Technical Specification Group Services and System Aspects
Meeting #22, Maui, Hawaii, USA, 15-18 December 2003

TSGS#22(03)0560

Source: TSG SA WG2
Title: CRs on 23.207 (End to End QoS)
Agenda Item: 7.2.3

The following Change Request has been approved by TSG SA WG2 and is requested to be approved by TSG SA plenary #22.
Note: the source of all these CRs is now S2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.

Tdoc #	Title	Spec	CR #	cat	Version in	REL	WI	S2 meeting	Clauses affected
S2-033781	Procedures in the AF	23.207	061r3	B	6.0.0	6	QoS1	S2-35	6.1.4
S2-033727	Information exchanged via Gq interface	23.207	062r1	B	6.0.0	6	QoS1	S2-35	5.3a.2
S2-033728	Procedures in the PDF	23.207	063r1	B	6.0.0	6	QoS1	S2-35	6.1.3
S2-033522	Editorial corrections to 23.207	23.207	064	D	6.0.0	6	QoS1	S2-35	1, 2, 3.1, 3.2, 5.1.1.1, 5.2.1, 5.2.2, 5.2.3, 5.3.2, 6.1, 6.1.1, 6.1.2, 6.1.3, 6.2, 6.3, 6.3.1, 6.3.2.1, 6.3.2.2, 6.3.2.3, 6.3.3, 6.3.4, 6.3.6, 6.3.6a, 6.3.7, 6.4, A.1, A.2.2, A.2.3, A.2.4, A.2.5, C
S2-034339	Gq-related updates to the signaling flows	23.207	065r2	B	6.0.0	6	QoS1	S2-36	All sub-clauses of 6.3, new Annex X (informative)
S2-034380	Requirements for IM CN Subsystem signalling flag	23.207	066r3	B	6.0.0	6	IMS2	S2-36	6.4
S2-034261	Defintion of the Application Function	23.207	067	F	6.0.0	6	QoS1	S2-36	3.1

Tdoc S2-033781

CR-Form-v7

CHANGE REQUEST

⌘ **23.207** **CR** **061** ⌘**rev** **3** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Procedures in the AF
Source:	⌘	Nokia
Work item code:	⌘	QoS1
Date:	⌘	27/10/2003
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	TS 23.207 is intended to describe the procedures in both “ends” of the Gq interface, i.e. the Application Function and the PDF.These procedures have been studied within the context of TR 23.917. Additionally, the procedures are scoped by the Go interface developed in Rel5. Hence, there is sufficient input available to incorporate initial description of the AF and PDF procedures to 23.207.
Summary of change:	⌘	Main procedures in the AF are incorporated.
Consequences if not approved:	⌘	
Clauses affected:	⌘	6.1.4

		Y	N		
Other specs Affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

6.1.4 Procedures in the AF

~~Editor's note: The details are for further study.~~

The authorize QoS resources procedure is triggered by the AF when it receives an AF session signalling message initiating a new AF session. Upon the authorize QoS procedure:

- The AF shall request one authorization token for a session, or multiple authorisation tokens to be used for future AF sessions, from the PDF in the initial authorisation request.
- If the AF indicates to the PDF that it wishes to be contacted upon berarer resource reservation, the service information shall be passed during the Gq interaction upon bearer resource reservation. Alternatively, if the initial AF session signalling message contains session description information, such as the end-point addresses, bandwidth requirements and the characteristics of the media exchange, the AF shall forward this information to the PDF as part of the service information at the same time with the authorisation token request.
- The PDF shall use the service information for the QoS policy set up for the session.

During a session change, the AF shall send an update for service information to the PDF based on the new session description information exchanged within AF session signalling.

The AF orders the PDF to enable or disable a media to pass through the access network. The AF shall be able to send an instruction for the PDF to wait for the Approval of QoS Commit procedure to enable the media as part of the authorization of the bearer establishment for the media. The AF may use Removal of QoS commit procedure to disable the media e.g. when a media component of a session is put on hold.

At session release, the AF shall send an instruction to the PDF to revoke the resource authorization.

Tdoc S2-033727

CR-Form-v7

CHANGE REQUEST

⌘ **23.207** **CR** **062** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Information exchanged via Gq interface
Source:	⌘	Nokia
Work item code:	⌘	QoS1
Date:	⌘	27/10/2003
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	TS 23.207 is intended to describe the information exchanged across the Gq interface on a stage-2 level. This information exchange has been studied within the context of TR 23.917. Additionally, the Gq infromation exchanged is scoped by the Go information exchange developed in Rel5. Hence, there is sufficient input available to incorporate initial description of the Gq interface data to 23.207.
Summary of change:	⌘	The information that needs to be exchanged between AF and PDF in Gq interface is described. Initial description of the required information elements for Gq interface has been added.
Consequences if not approved:	⌘	

Clauses affected:	⌘	5.3a.2			
Other specs affected:	⌘	**Y**	**N**		
		X		Other core specifications	⌘ TS 29.209 (Gq stage-3)
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

5.3a.2 Information Exchanged via Gq interface

~~Editor's note: The details of the Gq commands are for further study~~

Service information:

The AF provides the following service information to the PDF to be used as a basis for the service-based local policy decisions.

a) Description of session: the AF may provide one or more of the following information when describing the session (the set of information that needs to be sent in different cases depends on a service for which the media authorisation is required):

- Information defining the media to which QoS must be applied
- An indication of the requested type of service handling per media, e.g., conversational voice or video, streaming voice or video
- AF service signaling message direction (originating or terminating side)

b) Definition of whether PDF shall contact the AF at resource reservation during the session.

c) Install Gating Policy: Definition of whether gating control is used or not in the session. If gating control is not used, the PDF opens the gates in the GGSN at the bearer authorisation.

Authorisation token:

The PDF generates one or more Authorisation token(s) on request from the AF. The Authorization token contains the fully qualified domain name of the PDF and a reference in the PDF, which allows the PDF to uniquely identify the AF session.

Charging correlation related information:

The AF and PDF may exchange charging correlation related information. The AF charging identifier (e.g. ICID in case of IMS), if available, shall be transferred from the AF to the PDF, which shall forward it to the GGSN. GPRS charging identifier, if available in the PDF, shall be transferred to the AF.

Gate control indications:

The AF indicates when a media is to be enabled or disabled to pass through the access network. The indication contains information defining the media and its required status (enabled/disabled). The PDF opens or closes the gate in the GGSN based on this indication. The PDF shall respond with the result of the operation to the AF.

Bearer reservation indication:

The PDF shall send bearer reservation indication to the AF to indicate that the bearer resources have been reserved, if the AF in the initial authorisation request had requested it.

Bearer release indication:

Information available at the PDF on the bearer resource release is forwarded to the AF. The indication may contain information about the reason of the release.

Revoke authorisation command:

The AF determines when all authorisations related to an authorization token and all related authorizationsneed to be removed e.g. due to the AF session release, and shall instruct the PDF to remove the resources previously authorised for the session. The revoke authorisation command may contain information about the reason of the revoking.

Tdoc S2-033728

CR-Form-v7

CHANGE REQUEST

⌘ **23.207** **CR** **063** ⌘**rev** **1** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Procedures in the PDF
Source:	⌘	Nokia
Work item code:	⌘	QoS1
Date:	⌘	27/10/2003
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change: ⌘ The text in the chapter “6.1.3 Procedures in the PDF” requires some restructuring and generalization, as the policy control architecture is being generalized in Rel6 and is also to be applicable to other services than IMS. The current text still contains some IMS-specific text.

Summary of change: ⌘ Text in the chapter 6.1.3 restructured and IMS-specific text is generalized.

Consequences if not approved: ⌘

Clauses affected: ⌘ 6.1.3

Other specs affected: ⌘

Y	N	
	X	Other core specifications
	X	Test specifications
	X	O&M Specifications

⌘

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

6.1.3 Procedures in the PDF

~~Editor's note: There is still some IMS specific text contained in this clause, this will have to be revised and generalized later on.~~

In case of applying Service based local policy:

The QoS procedures in the PDF are related to service based local policy control.

The authorize QoS resources procedure can be invoked between the PDF and the AF at AF session establishment and/or at bearer establishment. When the AF requests ~~the~~one or more ~~token~~ Authorization-Token(s) from the PDF, it indicates whether or not the PDF should contact the AF at UE resource reservation. The Authorization-Token(s) is/are generated by the PDF and sent to the AF.~~.~~

When the PDF received service information from the AF, t~~T~~he PDF shall authorize the ~~required~~ QoS resources, and ~~install~~stores the ~~IP bearer level policy~~SBLP for the AF session based on the service information received from the AF.

~~The PDF provides the policy decision based on the information received from the AF.~~

~~The Authorization Token is generated by the PDF and sent to the AF.~~

Upon receiving the bearer authorization request from the GGSN, the PDF shall authorize the request according to the stored SBLP for the session.

The PDF makes a final decision to enable the allocated QoS resource for the authorized IP flows. This may be triggered by an instruction from the AF. QoS resources may also be enabled at the time they are authorised by the PDF.

When the PDF receives updated service information, ~~During the mid-call SIP signaling for media or codec change~~the AF sends an update for service information to the PDF, the PDF shall be able to decide if new QoS authorization is needed. A new authorization shall be required when the resources requested by the UE for a flow exceeds previous authorization, or a new flow is added, or when elements of the packet classifier(s) for authorized flow changed.

~~At IMS session release, t~~The PDF shall revoke the resource authorization based on request from the AF.

3GPP TSG-SA WG2 Meeting #35 **S3-033522**
Bangkok, Thailand. 27th - 31st October 2003.

CR-Form-v7

CHANGE REQUEST

⌘ **23.207** **CR** **064** ⌘ **rev** **-** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Editorial corrections to 23.207
Source:	⌘	Rapporteur (Ericsson)
Work item code:	⌘	QoS1
Date:	⌘	22/10/2003
Category:	⌘	**D**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	Editorial corrections of document
Summary of change:	⌘	Correcting spelling errors, removing extraneous spaces, using consistent capitalization for abbreviations (DiffServ, and IntServ)
Consequences if not approved:	⌘	Editorial errors remain

Clauses affected:	⌘	1, 2, 3.1, 3.2, 5.1.1.1, 5.2.1, 5.2.2, 5.2.3, 5.3.2, 6.1, 6.1.1, 6.1.2, 6.1.3, 6.2, 6.3, 6.3.1, 6.3.2.1, 6.3.2.2, 6.3.2.3, 6.3.3, 6.3.4, 6.3.6, 6.3.6a, 6.3.7, 6.4, A.1, A.2.2, A.2.3, A.2.4, A.2.5, C

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		X	Test specifications	
		X	O&M Specifications	

Other comments: ⌘

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

First amended section

1 Scope

The present document provides the framework for end-to-end Quality of Service involving GPRS and complements TS23.107 which describes the framework for Quality of Service within UMTS. -The end-to-end QoS architecture is provided in Figure 1. The document describes the interaction between the TE/MT Local Bearer Service, the GPRS Bearer Service, and the External Bearer Service, and how these together provide Quality of Service for the End-to-End Service. The document also describes IP level mechanisms necessary in providing end-to-end Quality of Service involving GPRS networks, including possible interaction between the IP level and the GPRS level, as well as the application level and the IP level.

In contrast to the TS23.107, the present document is only applicable to GPRS packet switched access services, and includes aspects of interworking to the IM subsystem as well as PSTN and other networks. The document does not cover the circuit switched access services.

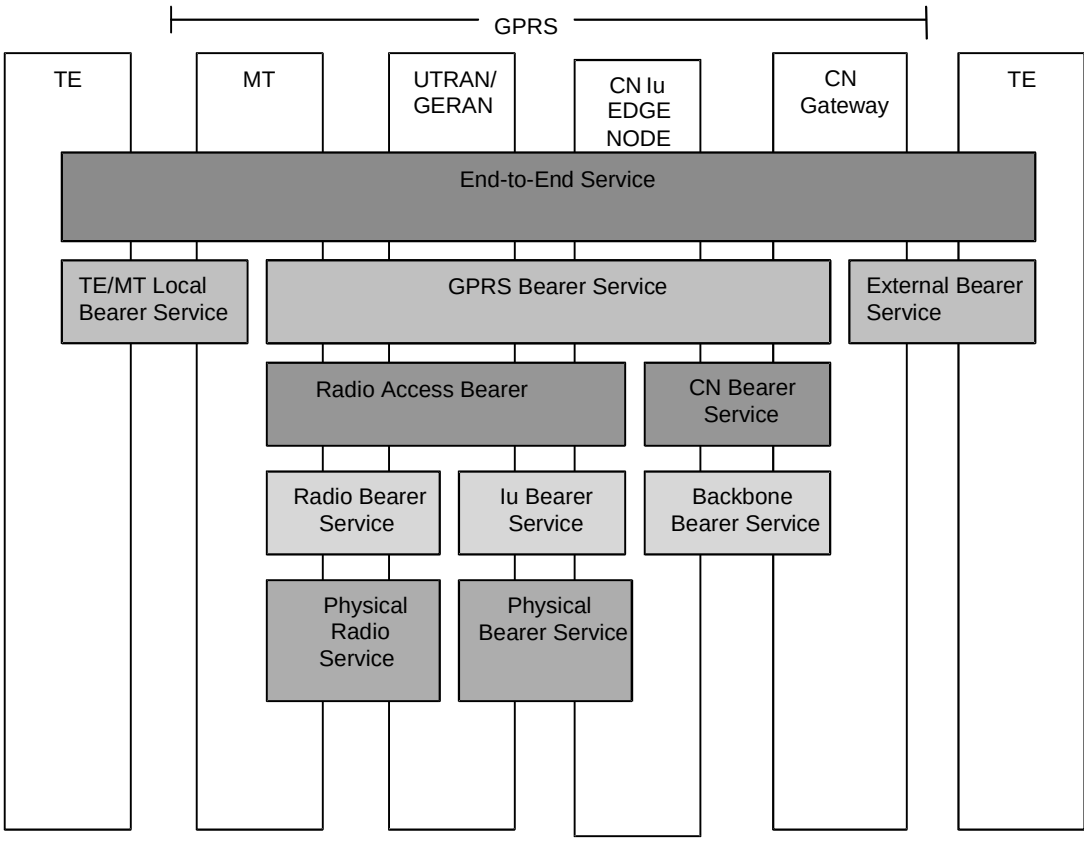


Figure 1: End-to-End QoS Architecture

Next amended section

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, edition number, version number, etc.) 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 TS 22.288: "Service requirements for the IP Multimedia – stage 1".

[2] 3GPP TS 23.002: "Network Architecture".

[3] 3GPP TS 23.107: "QoS Concept and Architecture".

[4] 3GPP TS 23.228: "IP Multimedia (IM) Subsystem – stage 2".

[4a] 3GPP TS 29.207: " Policy control over Go interface ".

[4b] 3GPP TS 29.208: " End to end Quality of Service (QoS) signalling flows".

[4c] 3GPP TS 29.xxx: “Policy control over Gq interface”.

[5] 3GPP TS 22.105: "Vocabulary for 3GPP Specifications".

[6] RFC 2475: "An Architecture for Differentiated Services (DiffSserv)".

[7] RFC 2753: "A Framework for Policy-based Admission Control ".

[8] RFC 2748: "Common Open Policy Service protocol (COPS)".

[9] RFC 2205: "Resource ReSerVation Protocol (RSVP)".

[10] RFC 2209: "Resource ReSerVation Protocol (RSVP) Message Processing Rules".

[11] RFC 2210: "The use of RSVP with IETF integrated Services".

[12] RFC 1633: "Integrated Services in the Internet Architecture: an Overview".

[13] RFC 3261: "SIP: Session Initiation Protocol".

[14] RFC 2327: "Session Description Protocol".

[15] RFC 2998: "A Framework For Integrated Services Operation Over DiffServ Networks".

[16] RFC 2750: "RSVP Extensions for Policy Control".

[17] RFC 2474: "Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers".

[18] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[19] 3GPP TS 23.060: “General Packet Radio Service (GPRS) Service description; Stage 2”

Next amended section

3.1 Definitions

RSVP - Resource ReSerVation Protocol: The RSVP protocol [9] is used by a host to request specific qualities of service from the network for particular application data streams or flows. The network responds by explicitly admitting or rejecting RSVP requests.

DiffServ - DiffSserv networks classify packets into one of a small number of aggregated flows or "classes", based on the DiffServ codepoint (DSCP) in the packet's IP header. This is known as behavior aggregate (BA) classification [6]. At each DiffServ router, packets are subjected to a "per-hop behavior" (PHB), which is invoked by the DSCP [17].

IntServ - The integrated services architecture [12] defined a set of extensions to the traditional best effort model of the Internet with the goal of allowing end-to-end QOS to be provided to applications. One of the key components of the architecture is a set of service definitions; the current set of services consists of the controlled load and guaranteed services. The architecture assumes that some explicit setup mechanism is used to convey information to routers so that they can provide requested services to flows that require them. While RSVP is the most widely known example of such a setup mechanism, the IntServ architecture is designed to accommodate other mechanisms.

COPS - Common Open Policy Service: The COPS protocol [8] is a simple query and response protocol that can be used to exchange policy information between a policy server (Policy Decision Point or PDP) and its clients (Policy Enforcement Points or PEPs).

Application Function: The Application Function (AF) is an element offering applications that require the control of IP bearer resources. The AF is capable of communicating with the PDF to transfer dynamic QoS-related application information. One example of an AF is the P-CSCF of the IM CN subsystem.

AF session: An AF session is established by an application level signaling protocol offered by the AF that requires a session set-up with explicit session description before the use of the service. One example of an AF session is an IMS session.

AF session signalling: AF session signalling is used to control the AF session. One example of AF session signalling is SIP/SDP.

Next amended section

3.2 Abbreviations

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

AF	Application Function
APN	Access Point Name (*)
COPS	Common Open Policy Service protocol
DiffServ	Differentiated Services
DSCP	DiffServ Code Point
GERAN	GSM/EDGE Radio Access Network (*)
GGSN	Gateway GPRS Support Node (*)
HTTP	Hypertext Transfer Protocol (*)
IMS	IP Multimedia Subsystem
IntServ	Integrated Services
LAN	Local Area Network
LDP	Label Distribution Protocol
MPLS	Multiprotocol Label Switching Architecture
PDF	Policy Decision Function
PEP	Policy Enforcement Point
PHB	Per Hop Behaviour
RNC	Radio Network Controller (*)
SDP	Session Description Protocol
SIP	Session Initiation Protocol (*)
SNMP	Simple Network Management Protocol (*)
TFT	Traffic Flow Template (*)

* This abbreviation is covered in 21.905v 4.2.0

Next amended section

5.1.1.1 QoS management functions for end-to-end IP QoS in UMTS Network

NOTE: The end-to-end QoS management functions do not cover the cases of a circuit switched service, or an IP service interworking with an ATM service at the gateway node.

IP BS Manager uses standard IP mechanisms to manage the IP bearer services. These mechanisms may be different from mechanisms used within the UMTS, and may have different parameters controlling the service. When implemented, the IP BS Manager may include the support of DiffServ Edge Function and the RSVP function. The **Translation/mapping function** provides the inter-working between the mechanisms and parameters used within the UMTS bearer service and those used within the IP bearer service, and interacts with the IP BS Manager. In the GGSN, the IP QoS parameters are mapped into UMTS QoS parameters, where needed. In the UE, the QoS requirements determined from the application layer (e.g., SDP) are mapped to either the PDP context parameters or IP layer parameters (e.g., RSVP).

If an IP BS Manager exists both in the UE and the Gateway node, it is possible that these IP BS Managers communicate directly with each other by using relevant signalling protocols.

The required options in the table define the minimum functionality that shall be supported by the equipment in order to allow multiple network operators to provide interworking between their networks for end-to-end QoS. Use of the optional functions listed below, other mechanisms which are not listed (e.g. over-provisioning), or combinations of these mechanisms are not precluded from use between operators.

The IP BS Managers in the UE and GGSN provide the set of capabilities for the IP bearer level as shown in Table 1. Provision of the IP BS Manager is optional in the UE, and required in the GGSN.

Table 1: IP BS Manager capability in the UE and GGSN

Capability	UE	GGSN
DiffServ Edge Function	Optional	Required
RSVP/IntServ	Optional	Optional
IP Policy Enforcement Point	Optional	Required (*)

(*) Although the capability of IP policy enforcement is required within the GGSN, the control of IP policy through the GGSN is a network operator choice.

Figure 2 shows the scenario for control of an IP service using IP BS Managers in both possible locations in the UE and Gateway node. The figure also indicates the optional communication path between the IP BS Managers in the UE and the Gateway node.

Policy Decision Function (PDF) is a logical policy decision element which uses standard IP mechanisms to implement Service Based Local Policy (SBLP) in the IP bearer layer. These mechanisms may be conformant to, for example, the framework defined in IETF [RFC2753] "A Framework for Policy-based Admission Control" where the PDF is effectively a Policy Decision Point (PDP). The PDF makes decisions in regard to SBLP using policy rules, and communicates these decisions to the IP BS Manager in the GGSN, which is the IP Policy Enforcement Point (PEP).

The interface between the PDF and the Application Function (AF) is the Gq interface specified in 3GPP TS 23.002 [2].

The interface between the PDF and GGSN is specified within 3GPP, named Go interface, and is included in the Reference Architecture depicted in TS23.002. The interface between the PDF and GGSN supports the transfer of information and policy decisions between the policy decision point and the IP BS Manager in the GGSN.

The PDF makes policy decisions based on information obtained from the AF. The PDF maps the policy set-up information received from the AF via the Gq interface into IP QoS parameters. The PDF is in the same domain as the GGSN. The AF may either be in the same domain as the PDF or may be in a different domain than the PDF.

NOTE: Currently in IETF, inter-domain policy interactions are not defined.

Application Function (AF) offers services that require the control of IP bearer resources. The AF maps QoS-related application level parameters (e.g. SDP) into policy set-up information, and sends this information to the PDF via the Gq interface.

Next amended section

5.2.1 GGSN

This clause provides functional descriptions of capabilities in GGSN. The capabilities are part of IP BS Manager (see 5.1.1.1) or corresponding user plane functions. Determination of exactly which functions are required to support interoperator and multi-vendor aspects are not addressed in this clause.

The **DiffServ Edge Function** shall be compliant to the IETF specifications for Differentiated Services [6]. The IETF Differentiated Services architecture will be used to provide QoS for the external bearer service.

Parameters for the Diff~~s~~serv Edge Function (i.e. classifiers, meters, packet handling actions) may be statically configured on the GGSN, derived from PDP Context parameters and/or derived from RSVP signalling.

Diff~~s~~serv functions configured on the basis of PDP Context parameters consist of marking user packets. The DSCP to be used is derived from the PDP Context parameters according to statically configured rules.

Statically configured Diff~~s~~serv functions may include classifiers, meters, markers, droppers and shapers acting on uplink traffic.

The **Service-based Local Policy Enforcement Point** controls the quality of service that is provided to a combined set of IP flows. The policy enforcement function includes policy-based admission control that is applied to the bearer associated with the flows, and configuration of the policy based "gating" functionality in the user plane. Service-based local policy decisions are either "pushed" to or requested by the GGSN via the Go interface.

Policy-based admission control ensures that the resources that can be used by a particular set of IP flows are within the "authorized resources" specified via the Go interface. The authorized resources provide an upper bound on the resources that can be reserved or allocated for the set of IP flows. The authorized resources are expressed as a maximum authorised bandwidth and QoS class. The QoS class identifies a bearer service (which has a set of bearer service characteristics associated with it). The PDF generates a maximum authorized QoS class for the set of IP flows. This information is mapped by the **Translation/mapping function** in the GGSN to give the authorized resources for UMTS bearer admission control.

In the user plane, policy enforcement is defined in terms of a "gate" implemented in the GGSN. A gate is a policy enforcement function that interacts through Go interface with PDF as the Policy Decision Point for QoS resource authorisation at the IP BS level for a unidirectional flow of packets. ~~-~~Gate operations as defined in TS23.228 are to control and manage media flows based on policy, and are under the control of PCF. A gate operates on a unidirectional flow of packets, i.e., in either the upstream or downstream direction. A gate consists of a packet classifier, and a gate status (open/closed). ~~-~~When a gate is open, the packets in a flow are accepted, and are thus subject to the Diff~~s~~serv edge treatment. When a gate is closed, all of the packets in the flow are dropped.

The gate shall be applied to the PDP contexts where SBLP applies, and for such PDP contexts the information received in the TFT is ignored. In the downlink direction, packets are processed against each gate in turn until a match is found. If a match is not found, packet processing shall then continue against filters installed from UE supplied TFTs for PDP contexts where SBLP is not applied according to specification TS 23.060.

