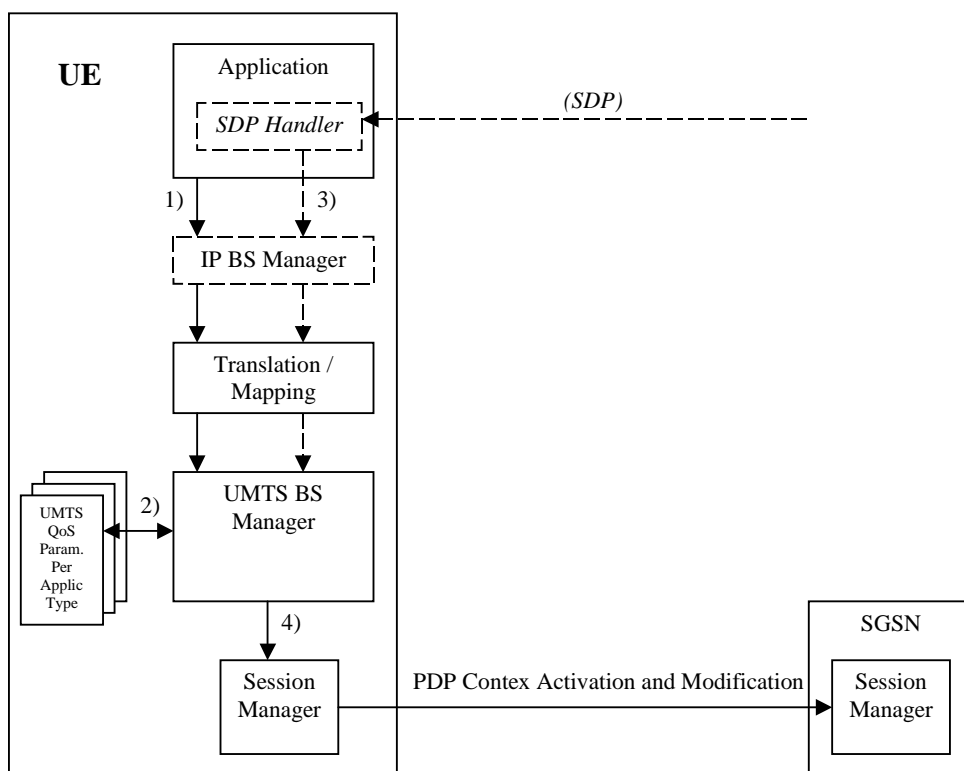


Figure 7.2: Framework for generating requested QoS parameters in the UE

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>; ELSEIF mediastream only uplink THEN Maximum Bitrate UL = Guaranteed Bitrate UL =<bandwidth>; ELSEIF mediastreams both downlink and uplink THEN Maximum Bitrate DL = Guaranteed Bitrate DL =<bandwidth>; Maximum Bitrate UL = Guaranteed Bitrate UL =<bandwidth>; ENDIF; ELSE /* SDP do 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 in an IMS context in which 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 to derive the Maximum Authorized Bandwidth UL/DL per media component.

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

In future releases this mapping rule may change. For release 5 this mapping rule is optional for the Rein the case of forking, the various forked responses may have different QoS requirements for the same media component. When the Authorized UMTS QoS Parameters are used by the UE, they shall be set equal to the highest values requested for 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 media component in the UE

Authorized UMTS QoS Parameter per media component	Derivation from SDP Parameters
Maximum Authorized Bandwidth DL (Max_BW_DL) and UL (Max_BW_UL) per media component (see note 3)	<pre> IF SBLP is applied THEN 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; IF b=AS:<bandwidth> is present THEN IF Direction=downlink THEN IF <transport>="RTP/AVP" then Max_BW_UL:=0.025 * <bandwidth>; Max_BW_DL:=1.025 * <bandwidth>; ELSE Max_BW_UL:=0; Max_BW_DL:=<bandwidth>; ENDIF; ELSE IF Direction=uplink THEN IF <transport>="RTP/AVP" then Max_BW_UL:= 1.025 * <bandwidth>; Max_BW_DL:=0.025 * <bandwidth>; ELSE Max_BW_UL:=<bandwidth>; Max_BW_DL:=0; ENDIF; ELSE /*Direction=both*/ Max_BW_UL:= 1.025 * <bandwidth>; Max_BW_DL:= 1.025 * <bandwidth>; ENDIF; 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 No authorization is done ; ENDIF ; </pre>

Authorized UMTS QoS Parameter per media component	Derivation from SDP Parameters
Maximum Authorized Traffic Class [MaxTrafficClass] per media component(see NOTE 1, 2 and 4)	<pre> IF SBLP is applied THEN IF (all media components 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: When an audio or video stream is removed from a session, the remaining media streams shall keep the originally assigned maximum Authorized Traffic Classes.</p> <p>NOTE 2: When an audio or video stream is added to a session, the UE shall derive the maximum Authorized TrafficClass taking into account the already existing media streams within the session.</p> <p>NOTE 3: For a RTP media component the Maximum Authorized Bandwidth DL/UL are the sum of the Maximum Authorized Bandwidths DL/UL for the RTP media streams and the associated RTCP IP flows DL/UL.</p> <p>NOTE 4: The Maximum Authorized Traffic Class for a RTCP IP flow is the same as for the corresponding RTP media stream.</p>	

The UE should per ongoing session store the Authorized UMTS QoS parameters per media component.

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). Furthermore, if the rule in table 7.2.2.1 for calculating Traffic Class per media component 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).