In the uplink direction, packets received on a PDP context with SBLP based filters shall be matched against those filters. If a match is found, the packet shall be passed if the gate associated with that filter is open processed according to the gate functions. If the gate is closed, or if the packet does not match any of the packet filters, the packet shall be silently discarded.

The packet classifier associated with a gate is a micro-flow classifier including the standard 5-tuple: (source IP address, destination IP address, source port, destination port, protocol), identifying a set of packets associated with a unidirectional flow.

Elements of the 5-tuple that cannot be derived from the SDP according to a set of rules shall be wild-carded.

The **Binding Mechanism Handling** associates the PDP context bearer with one or more IP flows in order to support service-based local policy enforcement. Binding information is included in PDP Context Activation or Modification messages to associate the PDP context bearer with SBLP policy decision information provided by the PCF associated with the IP flow(s). In order to allow SBLP policy information to be "pulled" from the PCF, the binding information shall allow the GGSN to determine the address of the PCF to be used.

When binding information is received, the GGSN shall ignore any UE supplied TFT, and the filters in that TFT shall not be installed in the packet processing table. When sending the binding information to the network, the UE~~e~~ shall populate the TFT filters with wildcard values..

Next amended section

5.2.2 UE

This clause provides functional descriptions of capabilities in UE. The capabilities are part of IP BS Manager (see 5.1.1.1) or corresponding user plane functions. Determination of exactly which functions are required to support interoperator and multi-vendor aspects are not addressed in this clause.

DiffServ Edge Function acts as a DiffServ (DS) boundary for the traffic from applications running on the UE. As specified in RFC2475, DS boundary node must be able to apply the appropriate PHB to packets based on the DS code point. In addition, DS boundary nodes may be required to perform traffic conditioning functions. When GGSN DiffServ marking is used, the DiffServ edge function in the UE is not needed.

RSVP/IntS~~s~~erv Function provides the capability for the UE to request end-to-end QoS using RSVP messages as defined in IETF standards. RSVP messages may also be used by the network to inform the DSCP to be used by the UE. RSVP messages shall include the authorization token and flow identifier(s) in a policy data object if the authorization token is available in the UE. RSVP may be used to trigger PDP context activation/modification. The inter-working between MT and TE is FFS.

Binding Mechanism associates the PDP context bearer to the IP flow(s) to support SBLP policy enforcement in the GGSN. The binding information containing the authorization token and flow identifier(s) provides the binding mechanism, and is included by the UE in the PDP Context Activation and Modification messages. The authorization token may also be used to bind a RSVP session with a SIP session by including the authorization token and flow identifier(s) in RSVP messages. The AF provides the authorization token to the UE during AF session set-up. E.g. for IMS services, the authorization token is provided to the UE by the P-CSCF during SIP session establishment.

For each bi-directional media flow, the UE shall ensure that the 64 bit IPv6 address prefix of the source address of outgoing packets is the same as the prefix of the destination address supplied for incoming packets.

Next amended section

5.2.3 PDF

This clause provides functional descriptions of capabilities in PDF. The PDF makes policy decisions based on policy set-up information obtained from the AF via the Gq interface.

Editor's note: Once the functional split between the AF and the PDF is further clarified, the P-CSCF(PDF) related text shall be accordingly revised, and the AF-related text is to be moved to section 5.2.4.

Service-based Local Policy Decision Point

- Authorize QoS resources (bandwidth, etc.) for the AF session. The PDF shall use the policy set-up information received from the AF to calculate the proper authorization. The authorization shall be expressed in terms of the IP resources to be authorized. The authorization shall include limits on QoS for the set of IP flows and restrictions on individual IP flows (e.g. destination address and port).

- For bi-directional media flows, the P-CSCF(PDF), according to operator policy, may assume that the 64-bit IPv6 address prefix of the source address for downstream packets is the same as the prefix of the destination address for upstream packets of the same media flow. The implementation of this P-CSCF(PDF) assumption would be determined by operator policy in order to reduce the possibilities of bearer misuse. In the filters supplied by the PDF for bi-directional flows, the source address prefix for downstream packets may be identified as the same as the destination address prefix for the upstream. Similarly, the source address prefix for the upstream packets may be identified as the same as the destination address prefix for the downstream.

- The P-CSCF (PDF) shall be able to enforce the behaviour of the UE with respect to the assignment of IMS media components to the same PDP Context or to separate PDP Contexts. This behaviour of the UE is controlled by the P-CSCF using the indications described in Section E.2.2.1 of [4]. In case the UE violates this indication, and attempts to carry multiple IMS media components in a single PDP context despite of an indication that mandated separate PDP contexts, the P-CSCF/PDF shall take care that such a PDP context would be rejected by the GGSN. To do so, the P-CSCF/PDF uses the Go interface.

- The P-CSCF (PDF) shall be able to decide if new QoS authorization (bandwidth, etc.) is needed due to the mid-call media or codec change. A new authorization shall be required when the resources requested by the UE for a flow exceeds previous authorization, or a new flow is added, or when elements of the packet classifier(s) for authorized flows change.

- The PDF functions as a Policy Decision Point for the service-based local policy control.

- The PDF shall exchange the authorization information with the GGSN via the Go interface.

- PDF provides final policy decisions controlling the allocated QoS resources for the authorized media stream. The decision shall be transferred from the PDF to the GGSN.

- At AF session release, the PDF shall revoke the QoS resource authorization for the AF session.

Binding Mechanism Handling

- The PDF generates an authorization token for each AF session on request from the AF. The authorization token includes a fully qualified domain name of the PDF. The authorization token shall be unique across all PDP contexts associated with an APN. The authorization token conforms to the IETF specification on SIP Extensions for Media Authorization.

Next amended section

5.3.2 Information Exchanged via Go Interface

The COPS protocol supports several messages between a client and server.

Additional 3GPP Go-specific information elements must be included in COPS messages to support the SBLP control functions identified in Section 5.3.1. Consistent with the COPS framework, the Go interface is identified by a "client type" allocated for a 3GPP Go COPS client (GGSN).

All of the information described in the remainder of this section applies specifically to the 3GPP Go COPS client type. The events specific to the UMTS or IP bearer service would trigger the request messages from the GGSN PEP to the PDF. The information elements specific to UMTS would be standardized and carried in the 3GPP Go specific interactions between the PDF and the GGSN.

A **Request** (REQ) message from the GGSN to the PDF shall allow the GGSN to request SBLP policy information for a set of IP flows identified by binding information (described below).

Binding information associates the PDP context to the IP flow(s) of an AF session, and is used by the GGSN to request SBLP policy information from the PDF. The binding information includes 1) an authorization token sent by the AF to the UE during AF session signalling, and 2) one or more flow identifiers used by the UE, GGSN and PDF to uniquely identify the IP media flow(s).

The authorization token shall be unique within the scope of the operator's domain. The authorization token conforms to relevant IETF standards on SIP Extensions for Media Authorization.

A flow identifier identifies an IP media flow associated with the SIP session. Flow identifiers are based on the ordering of media components (media description structure defined by a single 'm=' line), and port numbers within that media component in the SDP. A flow identifier combined with the authorization token shall be sufficient to uniquely identify an IP media flow.

A **Decision** (DEC) message from the PDF to the GGSN contains decision objects. A Decision object shall include one of the following commands:

- Install (Admit request/Install configuration, Commit)
- Remove (Remove request/Remove configuration)

These commands are used to:

- Authorize QoS/Revoke QoS authorization for one or more IP flows
- Control forwarding for one or more IP flows

The **responses** from the PEP to the PDF include an acknowledgement and/or an error response to commands received by the PEP. The following response messages shall be supported:

- Report State (Success/Failure/Accounting) (RPT)

The **Delete Request State (DRQ)** message from the PEP to the PDF indicates that the request state of a previously authorised bearer resource is no longer available/relevant at the GGSN so the corresponding COPS policy state shall likewise be removed at the PDF. The DRQ message includes the reason why the request state was deleted.

The Install command used to Authorize QoS contains the following policy information associated with the IP flow(s):

- Packet classifier(s)
- Authorized QoS information
- Packet handling action
- Charging information (ICID in case of IMS)

The packet classifier includes the standard 5-tuple: (source IP address, destination IP address, source port, destination port, protocol), identifying a set of packets associated with a unidirectional flow. Elements of the 5-tuple may be wild-carded.

The authorized QoS information provides an upper bound on the resources that can be reserved or allocated for the combined set of IP flows. The authorized QoS information shall contain the DiffServ class and Data rate parameter. The DiffServ class is used only to identify the maximum allowed traffic class.

NOTE: Further elements and details of the authorized QoS information are defined in 29.207.

The packet handling action defines the packet handling that should be accorded to packets matching the packet classifier. The packet handling action (gate status) shall result in packets being passed (gate open), or silently discarded (gate closed).

Charging information (ICID) allows the GGSN to be aware of the IMS session level charging identifier of the IMS session that the Install command relates to. The PDF shall send the ICID provided by the P-CSCF as part of the authorisation (Install) decision.

The Report State contains the following information:

- Charging correlation information

Charging correlation information contains information used to correlate usage records (e.g. CDRs) of the GGSN with AF session records from the AF. For this purpose, the GGSN shall send the GCID of the PDP context and the GGSN address to the PDF as part of the authorisation report (RPT).

The messages which revoke QoS authorisation or remove configuration information provide only the information that is needed to perform the action (e.g., the COPS handle element, which is used as a way of identifying the installed decision information).

Next amended section

6.1 QoS Procedures in Functional Elements

This section describes the main procedures that are used for the end-to-end QoS management. These procedures are described in text description for each involved network elements. The procedures described in this document are meant to provide a high level description for further Stage 3 work and are not intended to be exhaustive.

Next amended section

6.1.1 Procedures in the GGSN

The QoS procedures in the GGSN are triggered by the QoS signaling messages from the UE, i.e., PDP Context Activation message or the RSVP messages. The exact QoS procedures in the GGSN depend on the GGSN and UE QoS capabilities. The GGSN is required to support DiffServ edge function. Other QoS capabilities that may be supported at the GGSN are RSVP functions and service-based local policy enforcement functions.

For UEs that do not support RSVP, the GGSN may use the PDP context level information to configure the DiffServ edge functionality and provide internetworking between PDP context and backbone IP network. The authorization token is included in the PDP context activation/modification messages.

For UEs that support RSVP, the GGSN may also support RSVP and use RSVP rather than the PDP context to control the QoS through the backbone IP network. The authorization token may be included in the RSVP signaling and the PDP context activation/modification messages. Alternatively, the RSVP messages may pass transparently through the GGSN.

If SBLP is implemented in the operator's network, the GGSN shall authorize the PDP context activation/modification messages that are subject to service based local policy by sending an authorization request to the PDF. Alternatively, the GGSN may authorize PDP context activation/modification messages that are subject to service based local policy using the cached policy in the Local Decision Point. The GGSN shall map the received IP flow based policy information into PDP context based policy information.

Next amended section

6.1.2 Procedures in the UE

The QoS procedures in the UE are triggered by the application layer (e.g., SIP/SDP) QoS requirements. The exact QoS procedures in the UE depend on the UE QoS capabilities.

For UEs that support only UMTS QoS mechanism, the application QoS requirements will trigger a PDP Context Activation procedure with the corresponding UMTS QoS parameters. For UEs that support both IP (e.g., IP BS Manager) and UMTS QoS mechanism, the application QoS requirements are mapped down to the IP layer QoS parameters. The IP layer parameters are further mapped down to the PDP context parameters in the UE. For UEs that support RSVP, the application QoS requirements are mapped down to create an RSVP session. The UE shall establish a PDP context suitable for support of the RSVP session.

In addition in the case of IMS, the following procedures apply: if the UE received the Media Authorization Token in the SIP signalling, the UE shall include the Media Authorization Token in the PDP Context Activation request for the PDP Context(s) that are activated to carry the media flows of the IMS session.

For UEs that support RSVP, if the UE received the Media Authorization Token in AF session signalling, the UE shall include the Media Authorization Token in both the PDP Context Activation request for the PDP Context(s) that are activated to carry the media flows of the AF session, and the RSVP messages if the PDP Context/RSVP is associated to the session.

At the AF session release, the UE shall release all QoS resources allocated for the AF session.

NOTE: Service Based Local Policy may restrict the destination of packets to the addresses/ports included in the AF session signalling. Mechanisms such as MIPv6 Route Optimisation which send packets to other addresses/ports may therefore not operate correctly.

Next amended section

6.1.3 Procedures in the PDF

Editor's note: There is still some IMS-specific text contained in this clause, this will have to be revised and generalized later on.

In case of applying Service based local policy~~:~~.

~~T~~the QoS procedures in PDF are related to service based local policy control.

The authorize QoS resources procedure can be invoked between PDF and AF at AF session establishment and/or at bearer establishment. When the AF requests the token from the PDF, it indicates whether or not the PDF should contact the AF at UE resource reservation. The PDF shall authorize the required QoS resources and install the IP bearer level policy for the AF session.

The PDF provides the policy decision based on the information received from the AF.

The Authorization-Token is generated by the PDF and sent to the AF.

Upon receiving the bearer authorization request from the GGSN, the PDF shall authorize the request according to the stored SBLP for the session.

The PDF makes a final decision to enable the allocated QoS resource for the authorized IP flows. This may be triggered by an instruction from the AF. QoS resources may also be enabled at the time they are authorised by the PDF.

During the mid-call SIP signaling for media or codec change, the PDF shall be able to decide if new QoS authorization is needed. A new authorization shall be required when the resources requested by the UE for a flow exceeds previous authorization, or a new flow is added, or when elements of the packet classifier(s) for authorized flow changed.

At IMS session release, the PDF shall revoke the resource authorization.

Next amended section

6.2 IP Bearer Level / Application Level Binding Mechanism

The *binding mechanism* associates the PDP context bearer with policy information in the GGSN to support service based local policy enforcement. The SBLP policy decision information in the GGSN is based on IP media flows. The binding mechanism identifies the IP media flow(s) associated with a PDP context bearer and uses this information in selecting the policy information to apply.

The UE shall be able to include binding information in PDP Context Activation and Modification messages to associate the PDP context bearer with policy information. The binding information includes 1) an Authorization Token sent by

the AF to the UE during AF session signaling, and 2) one or more Flow Identifiers which are used by the UE, GGSN and PDF to uniquely identify the IP media flow(s). It is assumed that only one binding information is carried within PDP context Activation/Modification messages in this Release.

The authorization token shall be unique within the scope of the operator's domain. The authorization token conforms to relevant IETF standards.

A Flow Identifier identifies an IP media flow associated with the SIP session. Flow Identifiers are based on the sequence of media components (media description structure defined by a single 'm=' line) in the SDP, and IP flow numbers (defined in the order of increasing port numbers) within each media component.

A flow identifier combined with the authorization token shall be sufficient to uniquely identify an IP media flow.

In order to allow SBLP policy information to be "pulled" from the PDF, the authorization token shall allow the GGSN to determine the address of the PDF to be used.

Next amended section

6.3 Session Flow: QoS Interaction Procedures

This section highlights possible additions to the GPRS bearer establishment procedures specified in TS23.060 for support of IM Services, and describes the QoS interactions involved within the sub-procedure blocks for Authorize QoS Resources, Resource Reservation with Service-based Local Policy, Approval of QoS Commit, Removal of QoS Commit, Revoke Authorization for GPRS and IP Resources, Indication of PDP Context Release, Authorization of PDP Context Modification and Indication of PDP Context Modification in Chapter 5: 'IP multimedia subsystem procedures' of TS23.228. The possible additions refer to procedures on the use of Service-based Local Policy, and RSVP Signalling as well as the allowed combinations.

It shall be possible according to operator choice to use solely the GPRS bearer establishment procedures specified in TS23.060 without the additions described in this section.

For cases where Service-based Local Policy is not used, the Authorize QoS Resources, the Resource Reservation with Service-based Local Policy, the Approval of QoS Commit, the Removal QoS Commit, Revoke Authorization for GPRS and IP Resources, the Indication of PDP Context Release, the Authorization of PDP Context Modification and the Indication of PDP Context Modification sub-procedure blocks defined in TS23.228 are not applied.

For the flow sequences involving RSVP, the following are assumed:

- the successful setup of RSVP signalling.

For the flow sequences involving Authorize QoS Resources and Approval of QoS Commit, the following are assumed:

- the successful authorization of QoS resources.
- the successful approval of QoS commit.

NOTE: Whether 'gate' corresponds to a single IP flow or multiple IP flows is FFS.

NOTE: 'Activate (Secondary) PDP Context' here means that either Primary or Secondary PDP context may be activated.

NOTE: When necessary, it is assumed that there is an existing PDP context that carries signalling (e.g., RSVP) between the UE and GGSN.

Next amended section

6.3.1 Authorize QoS Resources

The Authorize QoS Resources procedure is triggered by the P-CSCF receiving a SIP message containing SDP information. An offer-answer pair of SDP payloads contain sufficient information about the session, such as the end-points, bandwidth requirements, and the characteristics of the media exchange.

The PDF shall authorize the required QoS resources for the session and install the IP bearer level policy based on information from the P-CSCF.

The following figure is applicable to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.

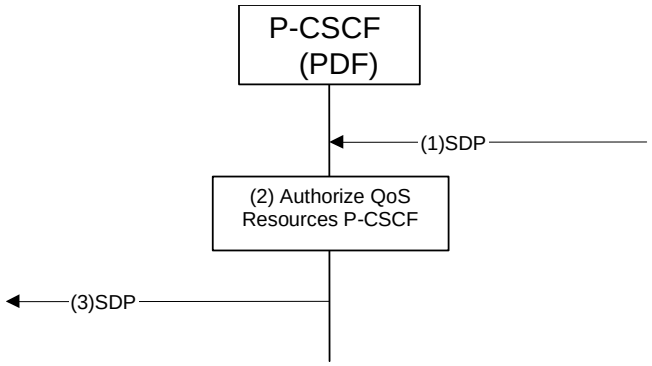


Figure 3: Authorize QoS Resources

1) A SIP message containing SDP payload is received by the P-CSCF.

2) The PDF shall authorize the required QoS resources for the session and install the IP bearer level policy based on information from the P-CSCF.

3) Upon successful authorization of the session, the P-CSCF forwards the SDP payload to the UE for the originating side. For the terminating side, the P-CSCF forwards the SDP payload to the terminating S-CSCF.

Next amended section

6.3.2.1 Resource Reservation with Service-based Local Policy

For this case, Service-based Local Policy is added to the GPRS bearer establishment procedures specified in TS23.060.

This section provides the flows for bearer establishment, resource reservation and policy control with PDP Context setup and DiffServ inter-working.

The following figure is applicable to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.

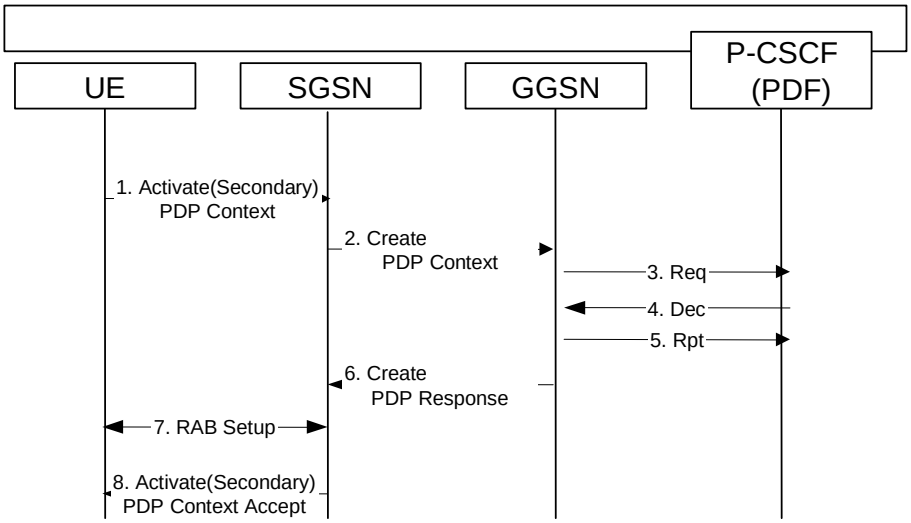


Figure 4: Resource Reservation with Service-based Local Policy

1) The UE sends an Activate (Secondary) PDP Context message to the SGSN with the UMTS QoS parameters. The UE includes the Binding Information in the Activate PDP Context message.

2) The SGSN sends the corresponding Create PDP Context message to the GGSN.

3) The GGSN sends a COPS REQ message with the Binding Information to the PDF in order to obtain relevant policy information.

4) The PDF sends a COPS DEC message back to the GGSN.

5) The GGSN sends a COPS RPT message back to the PDF.

6) The GGSN maps IP flow based policy information into PDP context based policy information and uses the PDP context based policy information to accept the PDP activation request, and sends a Create PDP Context Response message back to SGSN.

7) RAB setup is done by the RAB Assignment procedure.

8) The SGSN sends an Activate (Secondary) PDP Context Accept message to UE.

Next amended section

6.3.2.2 Resource Reservation with End-to-End RSVP

For this case, RSVP is added to the GPRS bearer establishment procedures specified in TS23.060, with no Service-based local policy.

NOTE: The diagrams in this subsection depict one possible signalling sequence, however, the alternative signalling sequences below are possible:

- to trigger the Create PDP Context Request message after the PATH message.
- to trigger the Create PDP Context Request message after the RESV message.
- to trigger only one PDP context after all RSVP exchanges have completed.

NOTE: The diagrams in this subsection depict the case when the GGSN is not RSVP aware, however, the alternative of GGSN being RSVP aware is also possible.

The following figure is applicable to the Mobile Originating (MO) side.

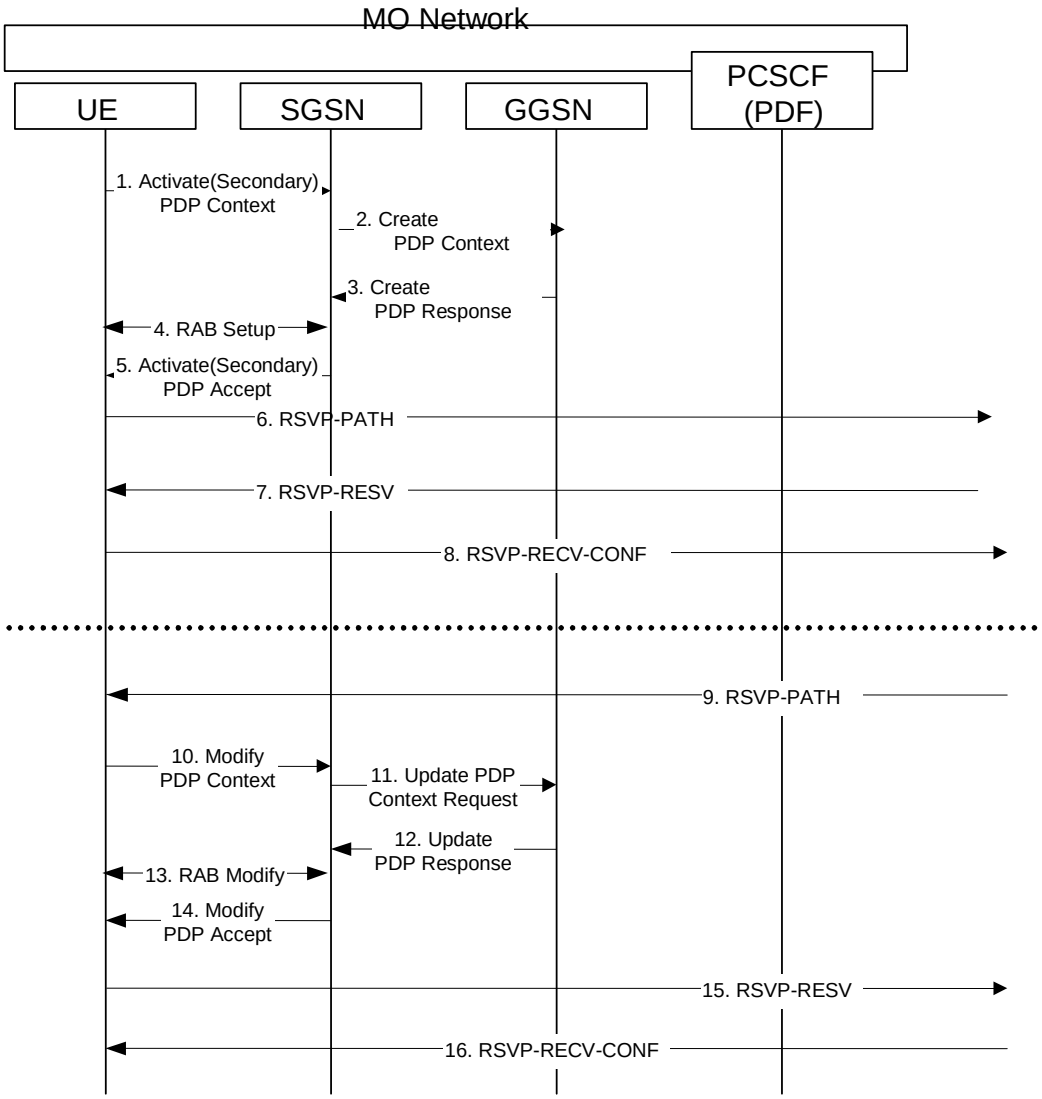


Figure 5: MO Resource Reservation with End-to-End RSVP

NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).

1) The UE sends an Activate (Secondary) PDP Context message to the SGSN with the UMTS QoS parameters.

2) The SGSN sends the corresponding Create PDP Context message to the GGSN.

3) The GGSN authorizes the PDP context activation request according to the local operator's IP bearer resource based policy, the local operator’s admission control function and the GPRS roaming agreements and sends a Create PDP Context Response message back to the SGSN.

4) RAB setup is done by the RAB Assignment procedure.

5) The SGSN sends an Activate (Secondary) PDP Context Accept message to UE.

6) UE sends an RSVP PATH message to the next hop, through the GGSN. The GGSN does not process the RSVP PATH message. Alternatively, the GGSN may process the RSVP PATH message and forward it to the next hop.

7) The UE receives the RSVP RESV message in the downlink direction, through the GGSN. The GGSN does not process the RSVP RESV message. Alternatively, the GGSN may process the RSVP RESV message and forward it to the UE.

8) The UE sends a RSVP RESV-CONF message to the next hop. The use of the RESV-CONF message is optional.

9) The UE receives a RSVP PATH message in the downlink direction, through the GGSN. The GGSN does not process the RSVP PATH message. Alternatively, the GGSN may process the incoming RSVP PATH message and forward it to the UE.

10) The UE may send a Modify PDP Context message to the SGSN with the necessary modification to UMTS QoS parameters according to the received RSVP PATH message.

11) The SGSN sends the corresponding Update PDP Context Request message to the GGSN.

12) The GGSN authorizes the PDP context modification according to the local operator's IP bearer resource based policy, the local operator’s admission control function and the GPRS roaming agreements and sends an Update PDP Context Response message back to the SGSN.

13) The radio access bearer modification may be performed by the RAB Assignment procedure.

14) The SGSN sends a Modify PDP Context Accept message to UE.

15) UE sends the RSVP RESV message to the next hop, through the GGSN. The GGSN does not process the RSVP RESV message. Alternatively, the GGSN may process the RSVP RESV message and forward it to the next hop.

16) The UE receives the RSVP RESV-CONF message in the downlink direction. The use of the RESV-CONF message is optional.

The following figure is applicable to the Mobile Terminating (MT) side. As the flow is the mirror of the Mobile Originating (MO) side, the step-by-step description is omitted.

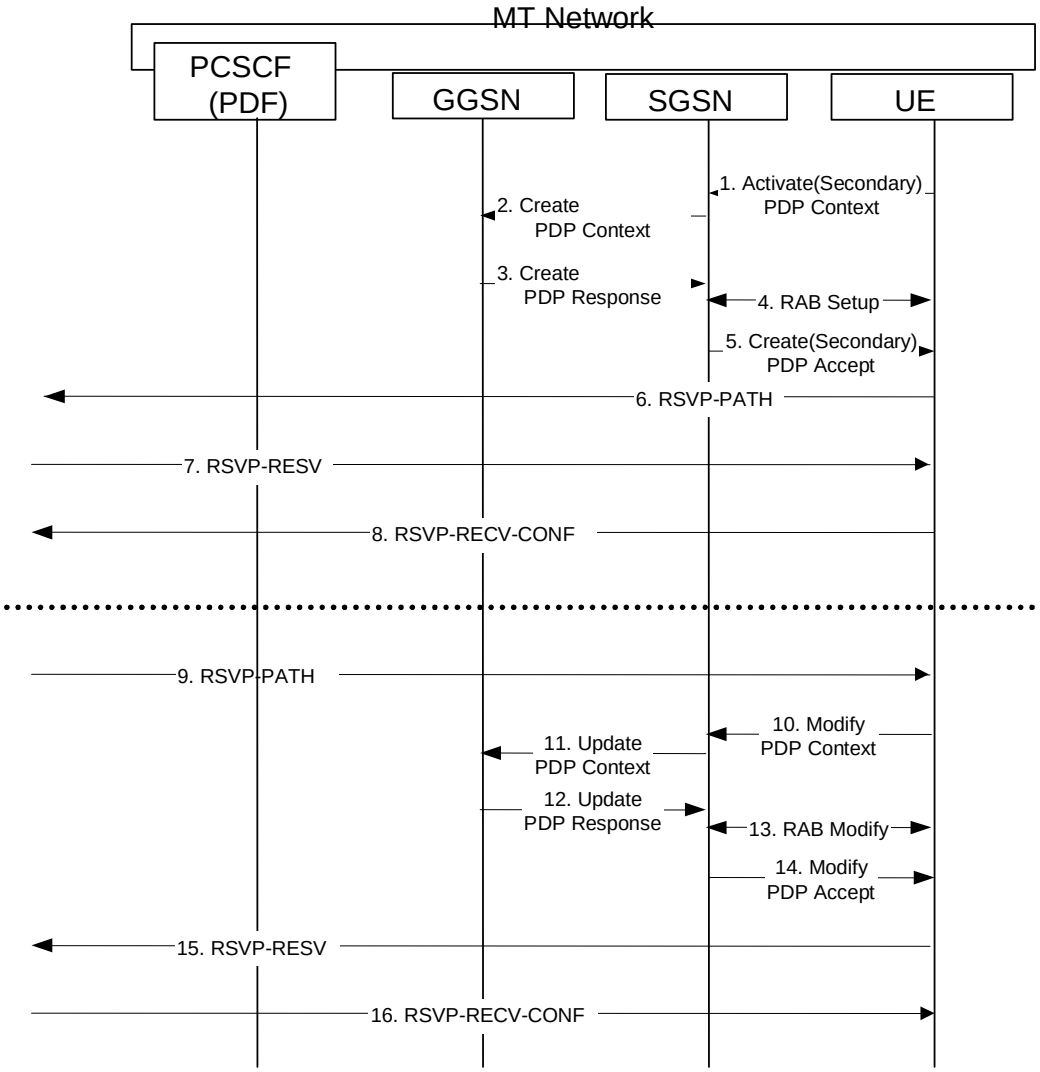


Figure 6: MT Resource Reservation with End-to-End RSVP

NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).

Next amended section

6.3.2.3 Resource Reservation with End-to-End RSVP and Service-based Local Policy

For this case, Service-based Local Policy and RSVP are added to the GPRS bearer establishment procedures specified in TS23.060.

NOTE: The diagrams in this subsection depict one possible signalling sequence, however, the alternative signalling sequences below are possible:

- to trigger the Create PDP Context Request message after the PATH message.
- to trigger the Create PDP Context Request message after the RESV message.

- to trigger only one PDP context after all RSVP exchanges have completed.

NOTE: The diagrams in this subsection depict the case when the GGSN is RSVP aware, however, the alternative of GGSN not being RSVP aware is also possible.

This section provides the flows for bearer establishment, resource reservation and policy control with RSVP.

The following figure is applicable to the Mobile Originating (MO) side.

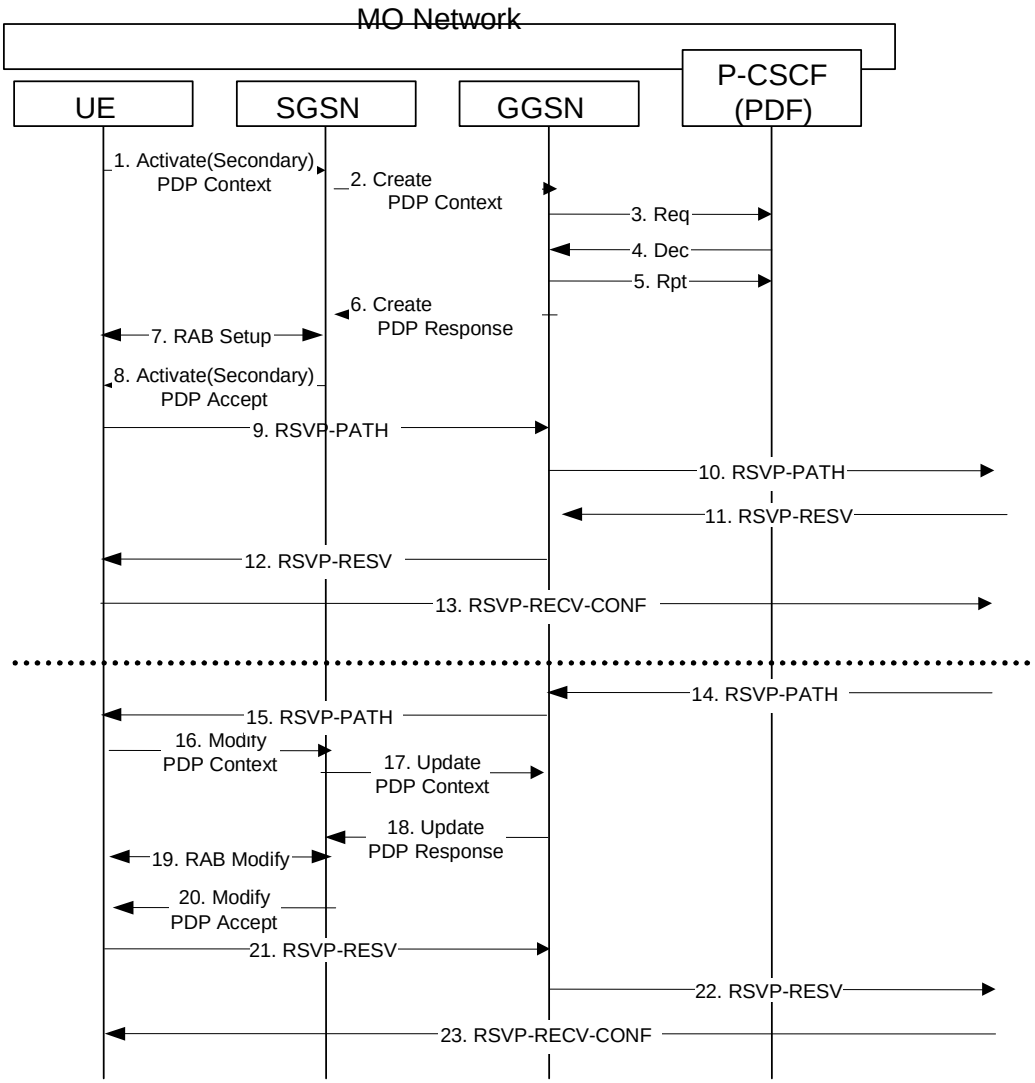


Figure 7: MO Resource Reservation with End-to-End RSVP and Service-based Local Policy

NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).

1) The UE sends an Activate (Secondary) PDP Context message to the SGSN with the UMTS QoS parameters. The UE includes the Binding Information in the Activate PDP Context message.

2) The SGSN sends the corresponding Create PDP Context message to the GGSN.

3) The GGSN sends a COPS REQ message with the Binding Information to the PDF in order to obtain relevant policy information.

4) The PDF sends a COPS DEC message back to the GGSN.

5) The GGSN sends a COPS RPT message back to the PDF.

6) The GGSN maps IP flow based policy information into PDP context based policy information and uses the PDP context based policy information to accept the PDP activation request, and sends a Create PDP Context Response message back to SGSN. The GGSN may cache the policy information.

7) RAB setup is done by the RAB Assignment procedure.

8) The SGSN sends an Activate (Secondary) PDP Context Accept message to UE.

9) UE sends a RSVP PATH message to GGSN. The UE includes the Binding Information.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

10) The GGSN uses the policy information to accept the RSVP PATH message, and forwards the RSVP PATH message to the next hop.

11) The GGSN receives the RSVP RESV message in the downlink direction.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

12) The GGSN uses the policy information to accept the RSVP RESV message, and forwards the RSVP RESV message to the UE.

13) The UE sends a RSVP RESV-CONF message to the next hop. The use of the RESV-CONF message is optional.

14) The GGSN receives a RSVP PATH message in the downlink direction.

15) The GGSN forwards the RSVP PATH message to the UE.

16) The UE may send a Modify PDP Context message to the SGSN with the necessary modification to UMTS QoS parameters according to the received RSVP PATH message. The UE includes the Binding Information in the Modify PDP Context message.

17) The SGSN sends the corresponding Update PDP Context message to the GGSN.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

18) The GGSN uses the policy information to accept the PDP modification request, and sends a Update PDP Context Response message back to SGSN.

19) The radio access bearer modification may be performed by the RAB Assignment procedure.

20) The SGSN sends a Modify PDP Context Accept message to UE.

NOTE: Steps 16 to 20 are optional if the existing PDP context already satisfies the QoS requirements.

21) The UE sends a RSVP RESV message to the GGSN. The UE includes the Binding Information in the RSVP RESV message.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

22) The GGSN uses the policy information to accept the RSVP RESV message, and forwards the RSVP RESV message to the next hop.

23) The UE receives the RSVP RESV-CONF message in the downlink direction. The use of the RESV-CONF message is optional.

The following figure is applicable to the Mobile Terminating (MT) side. As the flow is the mirror of the Mobile Originating (MO) side, the step-by-step description is omitted.

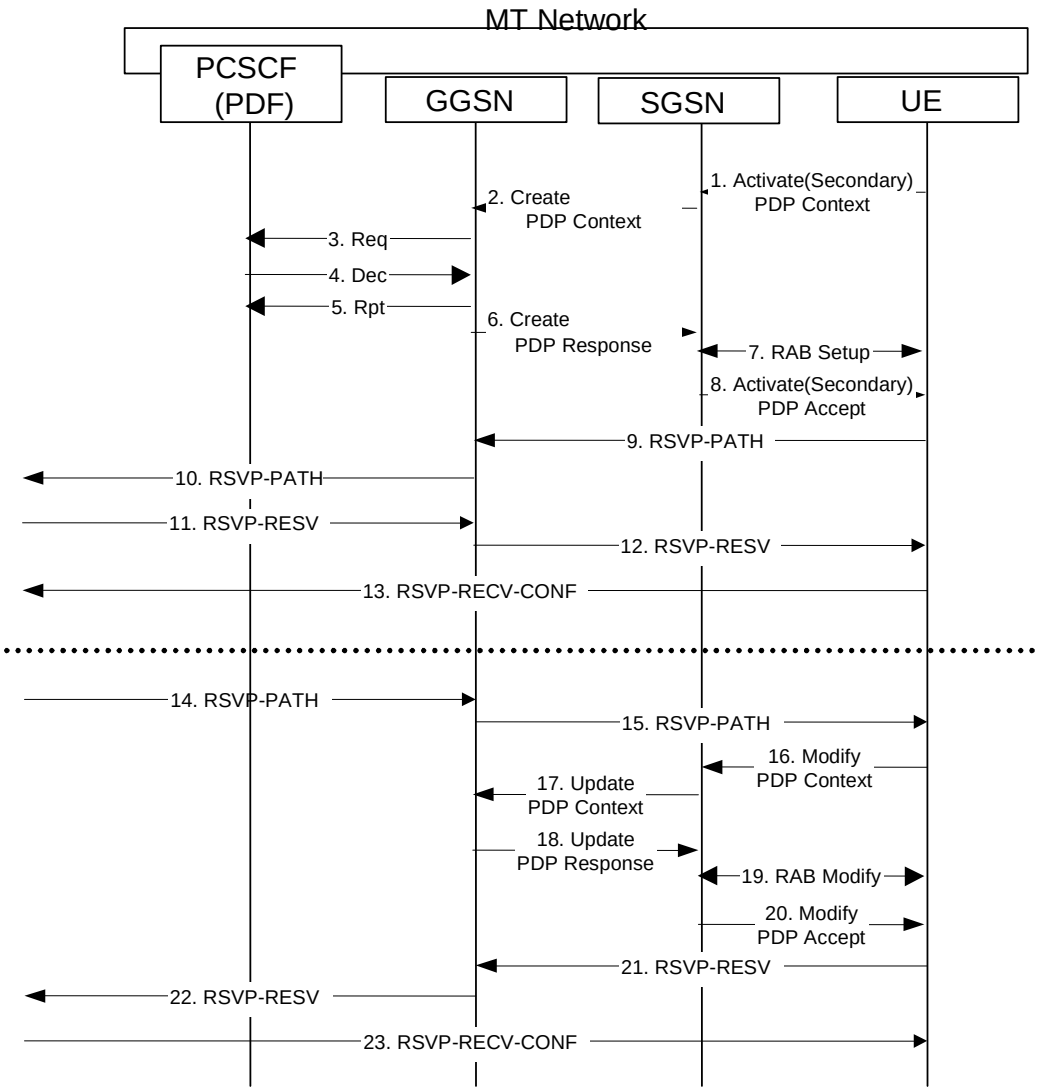


Figure 8: MT Resource Reservation with End-to-End RSVP and Service-based Local Policy

NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).

Next amended section

6.3.3 Approval of QoS Commit

The Approval of QoS Commit procedure is triggered by the P-CSCF receiving a 200 OK response to the INVITE request.

The following figure is applicable to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.

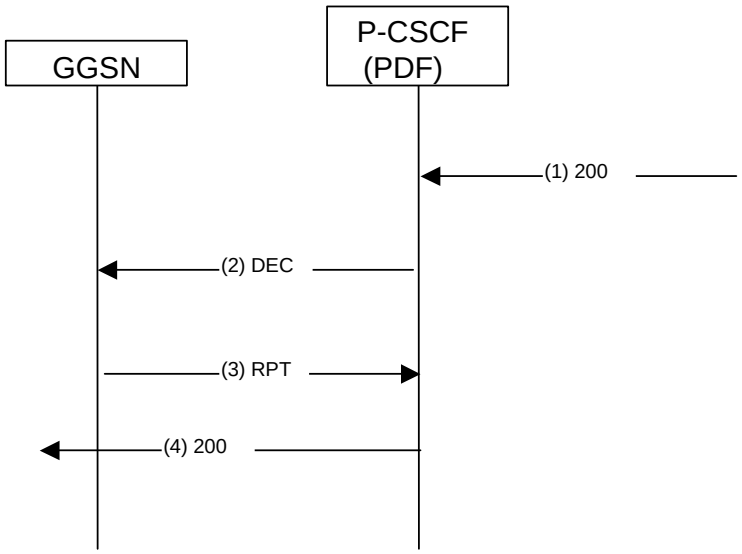


Figure 11: Approval of QoS Commit

1) The P-CSCF receives the 200 OK response to the INVITE request. -PDF approves the QoS Commit based on local policy.

2) The PDF shall send a COPS DEC message to the GGSN to open the 'gate' e.g., enable the use of the authorised QoS resources, unless this was done based on local policy at the time the QoS resources were authorised.

3) The GGSN receives the COPS DEC message and opens the 'gate' e.g., enables the use of the authorised QoS resources, and sends a COPS RPT message back to the PDF.

4) The P-CSCF forwards the 200 OK message to the UE for the originating side. For the terminating side, the P-CSCF forwards the SDP message to the terminating S-CSCF.

Next amended section

6.3.4 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 P-CSCF (PDF) provides final decision on removal of QoS commit for the authorized media stream to the GGSN. 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" and "Resource Reservation with Service-based Local Policy" request.

The GGSN closes the gate, and the media flow will be blocked.

The following figure presents the "Removal of QoS commit" procedure.

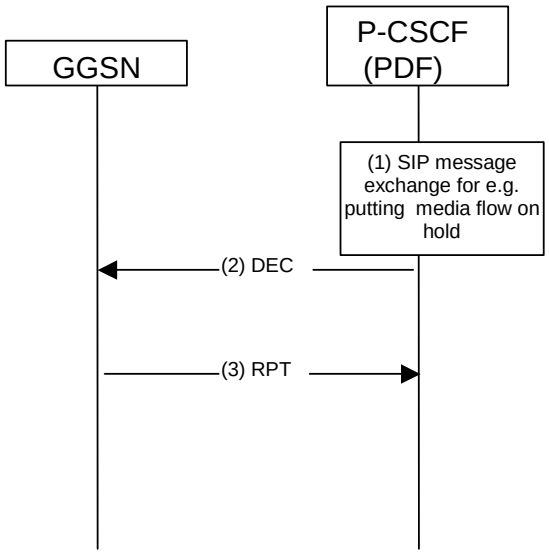


Figure 12: Removal of QoS commit

1) SIP message exchanges for e.g., putting a media flow on hold are carried out.
2) The PDF shall send a COPS DEC message to the GGSN to close the 'gate'.
3) The GGSN receives the COPS DEC message, closes the gate, and sends a COPS RPT message back to the PDF.

Next amended section

6.3.6 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.

The following figure presents the "Indication of PDP Context Release" procedure.

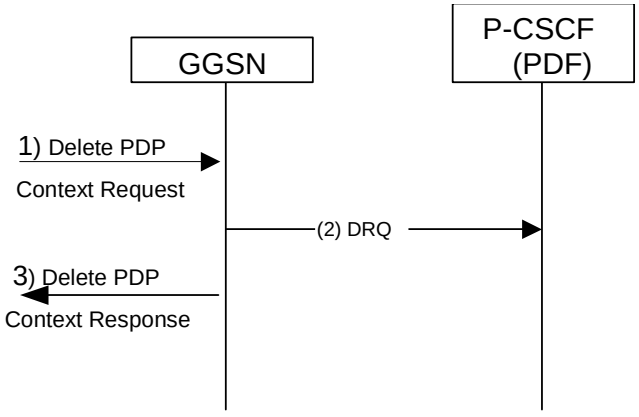


Figure 14: Indication of PDP Context Release

1) The GGSN receives a Delete PDP Context request for the PDP context related to the media flow.
2) The GGSN sends a COPS DRQ message to the P-CSCF(PDF).

3) The GGSN sends the Delete PDP Context Response message to the SGSN to acknowledge the PDP context deletion.

Next amended section

6.3.6a Authorization of PDP Context Modification

The "Authorization of PDP Context Modification" 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 new binding information is received. In this case, the GGSN communicates with the PDF as described below. The following figures present the "Authorization of PDP Context Modification" procedure.

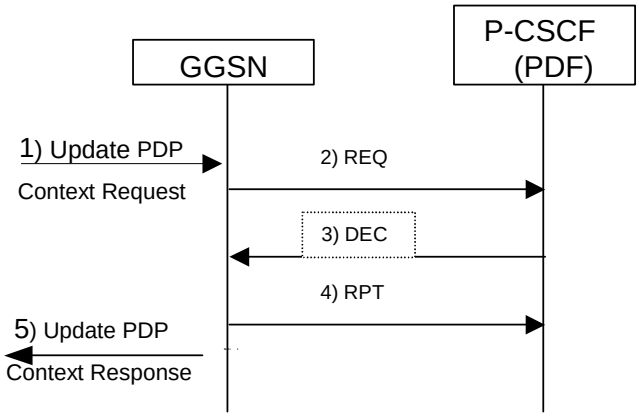


Figure 14a: Authorization of PDP Context Modification

1) A request to modify the PDP context related to the media flow is indicated by sending the Update PDP Context Request message to the GGSN.

2) The GGSN sends a COPS REQ message to the P-CSCF(PDF). If the GGSN has sufficient information to authorize this PDP context modification request, then the GGSN does not send a COPS REQ message to the P-CSCF(PDF).

3) The P-CSCF(PDF) receives the COPS REQ message, notes the requested modification and informs the GGSN of the authorization decision.

4) The GGSN sends a COPS RPT message back to the P-CSCF(PDF).

5) If the P-CSCF(PDF) accepted the modification, the GGSN sends the Update PDP Context Response message to the SGSN to acknowledge the PDP context modification.

Next amended section

6.3.7 Indication of PDP Context Modification

The "Indication of PDP Context Modification" procedure is used when a PDP Context is modified such that the maximum bit rate (downlink and uplink) is downgraded to 0 kbit/s or changed from 0 kbit/s to a value that falls within the limits that were authorized at PDP context activation(or last modification). In this case, the GGSN communicates

with the PDF as described below. The following figures present the "Indication of PDP Context Modification" procedure.