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
<p>Maximum Authorized Bandwidth DL and UL per PDP Context</p>	<pre> IF SBLP is applied THEN Maximum Authorized Bandwidth DL/UL per PDP Context is the sum of all Maximum Authorized Bandwidth DL/UL per media component for all the media component s to be carried by the PDP Context ; IF Maximum Authorized Bandwidth DL/UL per PDP Context > 2047 kbps THEN Maximum Authorized Bandwidth DL/UL per PDP Context = 2047 kbps /* See ref [8] */ ENDIF ; ELSE No authorization is done ; ENDIF ; </pre>
<p>Maximum Authorized Traffic Class per PDP Context</p>	<pre> IF SBLP is applied THEN Maximum Authorised Traffic Class per PDP Context = MAX [Maximum Authorised Traffic Class per media component among all the media component s to be carried by the PDP Context] ; ELSE No authorization is done ; ENDIF ; (The MAX function ranks the possible Maximum Authorised Traffic Class values as follows: Conversational > Streaming > Interactive > Background) </pre>

Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	R ev	Subject/Comment	Old	New
2001-10		N3-010484			The first TS 29.208 V0.1.0 has been produced based on TSab.cde V0.0.0 in N3-010482 discussed at CN3 #19 in Brighton, U.K.	0.0.0	0.1.0
2001-11		N3-010612			Tdocs N3-010608, N3-010554, N3-010526, N3-010609, and N3-010603 are agreed with some modifications at CN3 #20 – Cancun, Mexico and incorporated. Raised to Version 0.2.0.	0.1.0	0.2.0
2002-02		N3-020121			Tdocs N3-020057, N3-020110, N3-020111, and N3-020122 are agreed at CN3 #21 – Sophia Antipolis, France and incorporated. Raised to Version 0.3.0.	0.2.0	0.3.0
2002-02		N3-020164			Tdocs N3-020142, N3-020143, and N3-020125 are agreed with some modifications at Go drafting session in CN3 #21 Bis – Sophia Antipolis, France and incorporated. Raised to Version 0.3.0.	0.3.0	0.4.0
2002-02		NP-020078			Some editorial cleaning - presented to NP#15 for information	0.4.0	1.0.0
2002-04		N3-020365			Tdocs N3-020235, N3-020238, N3-020344, N3-020345, and N3-020363 are agreed at CN3 #22 – Fort Lauderdale, Florida, USA and incorporated. Raised to Version 1.1.0.	1.0.0	1.1.0
2002-05		N3-020515			Tdocs N3-020490, N3-020495, and N3-020509 are agreed at CN3 #23 – Budapest, Hungary and incorporated. Raised to Version 1.2.0.	1.1.0	1.2.0
2002-05		N3-020518			Tdocs N3-020513 is agreed at CN3 #23 – Budapest, Hungary and incorporated. Raised to Version 1.3.0.	1.2.0	1.3.0
2002-05		N3-020518			Comments agreed at CN3 #23 – Budapest, Hungary are incorporated. Raised to Version 1.4.0.	1.3.0	1.4.0
2002-06	NP#16	NP-020166			Approved at NP#16 and placed under change control	2.0.0	5.0.0
2002-09	NP#17	NP-020412	001	2	Service Class Mapping in the PDF	5.0.0	5.1.0
2002-09	NP#17	NP-020412	002	3	Data Rate Mapping in the PDF and in the UE	5.0.0	5.1.0
2002-09	NP#17	NP-020412	003		Correction of Reference [6]	5.0.0	5.1.0
2002-09	NP#17	NP-020412	004	2	QoS Parameter Mapping between IMS and GPRS	5.0.0	5.1.0
2002-09	NP#17	NP-020409	006	1	Authorized QoS vs. guaranteed and maximum bit rates	5.0.0	5.1.0
2002-09	NP#17	NP-020410	007	1	Support for forking	5.0.0	5.1.0
2002-09	NP#17	NP-020412	008	1	Removal of incomplete function	5.0.0	5.1.0
2002-12	NP#18	NP-020626	009	1	QoS mapping in the case of forking	5.1.0	5.2.0
2002-12	NP#18	NP-020626	010	2	Terminology in TS 29.208 in line with TS 29.207 and corrections	5.1.0	5.2.0
2002-12	NP#18	NP-020624	013	1	PCF by PDF substitution	5.1.0	5.2.0
2002-12	NP#18	NP-020620	014		Removal of editors note regarding calculation of 'b=AS:'	5.1.0	5.2.0
2002-12	NP#18	NP-020622	018		Replacement of DiffServ class with QoS Class	5.1.0	5.2.0
2003-03	NP#19	NP-030081	019	3	Mapping rules for QoS authorization	5.2.0	5.3.0
2003-03	NP#19	NP-030081	021	2	Correction of a clash	5.2.0	5.3.0
2003-03	NP#19	NP-030081	022		Addition of the SDP directional attribute "inactive".	5.2.0	5.3.0
2003-03	NP#19	NP-030081	025	2	Adding of the Resume case	5.2.0	5.3.0
2003-03	NP#19	NP-030081	026	1	Clarification on PDP context modification	5.2.0	5.3.0
2003-03	NP#19	NP-030081	029	2	Correcting and clarifying that SBLP is needed in some cases.	5.2.0	5.3.0
2003-03	NP#19	NP-030081	031		Corrections in the table 7.1.1.2 and in the table 7.2.2.1.	5.2.0	5.3.0

History

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V5.0.0	June 2002	Publication
V5.1.0	September 2002	Publication
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