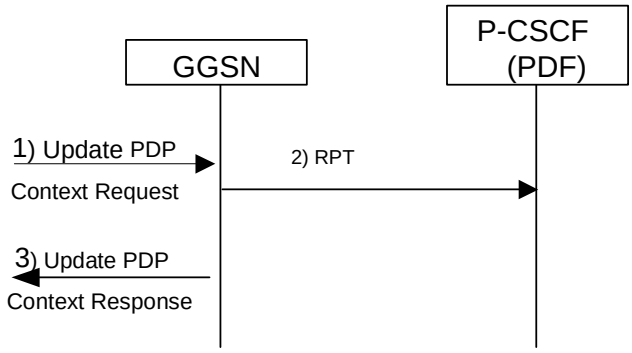


Figure 15: Indication of PDP Context Modification

1) A request to modify the PDP context related to the media flow is indicated by sending the Update PDP Context Request message to the GGSN.
2) The GGSN sends a COPS RPT message to the P-CSCF(PDF) to indicate the state changes of the PDP context.
3) The GGSN sends the Update PDP Context Response message to the SGSN to acknowledge the PDP context modification.

Next amended section

6.4 PDP Context Used for Application Level Signalling Transport

To establish a PDP context for application level signalling, the UE shall be able to include a signalling flag in PDP context activation procedure. This indicates to the network the intention of using the PDP context for application level signalling. The only defined application level signalling flag in this release is the IM CN subsystem signalling flag.

To establish a PDP context for application level signalling with prioritised handling over the radio interface, the UE shall be able to also set the Signalling Indication in the QoS IE in the PDP context activation procedure. The Signalling indication in the QoS IE indicates to the radio and core networks the requirement for enhanced handling over the radio interface, once it has been negotiated with the networks.

A request for a general purpose PDP context having the "signalling indication" within the QoS IE may be accepted or downgraded according to operator policy configured at the GGSN using the usual QoS negotiation mechanisms described in [19].

In the case of IMS, the IM CN Signalling Flag in the PCO IE is used to reference rules and restrictions on the PDP context used for application level signalling, as described in 23.228 section 4.2.6.

The IM CN Signalling Flag and the Signalling indication in the QoS profile detailed in TS23.107 may be used independently of each other.

Based on operator policy the "Signalling Indication" in the QoS IE may be allowed only if the "IM CN Subsystem Signalling" flag is present in the PCO IE.

Next amended section

A.1 Introduction

There are many different end-to-end scenarios that may occur from a UE connected to a UTMS network. The following examples depict how end-to-end QoS will be delivered for a number of scenarios that are considered to be significant.

NOTE: Further consideration of scenarios 2 and 3 is not needed for Stage 3 work in the Release 5 timeframe. The normative aspects of scenarios 2 and 3 are considered to be already covered by scenario 1.

In all the scenarios presented below, the network architecture is as shown in Figure A.1 below.

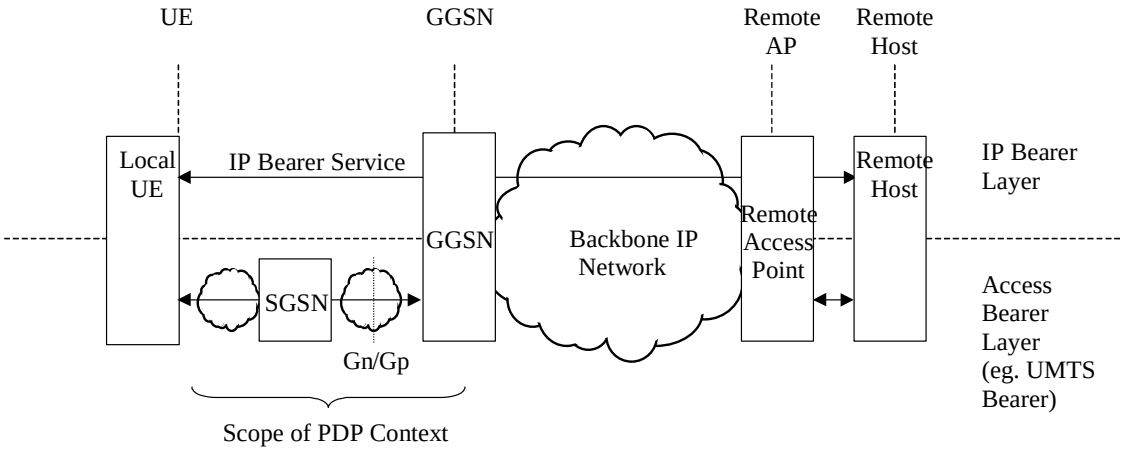


Figure A.1: Network Architecture for QoS Conceptual Models

Notes:

- Although the backbone IP network is shown as a single domain, it may consist of a number of separate domains.
- The structure of the Local UE is not specified. It includes cases from a simple host, to a gateway to a network such as a LAN. If the UE is acting as a gateway, it is responsible for providing the IP BS Management towards the extended network.
- The remote side is shown as a simple host. Other more complex cases on the remote side such as a private LAN with over-provisioning, or possibly LAN priority marking, and DiffServ and/or RSVP capable routing elements is not depicted. It is envisaged however that interworking between the QoS mechanisms in a more complex remote user side could also be performed with some similarities to the mechanisms shown at the local side.

The reference point shown at the UE is at the interface to the UE. Within the UE, the QoS control could be derived from any of the mechanisms that occur across that reference point, or it could use a different mechanism internally.

Although the scenarios currently identified are mainly using DiffServ in the backbone IP network (RSVP is indicated as an alternative in scenario 4), it is not mandated that DiffServ must be used in the backbone IP network. Other mechanisms, for example, over-provisioning and aggregated RSVP may be used.

Next amended section

A.2.2 Scenario 2

The UE performs an IP BS function which enables end-to-end QoS without IP layer signalling towards the IP BS function in the GGSN, or the remote terminal.

The scenario assumes that the UE and GGSN support DiffServ edge functions, and that the backbone IP network is DiffServ enabled.

NOTE: The UE may always include an authorisation token in establishment of the PDP context. Inclusion of the authorisation token in scenario 2 changes the QoS mechanisms to be the same as those described in scenario 5. Therefore, please refer to scenario 5 if the authorisation token is included.

The application layer (e.g. SIP/SDP) between the end hosts identifies the QoS needs. The QoS requirements from application layer (e.g. TS23.228 describes interworking from SIP/SDP to QoS requirements) are mapped down to the IP layer. The IP layer service requirements are further mapped down to the PDP context parameters in the UE.

In this scenario, the control of the QoS over the UMTS access network (from the UE to the GGSN) may be performed either from the terminal using the PDP context signalling. Alternatively, subscription data accessed by the SGSN may override the QoS requested via signalling from the UE (according to the procedures specified in TS 23.060).

In this scenario, the terminal supports DiffServ to control the IP QoS through the backbone IP network.

The IP QoS for the downlink direction is controlled by the remote terminal up to the GGSN. The PDP context controls the QoS between the GGSN and the UE. The UE may apply DiffServ edge functions to provide the DiffServ receiver control. Otherwise, the DiffServ marking from the GGSN will determine the IP QoS applicable at the UE.

The end-to-end QoS is provided by a local mechanism in the UE, the PDP context over the UMTS access network, DiffServ through the backbone IP network, and DiffServ in the remote access network in the scenario shown in the figure below. The UE provides control of the DiffServ, and therefore determines the appropriate interworking between the PDP context and DiffServ.

The GGSN DiffServ edge function may overwrite the DSCP received from the UE, possibly using information regarding the PDP context which is signalled between the UMTS BS managers and provided through the translation/mapping function to the IP BS Manager.

Note that DiffServ control at the Remote Host is shown in this example. However, other mechanisms may be used at the remote end, as demonstrated in the other scenarios.

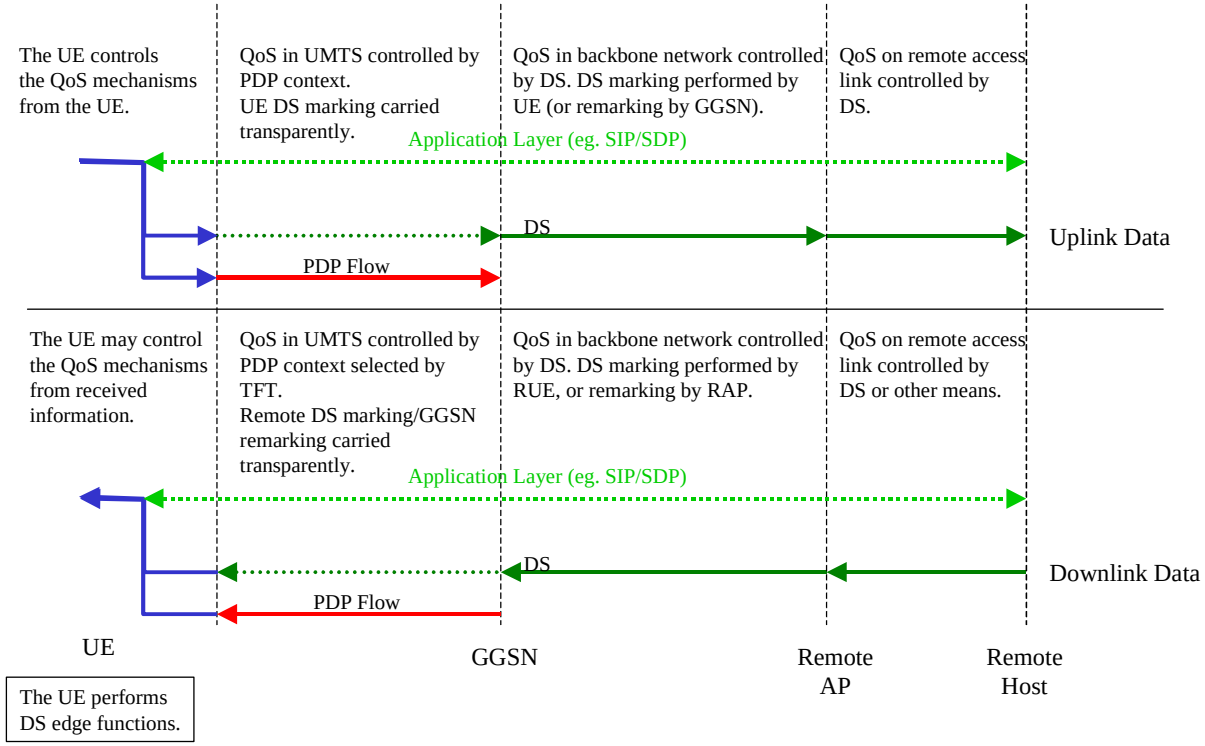


Figure A.3 Local UE supports DiffServ

Next amended section

A.2.3 Scenario 3

The UE performs an IP BS function which enables end-to-end QoS using IP layer signalling towards the remote end. There is no IP layer signalling between the IP BS Managers in the UE and the GGSN. However, the GGSN may make use of information regarding the PDP context which is signalled between the UMTS BS managers and provided through the translation/mapping function.

This scenario assumes that the UE and GGSN support DiffServ edge functions, and that the backbone IP network is DiffServ enabled. In addition, the UE supports RSVP signalling which interworks within the UE to control the DiffServ.

The application layer (e.g. SIP/SDP) between the end hosts identifies the QoS requirements. The QoS requirements from application layer (e.g. TS23.228 describes interworking from SIP/SDP to QoS requirements) are mapped down to create an RSVP session. The UE shall establish the PDP context suitable for support of the RSVP session. The authorisation token from the application layer when included shall be mapped to the PDP context parameters, and may also be mapped to the RSVP signalling.

In this scenario, the control of the QoS over the UMTS access network (from the UE to the GGSN) may be performed either from the terminal using the PDP context signalling. Alternatively, subscription data accessed by the SGSN may override the QoS requested via signalling from the UE (according to the procedures specified in TS 23.060).

In this scenario, the terminal supports signalling via the RSVP protocol to control the QoS at the local and remote accesses, and DiffServ to control the IP QoS through the backbone IP network. The RSVP signalling protocol may be used for different services. –It is expected that only RSVP using the Integrated Services (IntServ) semantics would be supported, although in the future, new service definitions and semantics may be introduced. The entities that are supporting the RSVP signalling should act according to the IETF specifications for IntServ and IntServ/DiffServ interwork.

The QoS for the wireless access is provided by the PDP context. The UE may control the wireless QoS through signalling for the PDP context. The characteristics for the PDP context may be derived from the RSVP signalling information, or may use other information.

QoS for the IP layer is performed at two levels. The end-to-end QoS is controlled by the RSVP signalling. Although RSVP signalling can be used end-to-end in the QoS model, it is not necessarily supported by all intermediate nodes. Instead, DiffServ is used to provide the QoS throughout the backbone IP network.

At the UE, the data is also classified for DiffServ. Intermediate QoS domains may apply QoS according to either the RSVP signalling information or DiffServ mechanisms. In this scenario, the UE is providing interworking between the RSVP and DiffServ domains. The GGSN may override the DiffServ setting from the UE. This GGSN may use information regarding the PDP context in order to select the appropriate DiffServ setting to apply, as shown in the figure below.

The end-to-end QoS is provided by a local mechanism in the UE, the PDP context over the UMTS access network, DiffServ through the backbone IP network, and DiffServ in the remote access network in the scenario shown in the figure below. The RSVP signalling may control the QoS at both the local and remote accesses. This function may be used to determine the characteristics for the PDP context, so the UE may perform the interwork between the RSVP signalling and PDP context.

The UE provides control of the DiffServ (although this may be overwritten by the GGSN), and in effect, determines the appropriate interworking between the PDP context and DiffServ.

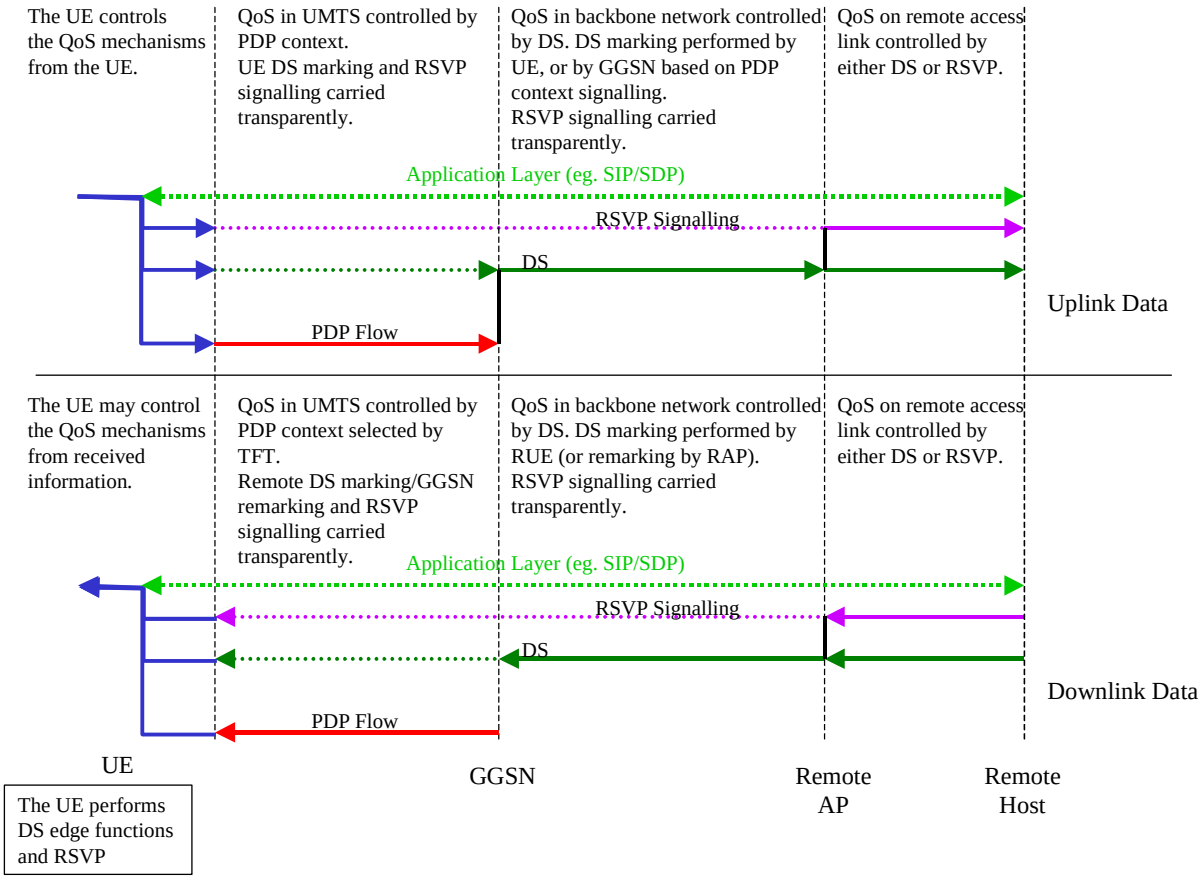


Figure A.4: Local UE supports RSVP signalling with IntServ semantics, and DiffServ; without service based policy

The GGSN provides the interworking between the PDP context and the DiffServ function. The application layer signaling may be processed in the local network at an application server such as the P-CSCF in the case of SIP signaling. Interworking between the GGSN and the application layer is shown as a vertical line where applicable. This interworking is for policy control and is between the GGSN and the PDF policy function co-located in the P-CSCF, as shown in the figure below.

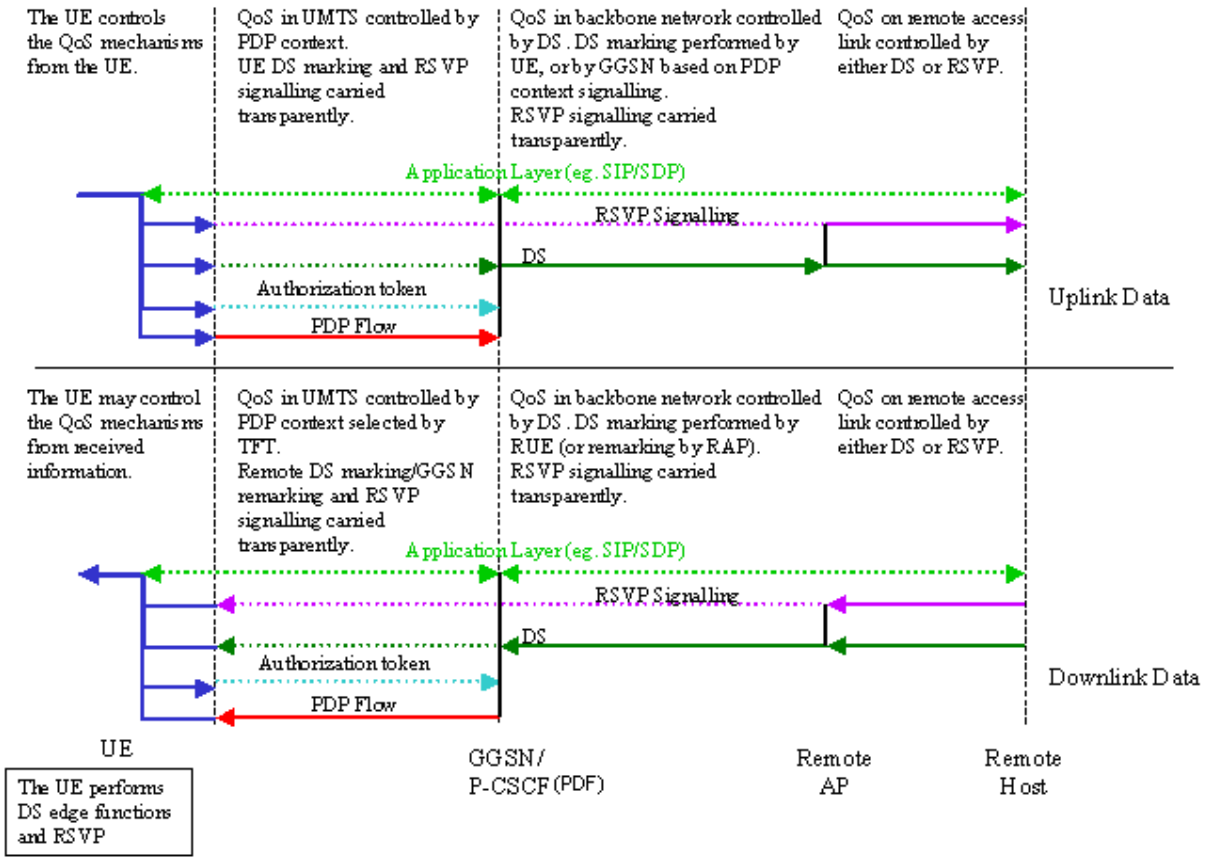


Figure A.5: Local UE supports RSVP signalling with IntServ semantics, and DiffServ; where service based policy is applied

Next amended section

A.2.4 Scenario 4

The UE performs an IP BS function which enables end-to-end QoS using IP layer signalling towards the remote end. However, the UE relies on this end-to-end communication being utilised by at least the access point (GGSN) in order to provide the end-to-end QoS.

This scenario assumes that the UE and GGSN support RSVP signalling which may control the QoS directly, or interwork with DiffServ. The backbone IP network is RSVP and/or DiffServ enabled.

The application layer (e.g. SIP/SDP) between the end hosts identifies the QoS requirements. The QoS requirements from application layer (e.g. TS23.228 describes interworking from SIP/SDP to QoS requirements) are mapped down to create an RSVP session. The UE shall establish the PDP context suitable for support of the RSVP session. The authorisation token from the application layer shall be mapped to the PDP context parameters, and may also be mapped to the RSVP signalling.

In this scenario, the terminal supports signalling via the RSVP protocol to control the QoS across the end-to-end path. The GGSN also supports the RSVP signalling, and uses this information rather than the PDP context to control the QoS through the backbone IP network. The control of the QoS through the core is expected to be supported through interworking with DiffServ at the GGSN, although it may optionally be supported by per flow resource reservation. The RSVP signalling protocol may be used for different services. It is only expected that only RSVP using the Integrated Services (IntServ) semantics would be supported, although in the future, new service definitions and semantics may be introduced. The entities that are supporting the RSVP signalling may fully support the specifications for IntServ and IntServ/DiffServ interwork. If not, they are expected to set the break bit.

In this scenario, the control of the QoS over the UMTS access network (from the UE to the GGSN) may be performed either from the terminal using the PDP context signalling. Alternatively, subscription data accessed by the SGSN may override the QoS requested via signalling from the UE (according to the procedures specified in TS 23.060).

QoS for the IP layer is performed at two levels. The end-to-end QoS is controlled by the RSVP signalling. Although RSVP signalling occurs end-to-end in the QoS model, it is not necessarily supported by all intermediate nodes. DiffServ is used to provide the QoS throughout the backbone IP network, although optionally each node may support RSVP signalling and allocation of resources per flow. -An authorisation token may be included in the RSVP signalling and the PDP context establishment/modification. The GGSN may authorise the RSVP session and configure the Diffserv classifier functionality.

The GGSN supports the RSVP signalling and acts as the interworking point between RSVP and DiffServ. Intermediate QoS domains may apply QoS according to either the RSVP or DiffServ mechanisms.

The end-to-end QoS is provided by a local mechanism in the UE, the PDP context over the UMTS access network, DiffServ through the backbone IP network, and RSVP in the remote access network in the scenario shown in the figure below. The RSVP signalling may control the QoS at the local access. This function may be used to determine the characteristics for the PDP context, so the UE may perform the interwork between RSVP and the PDP context.

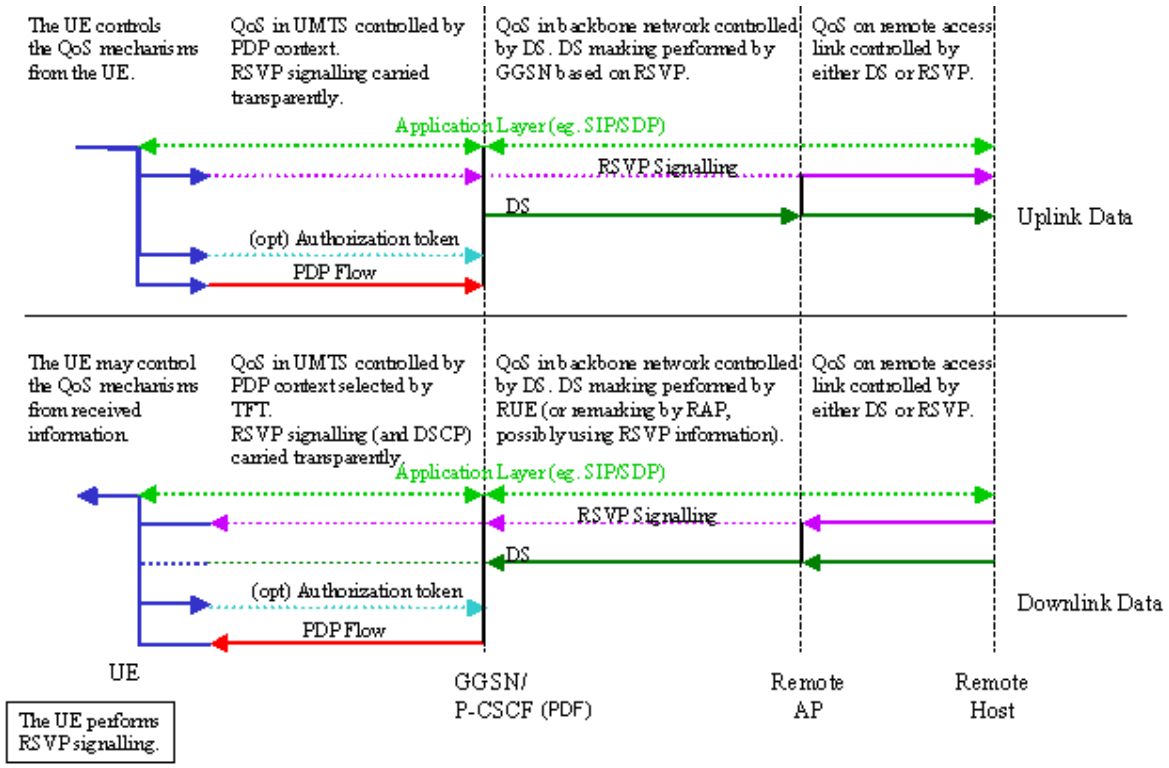


Figure A.6: Local UE supports RSVP signalling using IntServ Semantics

Next amended section

A.2.5 Scenario 5

The UE performs an IP BS function which enables end-to-end QoS without IP layer signalling and negotiation towards the IP BS function in the GGSN, or the remote host. The P-CSCF provides the authorization token to the UE during the SIP session setup process, and the UE provides the authorization token to the GGSN in the PDP context activation/modification message. The GGSN uses the authorization token to obtain a policy decision from the P-CSCF(PCF). This is done via the standardized interface between the PCF and GGSN. Even if the interface is an open interface where all information elements are standardized, the actual usage of the information is operator specific.

The scenario assumes that the GGSN support DiffServ edge functions, and that the backbone IP network is DiffServ enabled.

The application layer (e.g. SIP/SDP) between the end hosts identifies the QoS needs. The QoS requirements from application layer (e.g. TS23.228 describes interworking from SIP/SDP to QoS requirements) are mapped down to the IP layer and further down to the PDP context parameters in the UE. The authorisation token from the application layer is included in the PDP context parameters by the UE.

In this scenario, the control of the QoS over the UMTS access network (from the UE to the GGSN) may be performed from the terminal using the PDP context signalling. Alternatively, subscription data accessed by the SGSN may override the QoS requested via signalling from the UE (according to the procedures specified in TS 23.060).

The QoS for the downlink direction is controlled by the remote host from the remote network to the GGSN. The PDP context controls the UMTS level QoS between the GGSN and the UE. The QoS in the uplink direction is controlled by the PDP context up to the GGSN. The GGSN configures the DiffServ Edge function to interwork with the backbone IP network and control the IP QoS bearer service towards the remote host.

The end-to-end QoS is provided by a local mechanism in the UE, the PDP context over the UMTS access network, DiffServ through the backbone IP network, and DiffServ in the remote access network. Note that DiffServ control at the Remote Host is shown in this example. However, other mechanisms may be used at the remote end, as demonstrated in the other scenarios.

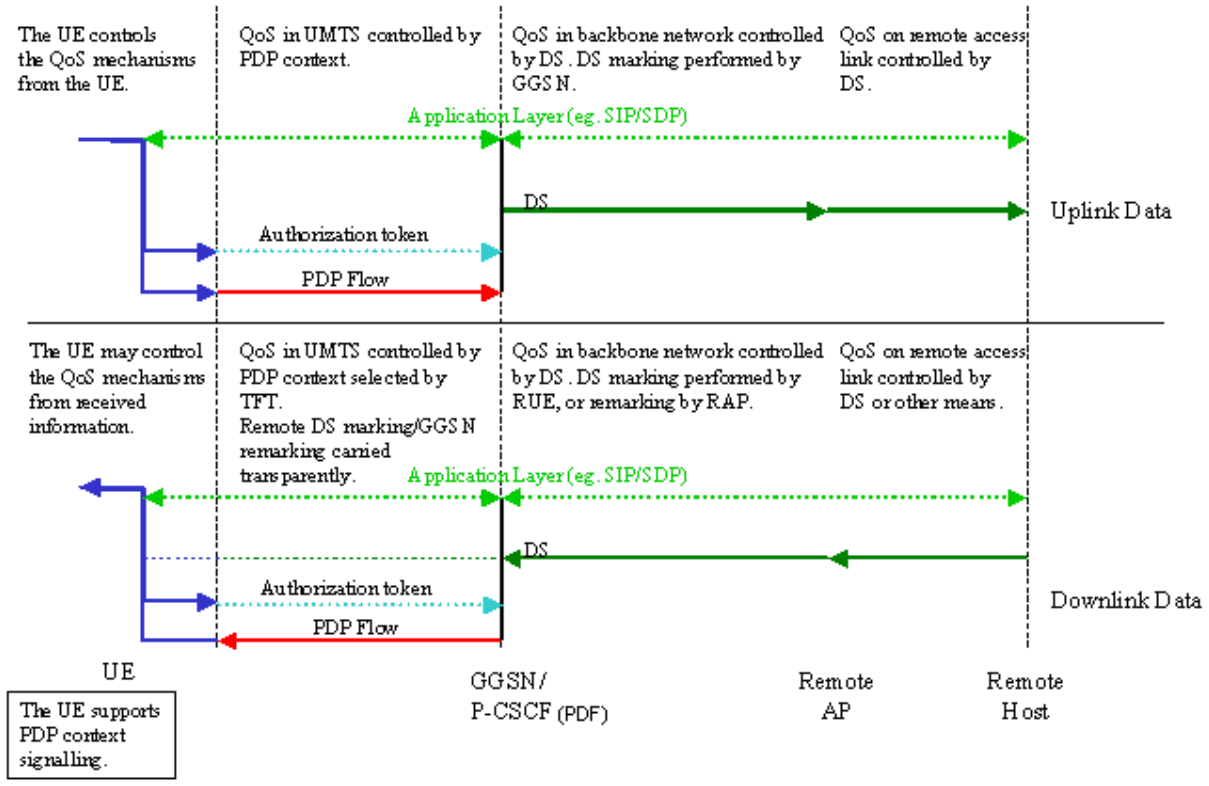


Figure A.7: Local UE provides authorization token in PDP context activation/modification message and GGSN provides interworking with DiffServ

Next amended section

Annex C (informative): Sample Mapping of SDP Descriptions Into QoS Authorization

The QoS requirement for a session depends on the media and codec information for the session. Initial session establishment in the IM Subsystem must determine a common codec (or set of common codecs for multimedia sessions) that will be used for the session. This is done through an end-to-end message exchange to determine the complete set of common codecs, and then the session initiator makes the decision as to the initial set of codecs for the media flows.

The session initiator includes an SDP in the SIP INVITE message that lists every codec that the originator is willing to support for this session. When the message arrives at the destination endpoint, it responds with the subset that it is also willing to support for the session by selectively accept or decline those media types in the original list. When multiple media codecs are listed, the caller and called party's media fields must be aligned—that is, there must be the same number, and they must be listed in the same order. QoS authorization is performed for this common subset. The P-CSCF(PCF) shall use the SDP contained in the SIP signaling to calculate the proper authorization. The authorization shall include limits on IP resources, and restrictions on IP packet flows, and may include restrictions on IP destinations. These restrictions are expressed as a data rate and QoS class for the combined set of IP flows, and a set of filter specs.

The QoS authorization for a session shall include an Authorization-Token, which shall be assigned by the P-CSCF(PCF). The Authorization-Token shall contain information that identifies the P-CSCF(PCF) that generated the

token. Each authorized session may include several flow authorizations. Each flow authorization may include an authorization for one or more flows. The authorization shall contain the following information:

- Filter Specs (IP flow 5-tuples that identify the set of flows)
- Data rate and QoS class that describes the authorized resource for the set of flows
- The IP flow 5-tuples includes Source Address, Source Port, Destination Address, Destination Port and Protocol ID. Note that some fields may be wildcarded.

A typical SDP description consists of a session-level description (details that apply to the whole session and all media flows) and the several media-level descriptions (details that apply to a single media flow). The four critical components for mapping an SDP description into a QoS authorization are the media announcements ("m="), the connection data ("c="), the attributes ("a=") and the bandwidth ("b=").

The media announcements field contains information about the type of media session, and is of the form:

m=<media> <port> <transport> <fmt list>

The attributes field contains attributes of the preceding media session, and is of the form:

a=<attribute><value>

The connection data field contains information about the media connection, and is of the form:

c=<network type> <address type> <connection address>

The optional bandwidth field contains information about the bandwidth required, and is of the form:

b=<modifier>:<bandwidth-value>

An example SDP description from the session originator in the SIP INVITE message:

v=0

o=hshieh 2890844526 2890842807 IN IP4 saturn.attws.com

s=-

c=IN IP4 192.141.10.188

t=0 0

b=AS:64

m=audio 29170 RTP/AVP 3 96 97

a=rtpmap:96 G726-32/8000

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

m=video 51372 RTP/AVP 34

a=fmtp 34 SQCIF=2/MaxBitRate=500/SAC AP

m=application 32416 udp text_chat

The called party answers the call and returns the following SDP description in the SIP 183 message:

v=0

o=johndoe 2890844526 2890842807 IN IP4 uranus.solar.com

s=-

c=IN IP4 204.142.180.111

t=0 0

b=AS:64

m=audio 31160 RTP/AVP 3 97

a=rtpmap:97 AMR

a=fmtp:97 mode-set=0,2,5,7; maxframes=2

a=recvonly

m=video 61000 RTP/AVP 31

a=fmtp 34 SQCIF=2/MaxBitRate=500/SAC AP

m=application 33020 udp text_chat

a=sendonly

Upon receiving the above SDP, the originator's P-CSCF will authorize QoS resource for the originator UE with the following media flows:

A uplink audio flow:

The following IP 5-tuples identify the flow:

SrcAddress	SrcPort	DestAddress	DestPort	ProtocolID
192.141.10.188	*****	**204.142.180.111**	**31160**	**17**

Since the conversational audio is very sensitive to delay, the maximum QoS class corresponding to conversational traffic class would be set. The b parameter is used to determine the maximum authorised data rate.

An uplink video flow:

The following IP 5-tuples identify the flow:

SrcAddress	SrcPort	DestAddress	DestPort	ProtocolID
192.141.10.188	*****	**204.142.180.111**	**61000**	**17**

The video flow may be assigned a maximum QoS class corresponding to streaming traffic class. The b parameter is used to determine the data rate.

A downlink video flow:

The following IP 5-tuples identify the flow:

SrcAddress	SrcPort	DestAddress	DestPort	ProtocolID
204.142.180.111	*****	**192.141.10.188**	**51372**	**17**

The video flow may be assigned a maximum QoS class corresponding to streaming traffic class. The b parameter is used to determine the maximum authorised data rate.

A downlink udp flow:

The following IP 5-tuples identify the flow:

SrcAddress	SrcPort	DestAddress	DestPort	ProtocolID
204.142.180.111	*	192.141.10.188	32416	17

The udp application flow may be assigned a maximum QoS class corresponding to interactive. The b parameter is used to determine the data rate.

Note: The sample mappings in this section are for illustration purpose only. The actual mapping of media codec to QoS resource requirement is specified in TS 29.208.

3GPP TSG-SA2 Meeting #36
New York, USA, 24-28 November 2003

Tdoc S2-034339

CR-Form-v7

CHANGE REQUEST

⌘ **23.207** **CR** **065** ⌘**rev** **2** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Updates to signaling flows for the Gq interface
Source:	⌘	Nokia
Work item code:	⌘	QoS1
Date:	⌘	24/11/2003
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘

TS 23.207 currently describes a Policy Decision Function (PDF) that is only applicable for IMS and is tightly linked to SIP session control. As a result, PDF is currently shown as being a logical entity of the P-CSCF.
Such an architecture does not enable a generic service policy to be applied to both IMS and non-IMS services.

TR 23.917 has studied the feasibility of standardising the interface between the PDF and Application Functions (e.g. P-CSCF in the IM domain), and has developed functional descriptions and procedures along with signaling flows. These new functionalities, procedures and signaling flows shall be reflected in the corresponding Technical Specification, i.e. TS 23.207.

Summary of change: ⌘

The signaling flows have been updated to reflect the new functions of generalized service based policy control.

Consequences if not approved: ⌘

Clauses affected: ⌘ All sub-clauses of 6.3, new Annex X (informative)

		Y	N		
Other specs	⌘	X		Other core specifications	⌘ TS 29.208, TS 29.209

affected:	X	Test specifications
	X	O&M Specifications
Other comments: ⌘		

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

********** First set of changes **********

6.3 Session Flow: QoS Interaction Procedures

This section highlights possible additions to the GPRS bearer establishment procedures specified in TS23.060 for support of ~~IM Services~~Service Based Local Policy. It~~, and~~ describes the QoS interactions involved within the sub-procedure blocks for Authorize QoS Resources, Resource Reservation with Service-based Local Policy, ~~Approval of QoS Commit~~Enable Media, ~~Removal of QoS Commit~~Disable Media, Revoke Authorization for GPRS and IP Resources, Indication of PDP Context Release, Authorization of PDP Context Modification and Indication of PDP Context Modification. These procedures are utilized to provide Service based Local Policy for session-based services, e.g. for IMS as described in Chapter 5: 'IP multimedia subsystem procedures' of TS23.228.

For IMS where Service-based Local Policy is not used, the Authorize QoS Resources, the Resource Reservation with Service-based Local Policy, the Enable Media, the Disable Media, Revoke Authorization for GPRS and IP Resources, the Indication of PDP Context Release, the Authorization of PDP Context Modification and the Indication of PDP Context Modification sub-procedure blocks defined in TS23.228 are not applied.

The possible additions refer to procedures on the use of Service-based Local Policy, and RSVP Signalling as well as the allowed combinations.

It shall be possible according to operator choice to use solely the GPRS bearer establishment procedures specified in TS23.060 without the additions described in this section.

~~For cases where Service-based Local Policy is not used, the Authorize QoS Resources,the Resource Reservation with Service-based Local Policy, the Approval of QoS Commit, the Removal QoS Commit, Revoke Authorization for GPRS and IP Resources, the Indication of PDP Context Release, the Authorization of PDP Context Modification and the Indication of PDP Context Modification sub-procedure blocks defined in TS23.228 are not applied.~~

~~For the flow sequences involving RSVP, the following are assumed:~~

~~- the successful setup of RSVP signalling.~~

~~-~~

For the flow sequences involving Authorize QoS Resources and Approval of QoS Commit, the following are assumed:

- the successful authorization of QoS resources.
- the successful approval of QoS commit.

~~NOTE: Whether 'gate' corresponds to a single IP flow or multiple IP flows is FFS.~~

NOTE: 'Activate (Secondary) PDP Context' here means that either Primary or Secondary PDP context may be activated.

NOTE: When necessary, it is assumed that there is an existing PDP context that carries signalling (e.g., RSVP) between the UE and GGSN.

6.3.1 Authorize QoS Resources, AF session establishment

The Authorize QoS Resources upon AF session establishment procedure is triggered by a session establishment event in the AF (e.g. the ~~P-CSCF~~AF receiving an ~~SIP~~ AF session signaling message containing session description information (e.g. SDP)). ~~An offer-answer pair of SDP payloads~~The session description negotiation between AF session endpoints contains ~~sufficient~~ information about the session, such as the end-points, bandwidth requirements, and the characteristics of the media exchange.

Note: The exact type and amount of session description information exchanged between AF session endpoints depend on the nature of the session and the application.

The PDF shall authorize the required QoS resources for the session and install the IP bearer level policy based on service information received from the ~~P-CSCF~~AF.

The following figure is applicable to both sides (i.e. originating and terminating) of the AF session.~~the Mobile Originating (MO) side and the Mobile Terminating (MT) side.~~

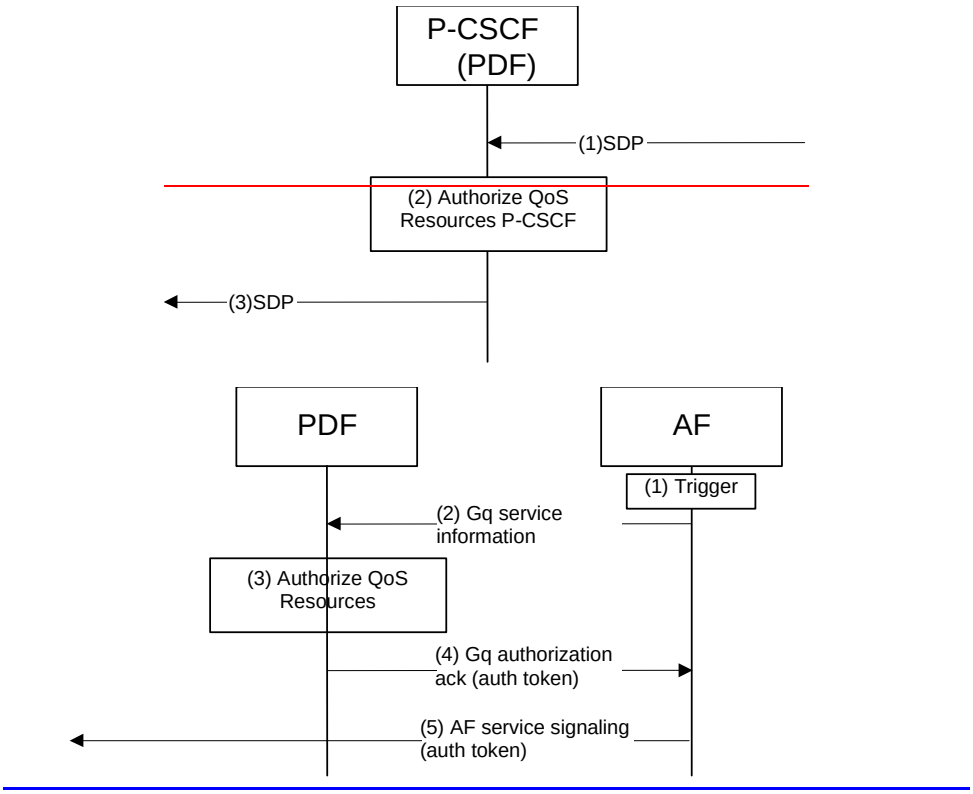


Figure 3: Authorize QoS Resources, AF session establishment

1) An AF session signaling message is received at or generated by the AF, or an internal action at the AF triggers the need for an authorization request.~~A SIP message containing SDP payload is received by the P-CSCF.~~

2) ~~2)~~ The Application Function sends a request for authorization token to the PDF with service information, which may include session description information based on the AF session signaling. Some services may require further interaction between the AF and the PDF to provide the full service information, e.g. for IMS session establishment (mobile terminated).
Note that it is also possible that the AF initiates a request for multiple authorization tokens to use for future sessions, in which case the PDF can generate multiple authorization tokens.

3) If the PDF has received AF session description in the service information in Step 2, ~~T~~the PDF shall authorize the required QoS resources for the AF session and install the IP bearer level policy based on information received from the ~~P-CSCF~~AF. If the service information was not received in Step 2 above, the QoS authorisation is deferred.
The PDF generates an authorization token for the AF session.

4) The PDF sends the authorisation token to the AF.

~~3~~5) ~~Upon successful authorization of the session, t~~The ~~P-CSCF~~AF forwards the AF session signaling message containing the session description. The AF shall include the authorization token in this AF session signaling message. ~~SDP payload .to the UE for the originating side. For the terminating side, the P-CSCF forwards the SDP payload to the terminating S-CSCF.~~

6.3.2 Resource Reservation Message Flows

6.3.2.1 Resource Reservation with Service-based Local Policy

For this case, Service-based Local Policy is added to the GPRS bearer establishment procedures specified in TS23.060.

This section provides the flows for bearer establishment, resource reservation and policy control with PDP Context setup and DiffServ inter-working.

The following figure is applicable to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.

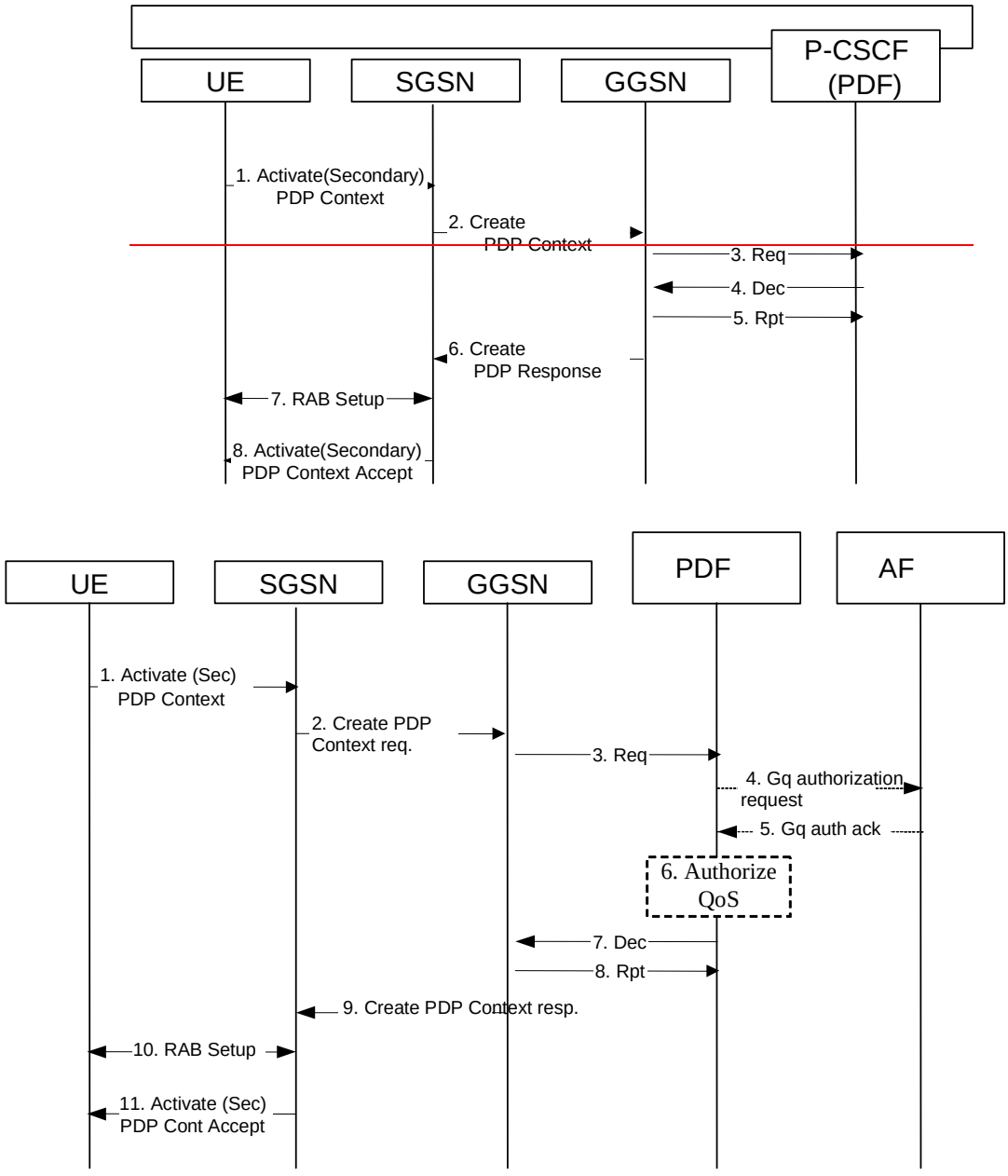


Figure 4: Resource Reservation with Service-based Local Policy

1) The UE sends an Activate (Secondary) PDP Context message to the SGSN with the UMTS QoS parameters. The UE includes the Binding Information in the Activate PDP Context message.

2) The SGSN sends the corresponding Create PDP Context message to the GGSN.

3) The GGSN sends a COPS REQ message with the Binding Information to the PDF in order to obtain relevant policy information.

4) A PDF generated authorization token enables the PDF to identify the authorisation status information. If the previous PDF interaction with that AF had requested this, or if the previous interaction with the AF did not include service information, the PDF sends an authorisation request to that Application Function.

5) The AF sends the service information to the PDF.

6) The PDF shall authorize the required QoS resources for the AF session and install the IP bearer level policy in its internal database. This is based on information from the Application Function.

7) The PDF sends a COPS DEC message back to the GGSN.

8~~5~~) The GGSN sends a COPS RPT message back to the PDF~~.~~, which may also trigger a report message to be sent from the PDF to the AF.~~–~~

9~~6~~) The GGSN maps IP flow based policy information into PDP context based policy information and uses the PDP context based policy information to accept the PDP activation request, and sends a Create PDP Context Response message back to SGSN.

10~~7~~) RAB setup is done by the RAB Assignment procedure.

11~~8~~) The SGSN sends an Activate (Secondary) PDP Context Accept message to UE.

6.3.2.2 Resource Reservation with ~~End-to-End RSVP~~IP QoS signaling

Editor's note: There is still ongoing work in IETF on new IP QoS signaling techniques, hence it is not possible to include flows using those new techniques into this version of the specification. Procedures describing resource reservation with end-to-end RSVP are described in Annex X.

~~For this case, RSVP is added to the GPRS bearer establishment procedures specified in TS23.060, with no Service based local policy.~~

~~NOTE: The diagrams in this subsection depict one possible signalling sequence, however, the alternative signalling sequences below are possible:~~

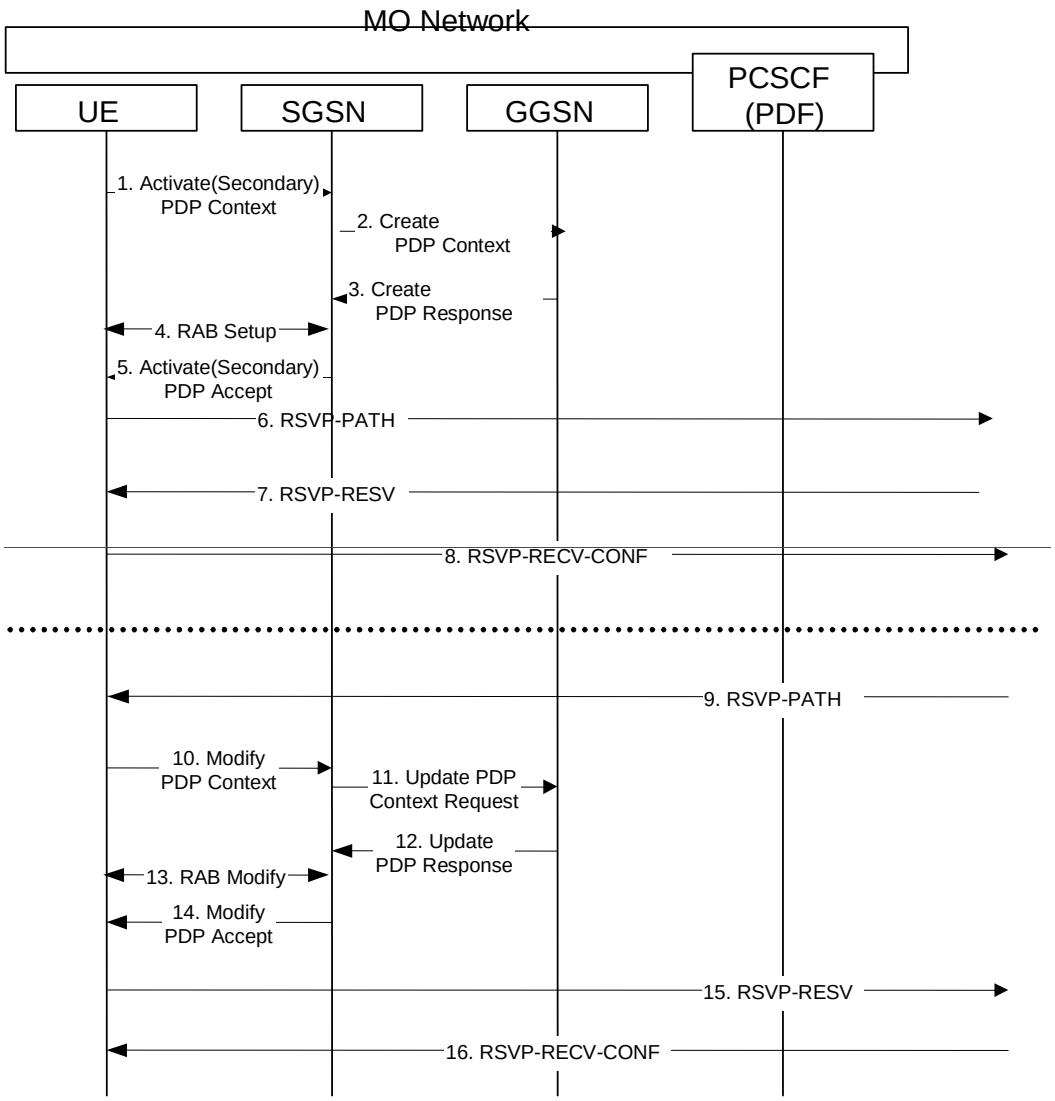
~~- to trigger the Create PDP Context Request message after the PATH message.~~

~~- to trigger the Create PDP Context Request message after the RESV message.~~

~~- to trigger only one PDP context after all RSVP exchanges have completed.~~

~~NOTE: The diagrams in this subsection depict the case when the GGSN is not RSVP aware, however, the alternative of GGSN being RSVP aware is also possible.~~

~~The following figure is applicable to the Mobile Originating (MO) side.~~



~~Figure 5: MO Resource Reservation with End-to-End RSVP~~

~~NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).~~

~~1) The UE sends an Activate (Secondary) PDP Context message to the SGSN with the UMTS QoS parameters.~~

~~2) The SGSN sends the corresponding Create PDP Context message to the GGSN.~~

~~3) The GGSN authorizes the PDP context activation request according to the local operator's IP bearer resource based policy, the local operator's admission control function and the GPRS roaming agreements and sends a Create PDP Context Response message back to the SGSN.~~

~~4) RAB setup is done by the RAB Assignment procedure.~~

~~5) The SGSN sends an Activate (Secondary) PDP Context Accept message to UE.~~

~~6) UE sends an RSVP PATH message to the next hop, through the GGSN. The GGSN does not process the RSVP PATH message. Alternatively, the GGSN may process the RSVP PATH message and forward it to the next hop.~~

~~7) The UE receives the RSVP RESV message in the downlink direction, through the GGSN. The GGSN does not process the RSVP RESV message. Alternatively, the GGSN may process the RSVP RESV message and forward it to the UE.~~

8) The UE sends a RSVP RESV-CONF message to the next hop. The use of the RESV-CONF message is optional.

9) The UE receives a RSVP PATH message in the downlink direction, through the GGSN. The GGSN does not process the RSVP PATH message. Alternatively, the GGSN may process the incoming RSVP PATH message and forward it to the UE.

10) The UE may send a Modify PDP Context message to the SGSN with the necessary modification to UMTS QoS parameters according to the received RSVP PATH message.

11) The SGSN sends the corresponding Update PDP Context Request message to the GGSN.

12) The GGSN authorizes the PDP context modification according to the local operator's IP bearer resource based policy, the local operator's admission control function and the GPRS roaming agreements and sends an Update PDP Context Response message back to the SGSN.

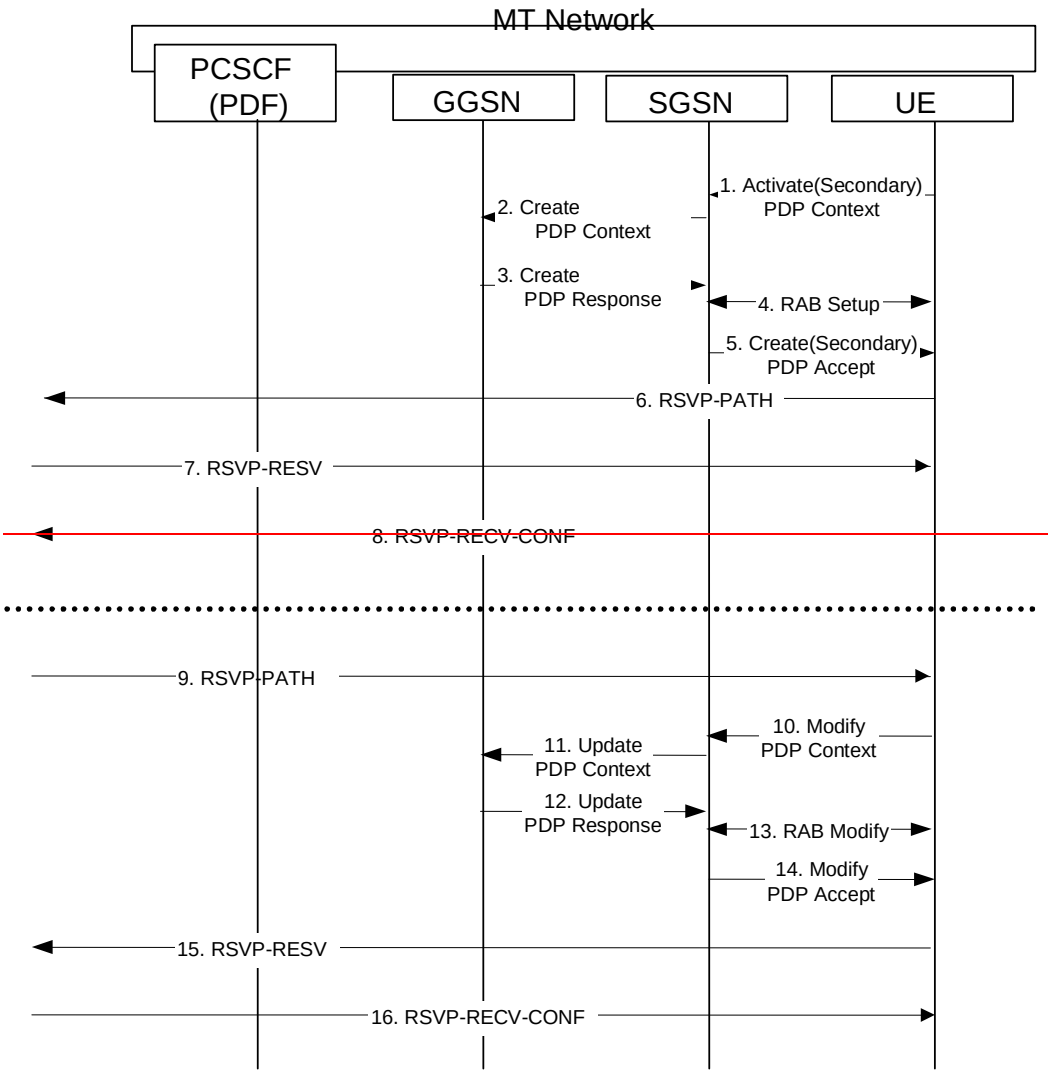
13) The radio access bearer modification may be performed by the RAB Assignment procedure.

14) The SGSN sends a Modify PDP Context Accept message to UE.

15) UE sends the RSVP RESV message to the next hop, through the GGSN. The GGSN does not process the RSVP RESV message. Alternatively, the GGSN may process the RSVP RESV message and forward it to the next hop.

16) The UE receives the RSVP RESV-CONF message in the downlink direction. The use of the RESV-CONF message is optional.

The following figure is applicable to the Mobile Terminating (MT) side. As the flow is the mirror of the Mobile Originating (MO) side, the step-by-step description is omitted.



~~Figure 6: MT Resource Reservation with End-to-End RSVP~~

~~NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).~~

6.3.2.3 Resource Reservation with ~~End-to-End RSVP~~IP QoS reservation signaling and Service-based Local Policy

Editor's note: There is still ongoing work in IETF on new IP QoS signaling techniques, hence it is not possible to include flows using those new techniques into this version of the specification. Procedures describing resource reservation with end-to-end RSVP and Service-based Local Policy are described in Annex X.

~~For this case, Service based Local Policy and RSVP are added to the GPRS bearer establishment procedures specified in TS23.060.~~

~~NOTE: The diagrams in this subsection depict one possible signalling sequence, however, the alternative signalling sequences below are possible:~~

- ~~to trigger the Create PDP Context Request message after the PATH message.~~
- ~~to trigger the Create PDP Context Request message after the RESV message.~~
- ~~to trigger only one PDP context after all RSVP exchanges have completed.~~

NOTE: The diagrams in this subsection depict the case when the GGSN is RSVP aware, however, the alternative of GGSN not being RSVP aware is also possible.

This section provides the flows for bearer establishment, resource reservation and policy control with RSVP.

The following figure is applicable to the Mobile Originating (MO) side.

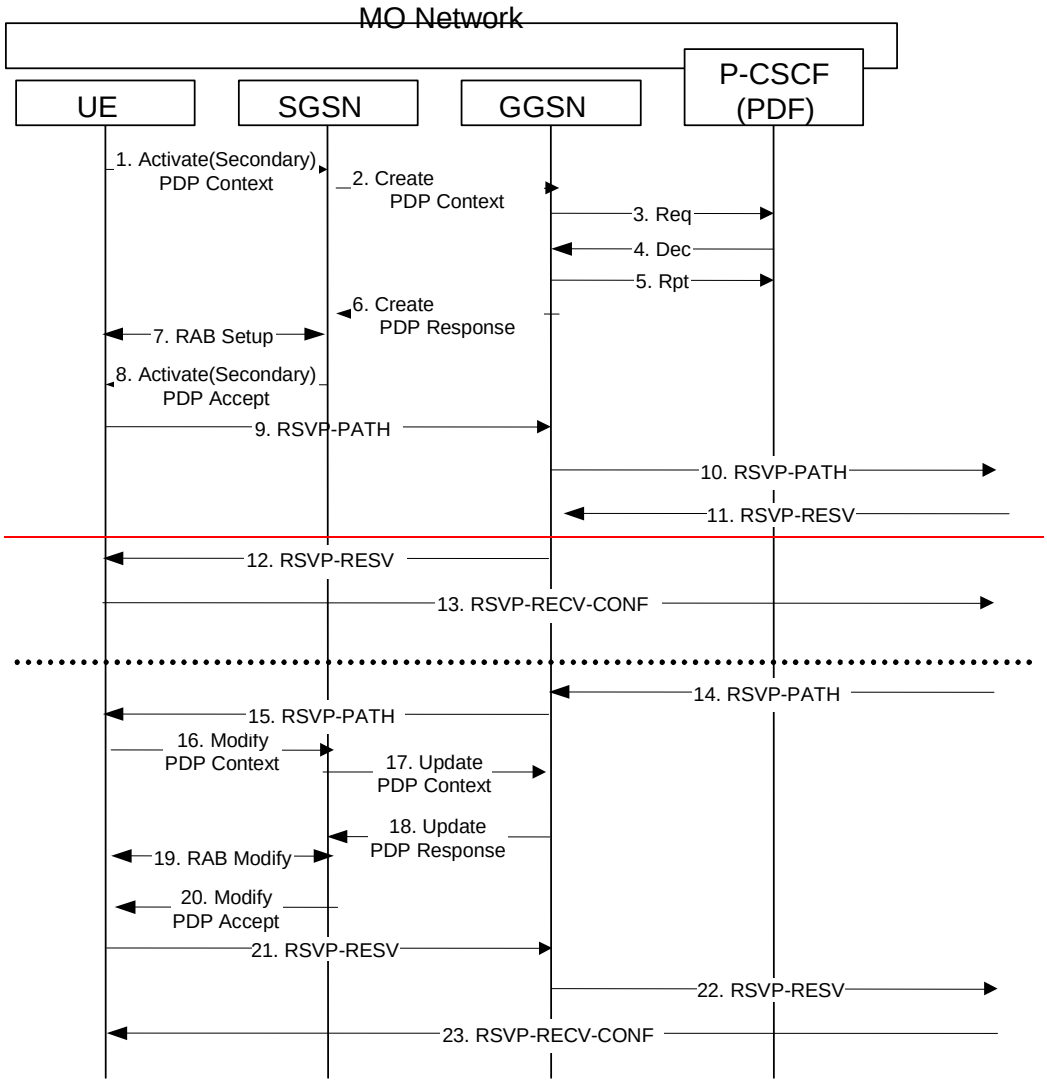


Figure 7: MO Resource Reservation with End-to-End RSVP and Service-based Local Policy

NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).

1) The UE sends an Activate (Secondary) PDP Context message to the SGSN with the UMTS QoS parameters. The UE includes the Binding Information in the Activate PDP Context message.

2) The SGSN sends the corresponding Create PDP Context message to the GGSN.

3) The GGSN sends a COPS REQ message with the Binding Information to the PDF in order to obtain relevant policy information.

4) The PDF sends a COPS DEC message back to the GGSN.

5) The GGSN sends a COPS RPT message back to the PDF.

6) The GGSN maps IP flow based policy information into PDP context based policy information and uses the PDP context based policy information to accept the PDP activation request, and sends a Create PDP Context Response message back to SGSN. The GGSN may cache the policy information.

7) RAB setup is done by the RAB Assignment procedure.

8) The SGSN sends an Activate (Secondary) PDP Context Accept message to UE.

9) UE sends a RSVP PATH message to GGSN. The UE includes the Binding Information.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

10) The GGSN uses the policy information to accept the RSVP PATH message, and forwards the RSVP PATH message to the next hop.

11) The GGSN receives the RSVP RESV message in the downlink direction.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

12) The GGSN uses the policy information to accept the RSVP RESV message, and forwards the RSVP RESV message to the UE.

13) The UE sends a RSVP RESV-CONF message to the next hop. The use of the RESV-CONF message is optional.

14) The GGSN receives a RSVP PATH message in the downlink direction.

15) The GGSN forwards the RSVP PATH message to the UE.

16) The UE may send a Modify PDP Context message to the SGSN with the necessary modification to UMTS QoS parameters according to the received RSVP PATH message. The UE includes the Binding Information in the Modify PDP Context message.

17) The SGSN sends the corresponding Update PDP Context message to the GGSN.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

18) The GGSN uses the policy information to accept the PDP modification request, and sends a Update PDP Context Response message back to SGSN.

19) The radio access bearer modification may be performed by the RAB Assignment procedure.

20) The SGSN sends a Modify PDP Context Accept message to UE.

NOTE: Steps 16 to 20 are optional if the existing PDP context already satisfies the QoS requirements.

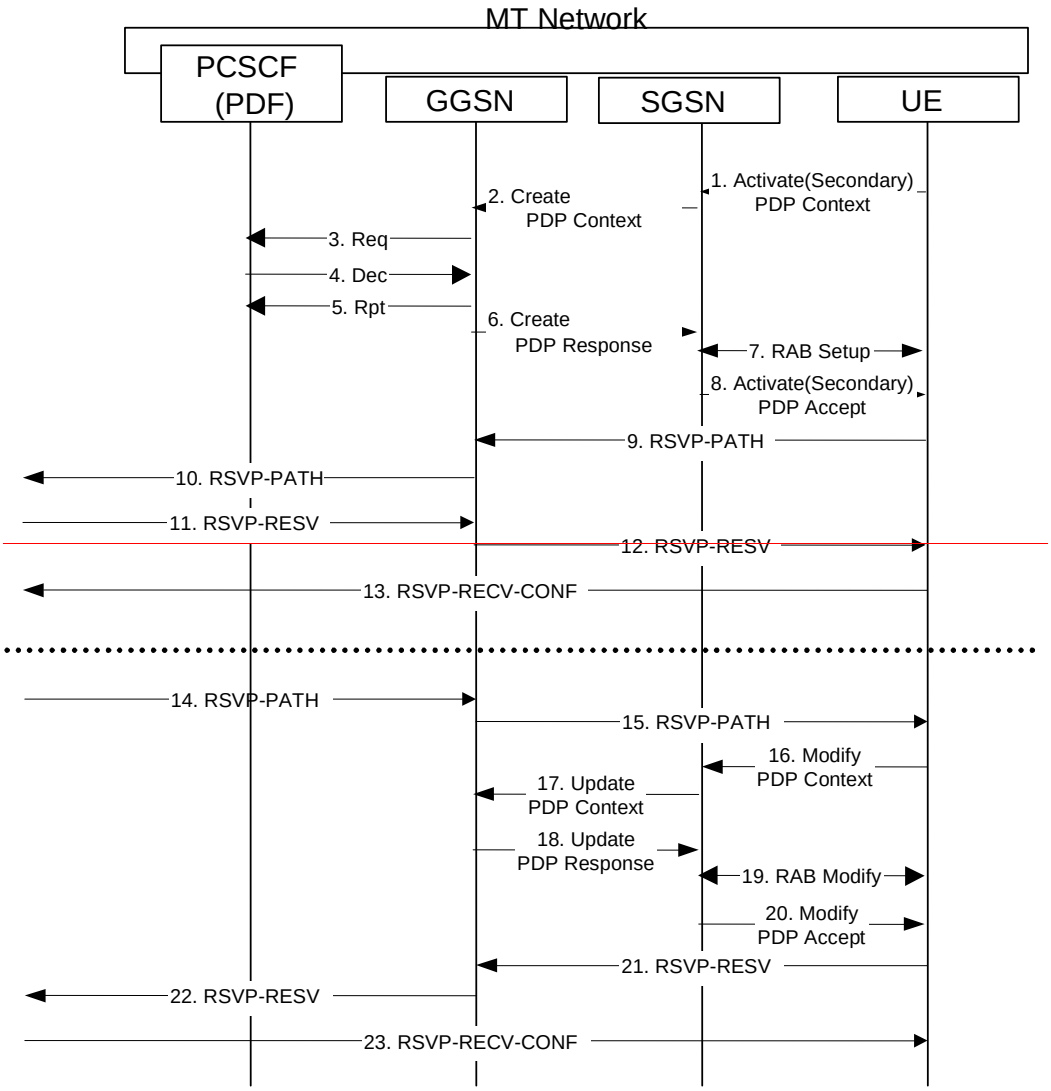
21) The UE sends a RSVP RESV message to the GGSN. The UE includes the Binding Information in the RSVP RESV message.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

22) The GGSN uses the policy information to accept the RSVP RESV message, and forwards the RSVP RESV message to the next hop.

23) The UE receives the RSVP RESV-CONF message in the downlink direction. The use of the RESV-CONF message is optional.

The following figure is applicable to the Mobile Terminating (MT) side. As the flow is the mirror of the Mobile Originating (MO) side, the step-by-step description is omitted.



~~**Figure 8: MT Resource Reservation with End-to-End RSVP and Service-based Local Policy**~~

~~NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).~~

6.3.2.4 (void)

6.3.3 ~~Approval of QoS Commit~~Enable Media procedure

The ~~Approval of QoS Commit~~'Enable media' procedure is triggered by ~~the P-CSCF receiving a 200 OK response to the INVITE request.~~an AF session signaling message received at the AF, or an internal action at the AF (e.g. in IMS this is triggered by the P-CSCF receiving the 200 OK response to the INVITE request). The 'Enable media' procedure is optional and is only needed if the AF ordered the PDF to wait for the Approval of QoS Commit procedure to enable the media.

The following figure is applicable to both the Mobile Originating (MO) side and the Mobile Terminating (MT) side.

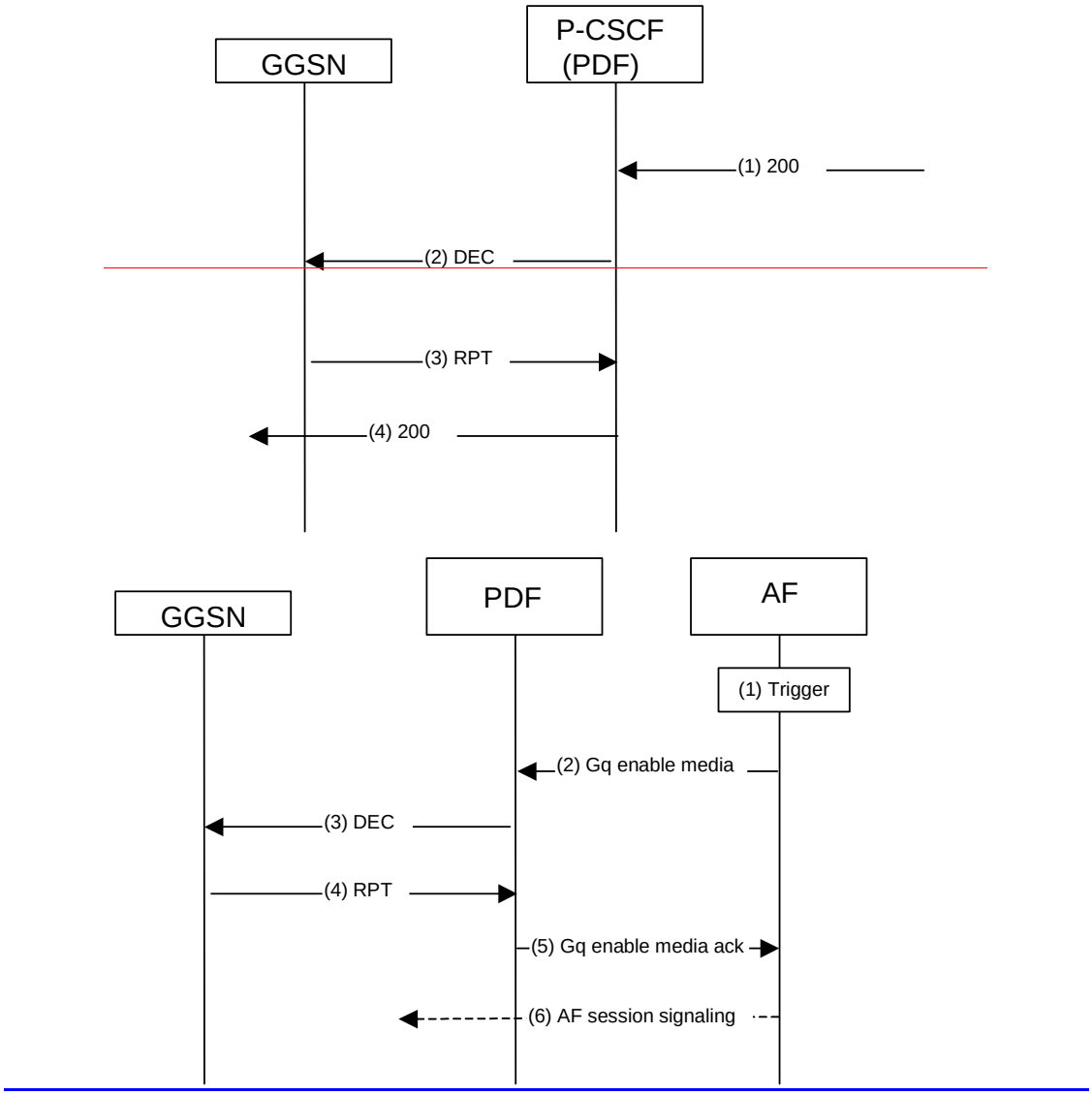


Figure 11: ~~Approval of QoS Commit~~Enable media procedure

1) ~~1)~~ An AF session signaling message is received at the AF, or an internal action at the AF triggers the need to enable the media for the application. In IMS this is triggered by ~~T~~the P-CSCF receive~~s~~ing the 200 OK response to the INVITE request.

2) The Application Function sends an enable media indication to the PDF. ~~PDF approves the QoS Commit based on local policy.~~

3~~2~~) The PDF shall send a COPS DEC message to the GGSN to open the 'gate' e.g., enable the use of the authorised QoS resources, unless this was done based on local policy at the time the QoS resources were authorised.

4~~3~~) The GGSN receives the COPS DEC message and opens the 'gate' e.g., enables the use of the authorised QoS resources, and sends a COPS RPT message back to the PDF.

5) The PDF reports the successful enable media operation to the Application Function.

~~4~~6) The AF session signaling message may occur in case required by the AF session procedures.
In IMS, ~~T~~the P-CSCF forwards the 200 OK message to the UE for the originating side. For the terminating side, the P-CSCF forwards the SDP message to the terminating S-CSCF.

6.3.4 ~~Removal of QoS Commit~~Disable Media procedure

The ~~"Removal of QoS commit"~~'Disable Media' procedure is used e.g. when a media component of an AF session ~~is put on hold~~needs to be disabled (e.g. in case of IMS a media re-negotiation or call hold). The ~~P-CSCF (~~PDF~~)~~ provides final decision on removal of QoS commit for the authorized media stream to the GGSN. 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" and "Resource Reservation with Service-based Local Policy" request.

The GGSN closes the gate, and the media flow will be blocked.

The following figure presents the "Removal of QoS commit" procedure.

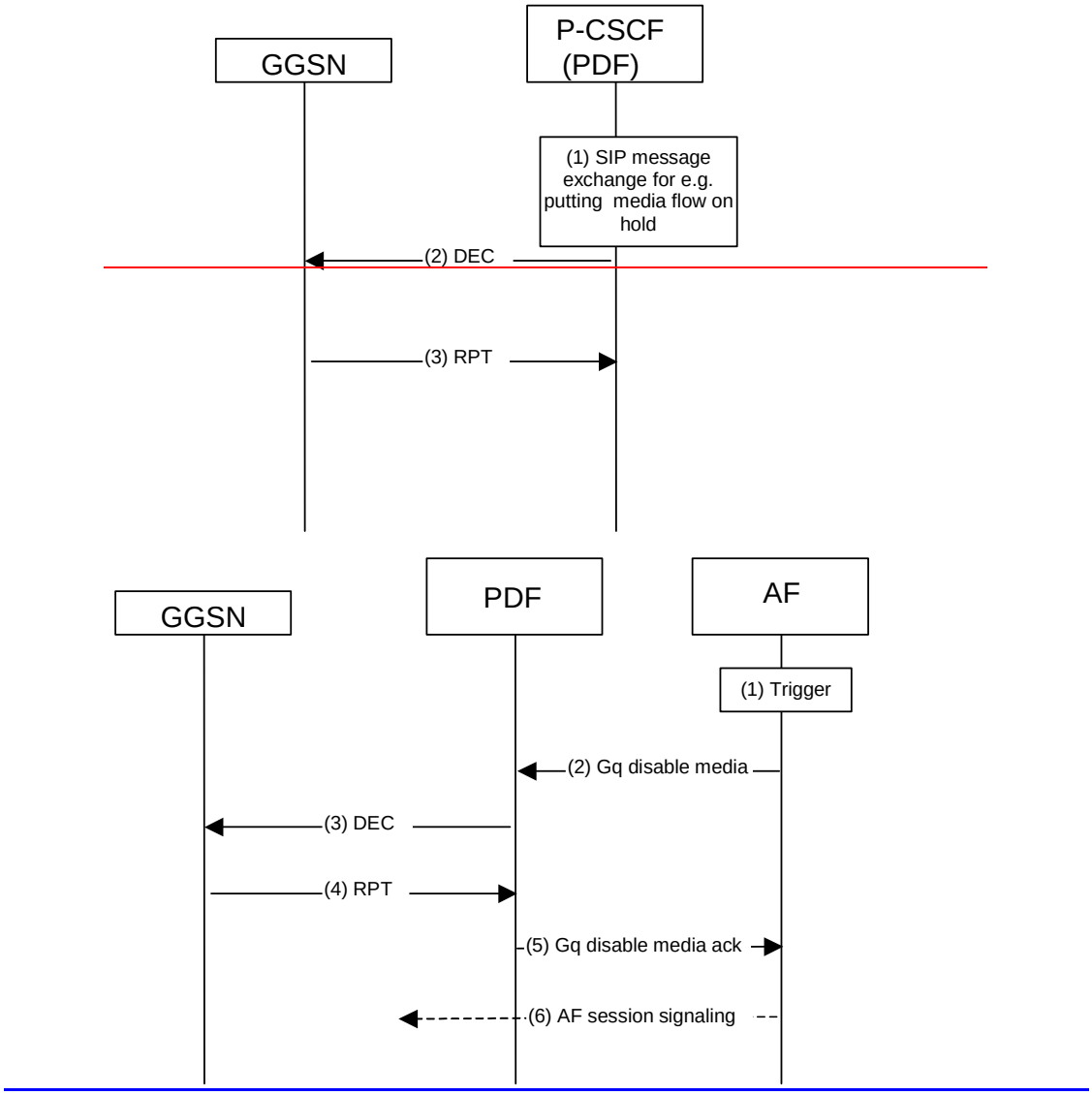


Figure 12: ~~Removal of QoS commit~~Disable media procedure

1) An AF session signaling message is received at the AF, or an internal action at the AF triggers the need to disable the media for the application. In IMS this is triggered by a SIP message exchanges for e.g., putting a media flow on hold ~~are carried out~~.

2) The Application Function sends a disable media indication to the PDF.

3) The PDF shall send a COPS DEC message to the GGSN to close ~~–~~the 'gate'.

~~3~~4) The GGSN receives the COPS DEC message, closes the gate, and sends a COPS RPT message back to the PDF.

5) The PDF reports the successful disable media operation to the Application Function.

6) The AF session signaling message may occure in case required by the AF session procedures.

6.3.5 Revoke Authorization for GPRS and IP Resources

The "Revoke Authorization for GPRS and IP resources" procedure is used when AF session signaling releases the AF session, e.g. upon IMS session release. 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" and "Resource Reservation with Service-based Local Policy" request.

The following figure presents the "Revoke Authorization for GPRS and IP Resources" procedure. This procedure is applied for user plane PDP context(s).

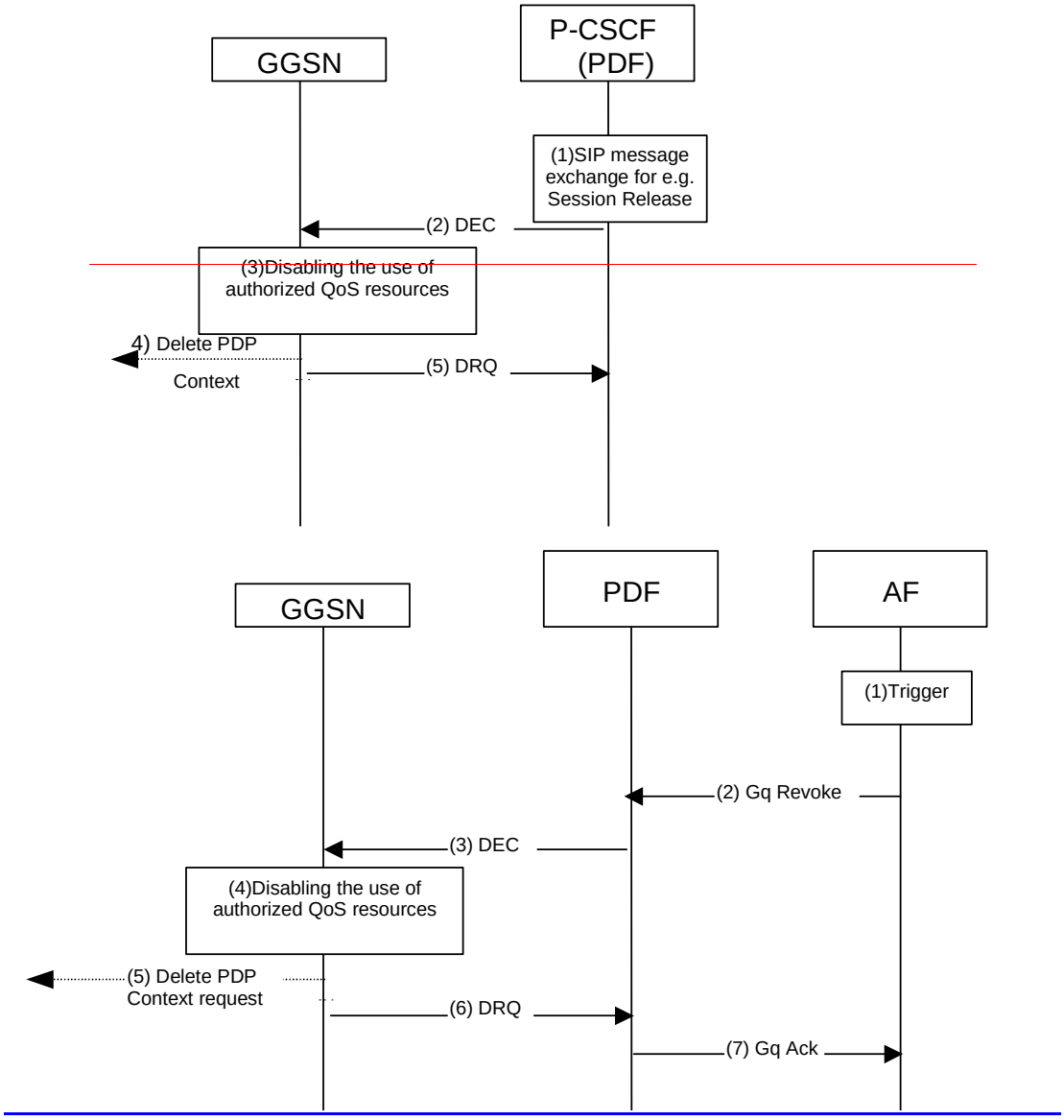


Figure 13: Revoke Authorization for GPRS and IP Resources

1) ~~SIP~~ AF session signaling message exchanges for e.g. AF session release ~~are carried out~~ or internal action at the AF triggers the need to revoke the authorization.

2) The Application Function sends a message to the PDF to indicate the revocation.

32) The PDF shall send a COPS DEC (Decision) message containing revoke command to the GGSN.

34) The GGSN receives the COPS DEC message, and disables the use of the authorized QoS resources.

54) The GGSN initiates deactivation of the PDP context used for the ~~IP multimedia~~AF session, in case the UE has not done it before.

65) Upon deactivation of the PDP Context, the GGSN sends a COPS DRQ (Delete Request State) message back to the PDF.

7) The PDF indicates the successful execution of the revoke indication.

6.3.6 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.

The following figure presents the "Indication of PDP Context Release" procedure.

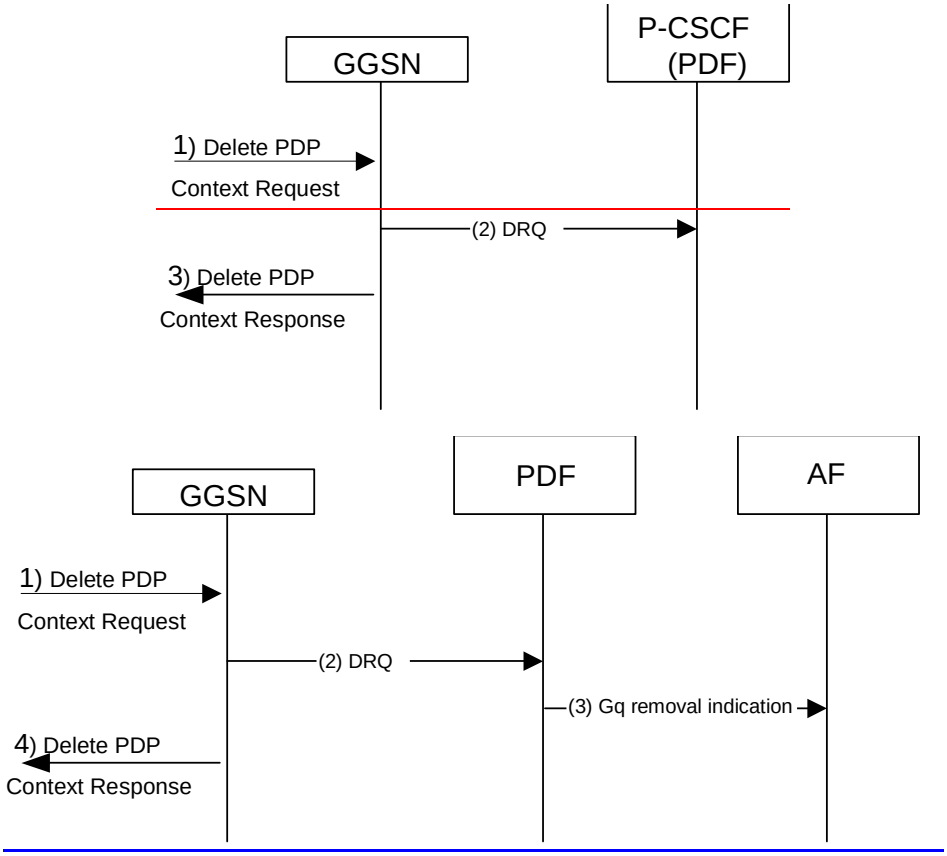


Figure 14: Indication of PDP Context Release

1) The GGSN receives a Delete PDP Context request for the PDP context related to the media flow.

2) The GGSN sends a COPS DRQ message to the ~~P-CSCF(~~PDF~~)~~.

3) The PDF indicates the bearer removal to the AF.

34) The GGSN sends the Delete PDP Context Response message to the SGSN to acknowledge the PDP context deletion.

6.3.6a Authorization of PDP Context Modification

The "Authorization of PDP Context Modification" 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 new binding information is received. In this case, the GGSN communicates with the PDF as described below. The following figures present the "Authorization of PDP Context Modification" procedure.

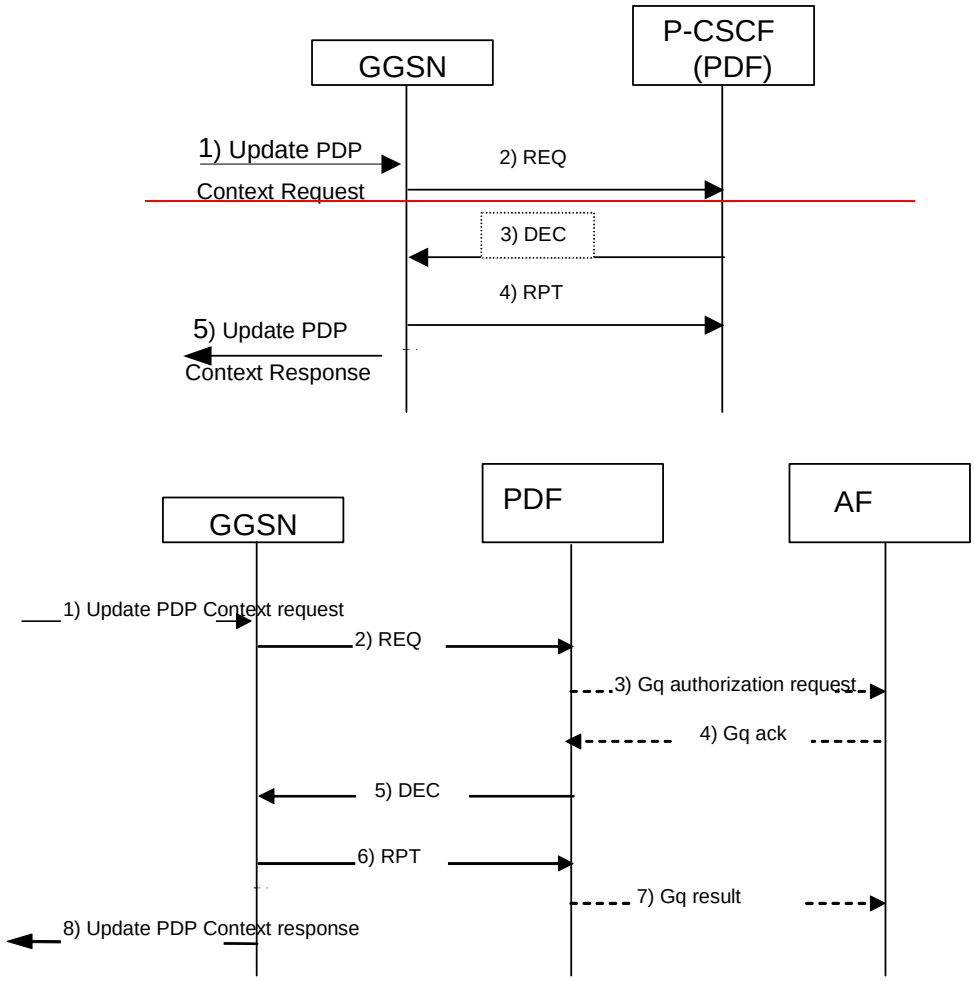


Figure 14a: Authorization of PDP Context Modification

1) A request to modify the PDP context related to the media flow is indicated by sending the Update PDP Context Request message to the GGSN.

2) The GGSN sends a COPS REQ message to the ~~P-CSCF(~~PDF~~)~~. If the GGSN has sufficient information to authorize this PDP context modification request, then the GGSN does not send a COPS REQ message to the ~~P-CSCF(~~PDF~~)~~.

3) The PDF may send an authorization request to the Application Function. This may be the case if this was requested from the AF at initial authorisation, and if PDF requires more information from the AF before authorising the network resources modification.

4) The AF shall send service information for authorization of the bearer modification.

~~3~~5) The ~~P-CSCF(~~PDF~~)~~ receives the COPS REQ message, notes the requested modification and informs the GGSN of the authorization decision.

6~~4~~) The GGSN sends a COPS RPT message back to the ~~P-CSCF(~~PDF~~)~~.

7) In case the PDF had contacted the AF in step 3), then the successful installation of the decision is reported to the AF.

85) If the ~~P-CSCF(~~PDF~~)~~ accepted the modification, the GGSN sends the Update PDP Context Response message to the SGSN to acknowledge the PDP context modification.

6.3.7 Indication of PDP Context Modification

The "Indication of PDP Context Modification" procedure is used when a PDP Context is modified such that the maximum bit rate (downlink and uplink) is downgraded to 0 kbit/s or changed from 0 kbit/s to a value that falls within the limits that were authorized at PDP context activation(or last modification). In this case, the GGSN communicates with the PDF as described below. The following figures present the "Indication of PDP Context Modification" procedure.

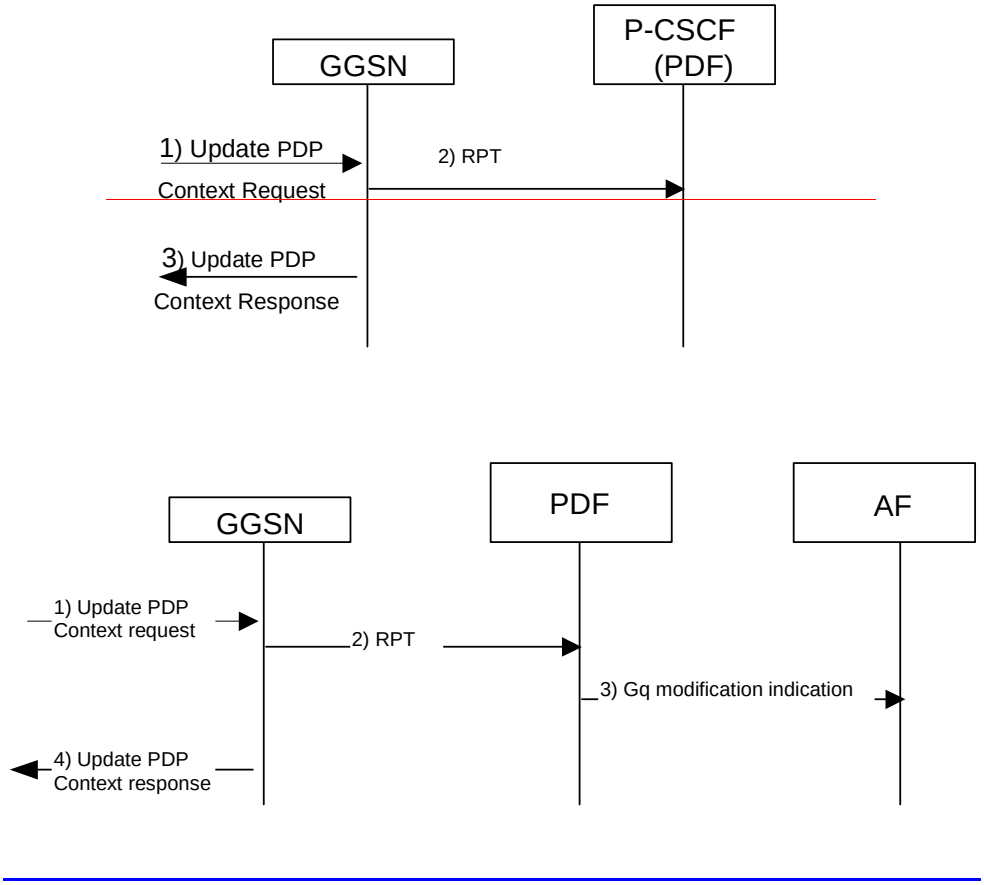


Figure 15: Indication of PDP Context Modification

1) A request to modify the PDP context related to the media flow is indicated by sending the Update PDP Context Request message to the GGSN.

2) The GGSN sends a COPS RPT message to the ~~P-CSCF(~~PDF~~)~~ to indicate the state changes of the PDP context.

3) If this state change matches the criteria for which that the AF had requested to be informed, the PDF shall give a bearer modification indication to the Application Function

3) The GGSN sends the Update PDP Context Response message to the SGSN to acknowledge the PDP context modification.

********** Second set of changes **********

Annex X (informative): Resource reservation and end-to-end RSVP

X.1 Resource reservation with end-to-end RSVP

For this case, RSVP is added to the GPRS bearer establishment procedures specified in TS23.060, with no Service-based local policy.

NOTE: The diagrams in this subsection depict one possible signalling sequence, however, the alternative signalling sequences below are possible:

- to trigger the Create PDP Context Request message after the PATH message.
- to trigger the Create PDP Context Request message after the RESV message.
- to trigger only one PDP context after all RSVP exchanges have completed.

NOTE: The diagrams in this subsection depict the case when the GGSN is not RSVP aware, however, the alternative of GGSN being RSVP aware is also possible.

The following figure is applicable to the Mobile Originating (MO) side.

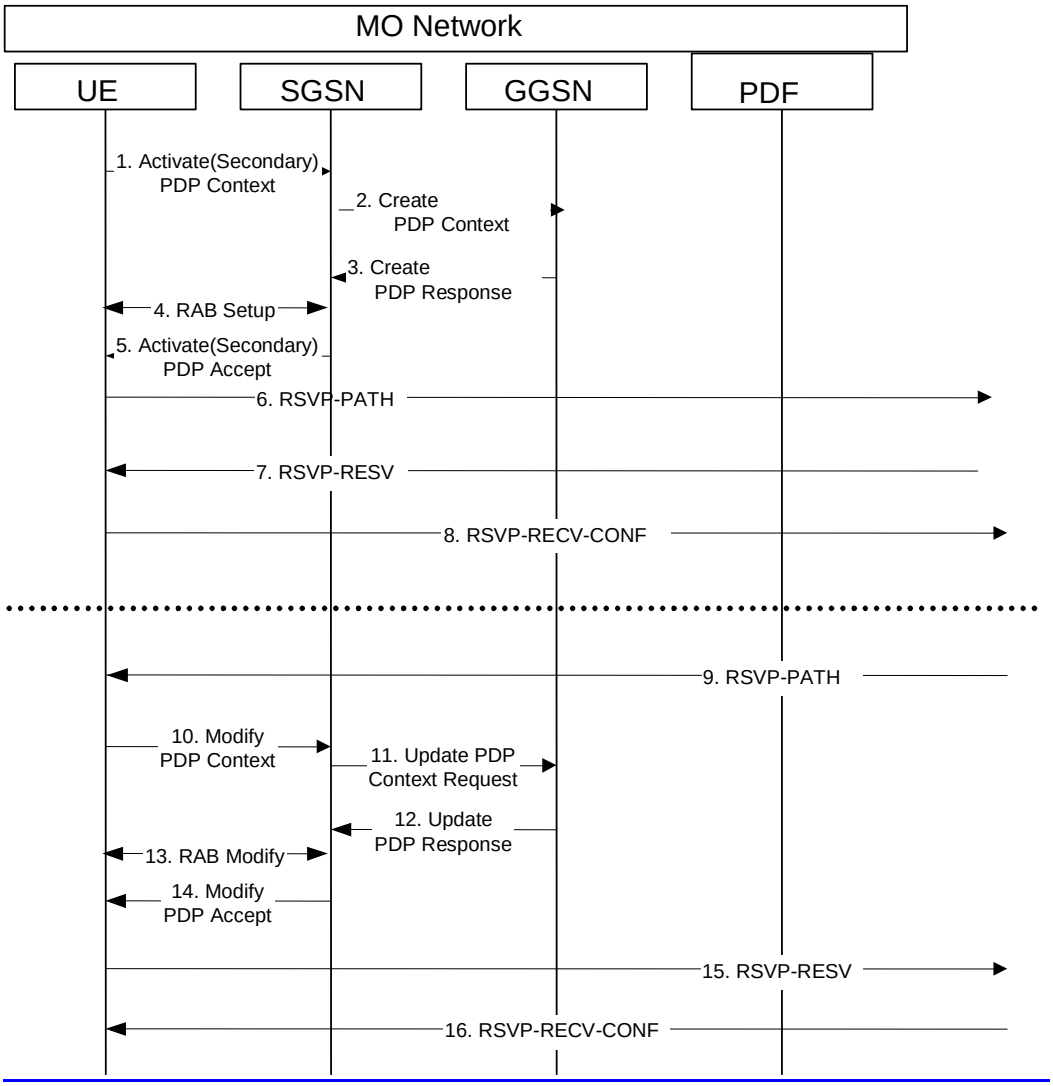


Figure X.1: MO Resource Reservation with End-to-End RSVP

NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).

1) The UE sends an Activate (Secondary) PDP Context message to the SGSN with the UMTS QoS parameters.

2) The SGSN sends the corresponding Create PDP Context message to the GGSN.

3) The GGSN authorizes the PDP context activation request according to the local operator's IP bearer resource based policy, the local operator's admission control function and the GPRS roaming agreements and sends a Create PDP Context Response message back to the SGSN.

4) RAB setup is done by the RAB Assignment procedure.

5) The SGSN sends an Activate (Secondary) PDP Context Accept message to UE.

6) UE sends an RSVP PATH message to the next hop, through the GGSN. The GGSN does not process the RSVP PATH message. Alternatively, the GGSN may process the RSVP PATH message and forward it to the next hop.

7) The UE receives the RSVP RESV message in the downlink direction, through the GGSN. The GGSN does not process the RSVP RESV message. Alternatively, the GGSN may process the RSVP RESV message and forward it to the UE.

8) The UE sends a RSVP RESV-CONF message to the next hop. The use of the RESV-CONF message is optional.

9) The UE receives a RSVP PATH message in the downlink direction, through the GGSN. The GGSN does not process the RSVP PATH message. Alternatively, the GGSN may process the incoming RSVP PATH message and forward it to the UE.

10) The UE may send a Modify PDP Context message to the SGSN with the necessary modification to UMTS QoS parameters according to the received RSVP PATH message.

11) The SGSN sends the corresponding Update PDP Context Request message to the GGSN.

12) The GGSN authorizes the PDP context modification according to the local operator's IP bearer resource based policy, the local operator's admission control function and the GPRS roaming agreements and sends an Update PDP Context Response message back to the SGSN.

13) The radio access bearer modification may be performed by the RAB Assignment procedure.

14) The SGSN sends a Modify PDP Context Accept message to UE.

15) UE sends the RSVP RESV message to the next hop, through the GGSN. The GGSN does not process the RSVP RESV message. Alternatively, the GGSN may process the RSVP RESV message and forward it to the next hop.

16) The UE receives the RSVP RESV-CONF message in the downlink direction. The use of the RESV-CONF message is optional.

The following figure is applicable to the Mobile Terminating (MT) side. As the flow is the mirror of the Mobile Originating (MO) side, the step-by-step description is omitted.

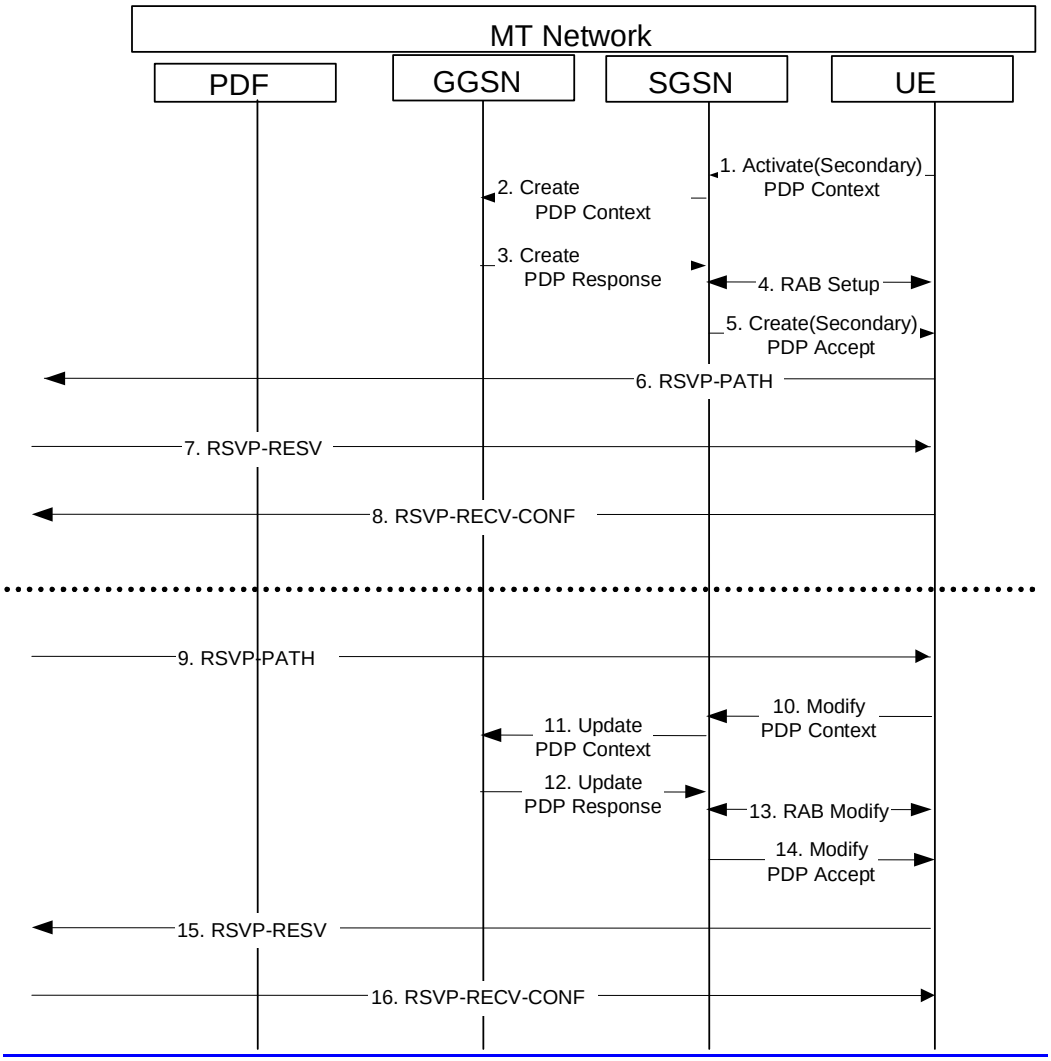


Figure X.2: MT Resource Reservation with End-to-End RSVP

NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).

X.2 Resource Reservation with End-to-End RSVP and Service-based Local Policy

For this case, Service-based Local Policy and RSVP are added to the GPRS bearer establishment procedures specified in TS23.060.

NOTE: The diagrams in this subsection depict one possible signalling sequence, however, the alternative signalling sequences below are possible:

- to trigger the Create PDP Context Request message after the PATH message.
- to trigger the Create PDP Context Request message after the RESV message.
- to trigger only one PDP context after all RSVP exchanges have completed.

NOTE: The diagrams in this subsection depict the case when the GGSN is RSVP aware, however, the alternative of GGSN not being RSVP aware is also possible.

This section provides the flows for bearer establishment, resource reservation and policy control with RSVP.

The following figure is applicable to the Mobile Originating (MO) side.

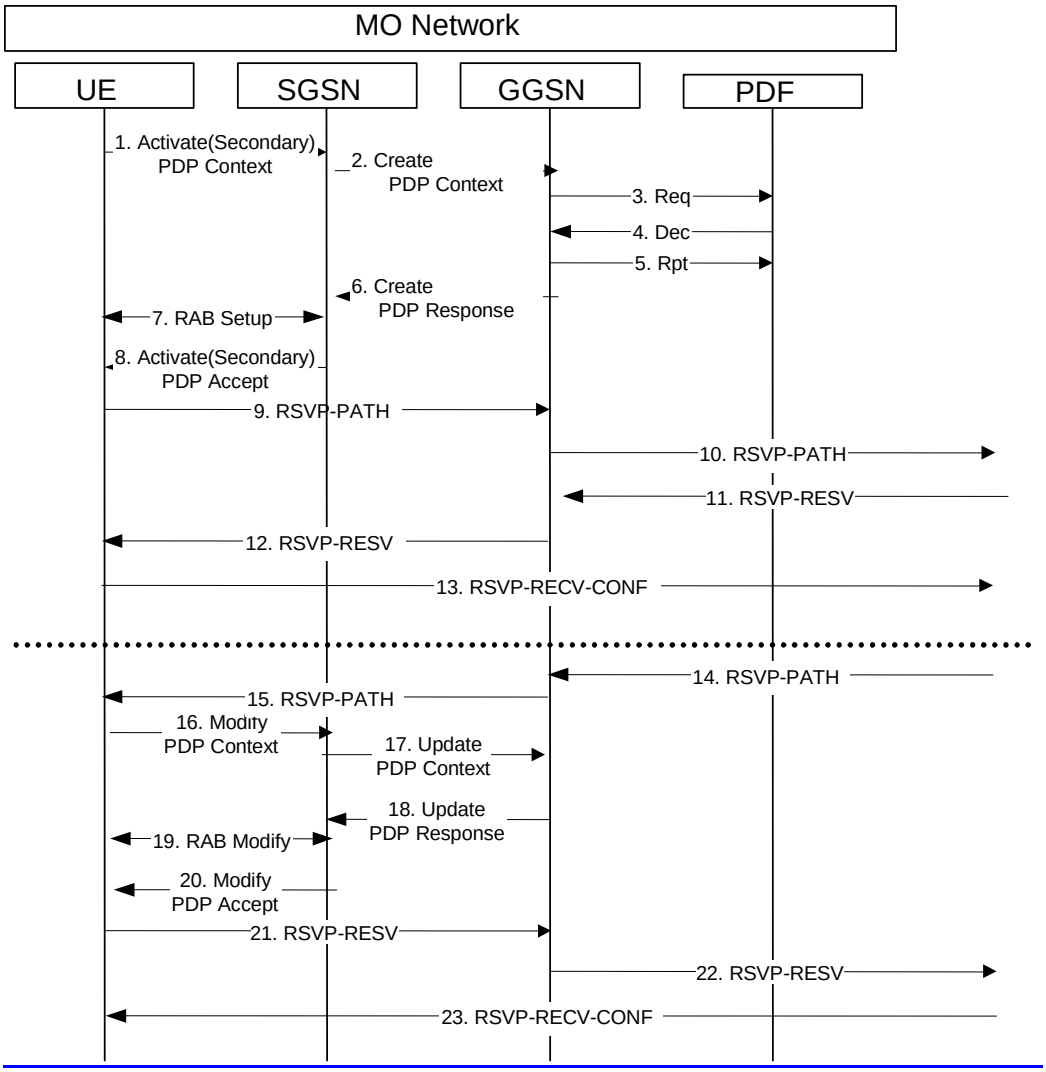


Figure X.3: MO Resource Reservation with End-to-End RSVP and Service-based Local Policy

NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).

1) The UE sends an Activate (Secondary) PDP Context message to the SGSN with the UMTS QoS parameters. The UE includes the Binding Information in the Activate PDP Context message.

2) The SGSN sends the corresponding Create PDP Context message to the GGSN.

3) The GGSN sends a COPS REQ message with the Binding Information to the PDF in order to obtain relevant policy information.

4) The PDF sends a COPS DEC message back to the GGSN.

5) The GGSN sends a COPS RPT message back to the PDF.

6) The GGSN maps IP flow based policy information into PDP context based policy information and uses the PDP context based policy information to accept the PDP activation request, and sends a Create PDP Context Response message back to SGSN. The GGSN may cache the policy information.

7) RAB setup is done by the RAB Assignment procedure.

8) The SGSN sends an Activate (Secondary) PDP Context Accept message to UE.

9) UE sends a RSVP PATH message to GGSN. The UE includes the Binding Information.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

10) The GGSN uses the policy information to accept the RSVP PATH message, and forwards the RSVP PATH message to the next hop.

11) The GGSN receives the RSVP RESV message in the downlink direction.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

12) The GGSN uses the policy information to accept the RSVP RESV message, and forwards the RSVP RESV message to the UE.

13) The UE sends a RSVP RESV-CONF message to the next hop. The use of the RESV-CONF message is optional.

14) The GGSN receives a RSVP PATH message in the downlink direction.

15) The GGSN forwards the RSVP PATH message to the UE.

16) The UE may send a Modify PDP Context message to the SGSN with the necessary modification to UMTS QoS parameters according to the received RSVP PATH message. The UE includes the Binding Information in the Modify PDP Context message.

17) The SGSN sends the corresponding Update PDP Context message to the GGSN.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

18) The GGSN uses the policy information to accept the PDP modification request, and sends a Update PDP Context Response message back to SGSN.

19) The radio access bearer modification may be performed by the RAB Assignment procedure.

20) The SGSN sends a Modify PDP Context Accept message to UE.

NOTE: Steps 16 to 20 are optional if the existing PDP context already satisfies the QoS requirements.

21) The UE sends a RSVP RESV message to the GGSN. The UE includes the Binding Information in the RSVP RESV message.

NOTE: If the decision was previously cached locally at the GGSN, it may not be necessary to query the PDF again. Otherwise the GGSN may have to query the PDF.

22) The GGSN uses the policy information to accept the RSVP RESV message, and forwards the RSVP RESV message to the next hop.

23) The UE receives the RSVP RESV-CONF message in the downlink direction. The use of the RESV-CONF message is optional.

The following figure is applicable to the Mobile Terminating (MT) side. As the flow is the mirror of the Mobile Originating (MO) side, the step-by-step description is omitted.

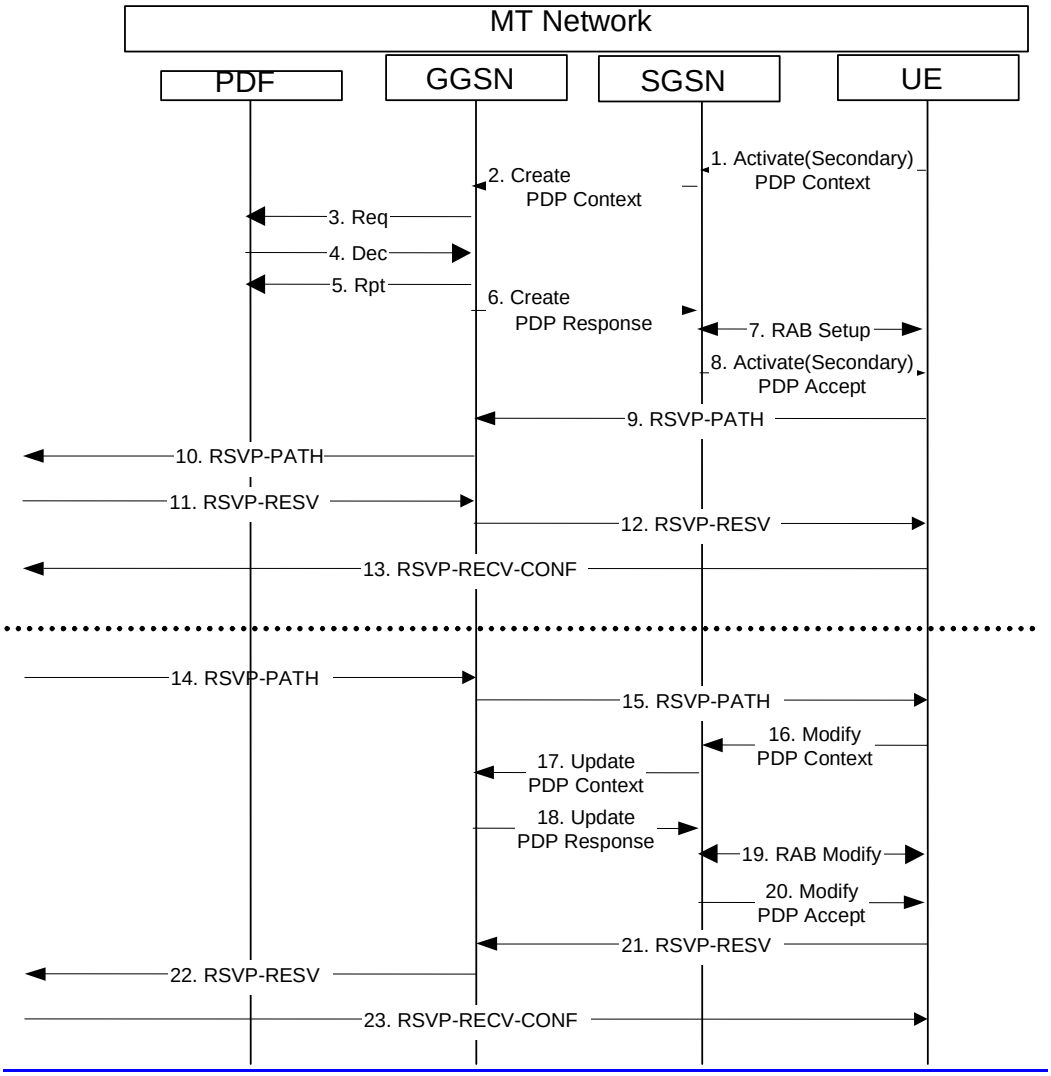


Figure X.4: MT Resource Reservation with End-to-End RSVP and Service-based Local Policy

NOTE: There is no timing relationship between the set of flows for the uplink (above the line) and the downlink (below the line).

********** End of all changes **********

3GPP TSG-SA WG2 Meeting #36
New York, USA, 24-28 November 2003

Tdoc ⌘S2-~~034304~~034380

CR-Form-v7

CHANGE REQUEST

⌘ **23.207** **CR** **66** ⌘**rev** **3** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Requirements for IM CN Subsystem signalling flag
Source:	⌘	Nortel Networks
Work item code:	⌘	IMS2
Date:	⌘	24/11/2003
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	A network with Bearer Flow charging capabilities (as introduced in release 6) means that the UE does not have to provide an IM CN Subsystem signalling flag to the network.
Summary of change:	⌘	The network also supports other mechanisms that cater for identifying application level signalling flows within a PDP context, added reference to 23.228
Consequences if not approved:	⌘	

Clauses affected:	⌘	6.4			
Other specs affected:	⌘	**Y**	**N**		
		X		Other core specifications	⌘ 23.228
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

6.4 PDP Context Used for Application Level Signalling Transport

To establish a PDP context for application level signalling, the UE shall be able to include a signalling flag in PDP context activation procedure. This indicates to the network the intention of using the PDP context for application level signalling. The only defined application level signalling flag in this release is the IM CN subsystem signalling flag. However, the network may also support other mechanisms that cater for identifying application level signalling flows within a PDP context, as described in 23.228 section 4.2.6.

To establish a PDP context for application level signalling with prioritised handling over the radio interface, the UE shall be able to ~~also~~ set the Signalling Indication in the QoS IE in the PDP context activation procedure. The Signalling indication in the QoS IE indicates to the radio and core networks the requirement for enhanced handling over the radio interface, once it has been negotiated with the networks.

A request for a general purpose PDP context having the "signalling indication" within the QoS IE may be accepted or downgraded according to operator policy configured at the GGSN using the usual QoS negotiation mechanisms described in [19].

In the case of IMS, the IM CN Signalling Flag in the PCO IE is used to reference rules and restrictions on the PDP context used for application level signalling, as described in 23.228 section 4.2.6.

The IM CN Signalling Flag and the Signalling indication in the QoS profile detailed in TS23.107 may be used independently of each other.

Based on operator policy the "Signalling Indication" in the QoS IE may be allowed only if the "IM CN Subsystem Signalling" flag is present in the PCO IE.

3GPP TSG- SA WG2 Meeting #36
New York, USA, 24 - 28 Nov 2003

Tdoc S2-034261

CR-Form-v7

CHANGE REQUEST

⌘ **23.207** **CR** **67** ⌘**rev** **-** ⌘ Current version: **6.0.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Defintion of the Application Function
Source:	⌘	Nokia
Work item code:	⌘	QoS1
Date:	⌘	24/11/2003
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The definition of the Application Function has been added to TS 23.002 is slightly improved compared to the definition present in TS 23.207. The same improvements should also be aplied in 23.207 to keep the definitions consistent.
Summary of change:	⌘	The definition of the Application Function is proposed to be improved.
Consequences if not approved:	⌘	Inconsistency with TS 23.207.

Clauses affected:	⌘	3.1			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

********** First change **********

3.1 Definitions

RSVP - Resource ReSerVation Protocol: The RSVP protocol [9] is used by a host to request specific qualities of service from the network for particular application data streams or flows. The network responds by explicitly admitting or rejecting RSVP requests.

DiffServ- Diffserv networks classify packets into one of a small number of aggregated flows or "classes", based on the Diffserv codepoint (DSCP) in the packet's IP header. This is known as behavior aggregate (BA) classification [6]. At each Diffserv router, packets are subjected to a "per-hop behavior" (PHB), which is invoked by the DSCP [17].

IntServ - The integrated services architecture [12] defined a set of extensions to the traditional best effort model of the Internet with the goal of allowing end-to-end QOS to be provided to applications. One of the key components of the architecture is a set of service definitions; the current set of services consists of the controlled load and guaranteed services. The architecture assumes that some explicit setup mechanism is used to convey information to routers so that they can provide requested services to flows that require them. While RSVP is the most widely known example of such a setup mechanism, the Intserv architecture is designed to accommodate other mechanisms.

COPS - Common Open Policy Service: The COPS protocol [8] is a simple query and response protocol that can be used to exchange policy information between a policy server (Policy Decision Point or PDP) and its clients (Policy Enforcement Points or PEPs).

Application Function: The Application Function (AF) is an element offering applications ~~that require~~ the control of IP bearer resources when required. The AF is capable of communicating with the PDF to transfer dynamic QoS-related service ~~application~~ information. One example of an AF is the P-CSCF of the IM CN subsystem.

AF session: An AF session is established by an application level signaling protocol offered by the AF that requires a session set-up with explicit session description before the use of the service. One example of an AF session is an IMS session.

AF session signalling: AF session signalling is used to control the AF session. One example of AF session signalling is SIP/SDP.

********** End of changes **********