Technical Specification Group Services and System Aspects ***TSGS#16(02)0315***

Meeting #16, Marco Island, USA, 10-13 June 2002

Source: **TSG SA WG2**
Title: **CRs on 23.207**
Agenda Item: **7.2.3**

The following Change Requests (CRs) have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #16.
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.

S2 Tdoc #	Spec	CR #	rev	Rel	Title	cat	V in	V out	WI
S2-021369rev1	23.207	28	2	Rel-5	Alignment of TS 23.207	F	5.3.0	5.4.0	E2E QoS
S2-021368	23.207	27	1	Rel-5	Clarifications to TS 23.207	F	5.3.0	5.4.0	E2E QoS
S2-021140	23.207	30		Rel-5	Correct miss-match between figure and explanatory texts	F	5.3.0	5.4.0	E2EQOS
S2-021516rev3	23.207	34	3	Rel-5	Number of media components per PDP Context	F	5.3.0	5.4.0	E2EQoS

3GPP TSG-S2#24
Madrid, Spain, 22nd – 26th April 2002

Tdoc S2-021140

CR-Form-v3

CHANGE REQUEST

⌘ **TS 23.207** **CR** **30** ⌘ rev ⌘ Current version: **5.3.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Correct miss-match between figure and explanatory texts
Source:	⌘	NEC
Work item code:	⌘	TEI_5
Date:	⌘	16th April 2002
Category:	⌘	**F**
Release:	⌘	REL-5

Use one of the following categories:
F *(essential 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)*

Reason for change:	⌘	When the CR#20 S2-020585 (SP-020134) was approved, this CR contained the wrong figure as the original figure in TS 23.207. This led the wrong CR implementation and resulted the miss-match between figure and explanatory texts.
Summary of change:	⌘	Fix the Figure 7 as the CR S2-020585 wanted to modify. This treatment fixes the miss-match between finger and texts.
Consequences if not approved:	⌘	The miss-match between finger and texts remains.

Clauses affected:	⌘	6.3.2.3
Other specs Affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ 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/3G_Specs/CRs.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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

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

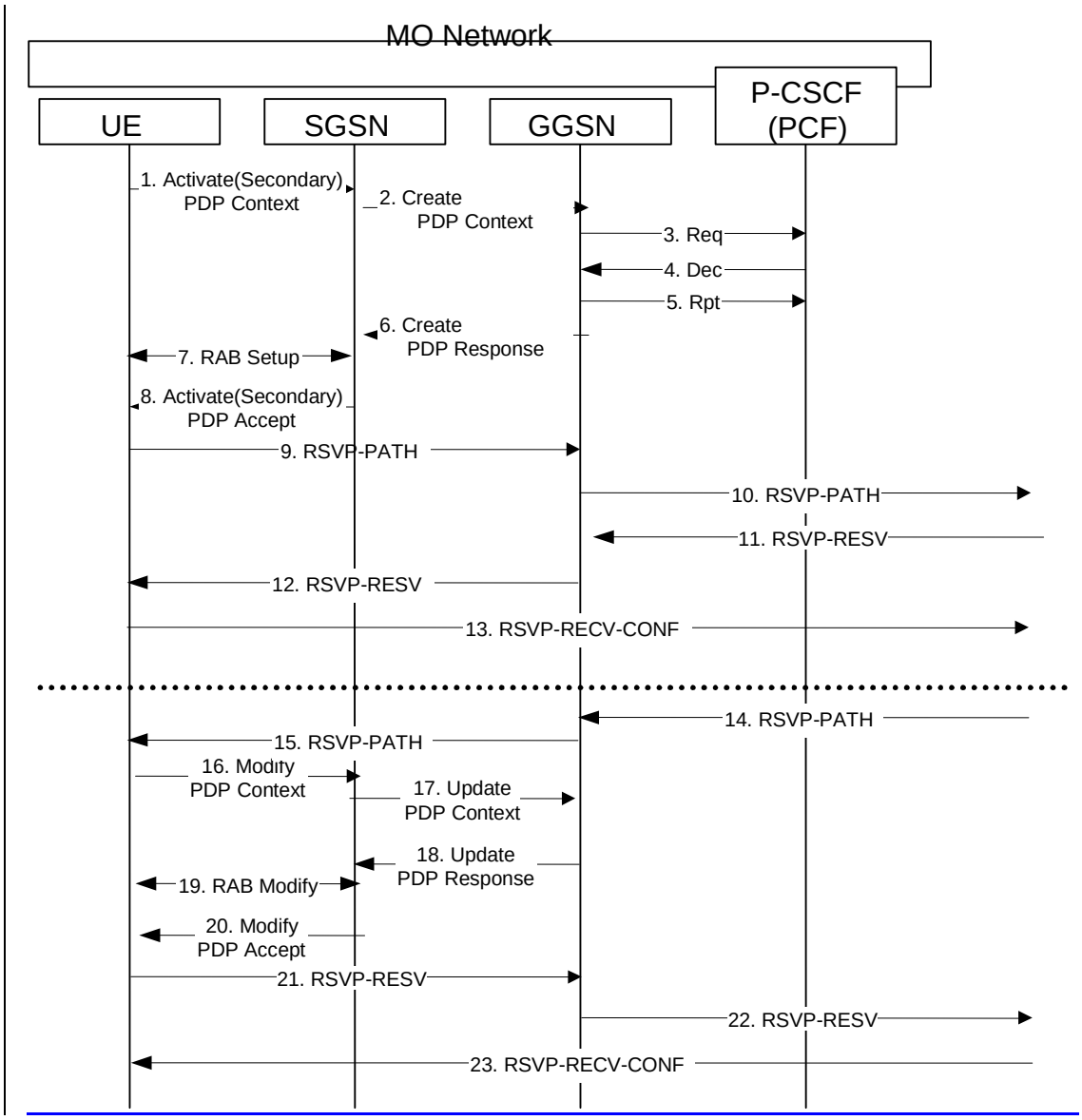
For this case, Service-based Local Policy and RSVP are added to the GPRS bearer establishment procedures specified in TS23.060.

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.


MO Network
UE
SGSN
GGSN
P-CSCF
(PCF)
1. Activate(Secondary)
PDP Context
2. Create
PDP Context
3. Req
4. Dec
5. Rpt
6. Create
PDP Response
7. RAB Setup
8. Activate(Secondary)
PDP Accept
9. RSVP-PATH
10. RSVP-PATH
11. RSVP-RESV
12. RSVP-RESV
13. RSVP-RECV-CONF
14. RSVP-PATH
15. RSVP-PATH
16. Modify
PDP Context
17. Update
PDP Context
18. Update
PDP Response
19. RAB Modify
20. Modify
PDP Accept
21. RSVP-RESV
22. RSVP-RESV
23. RSVP-RECV-CONF

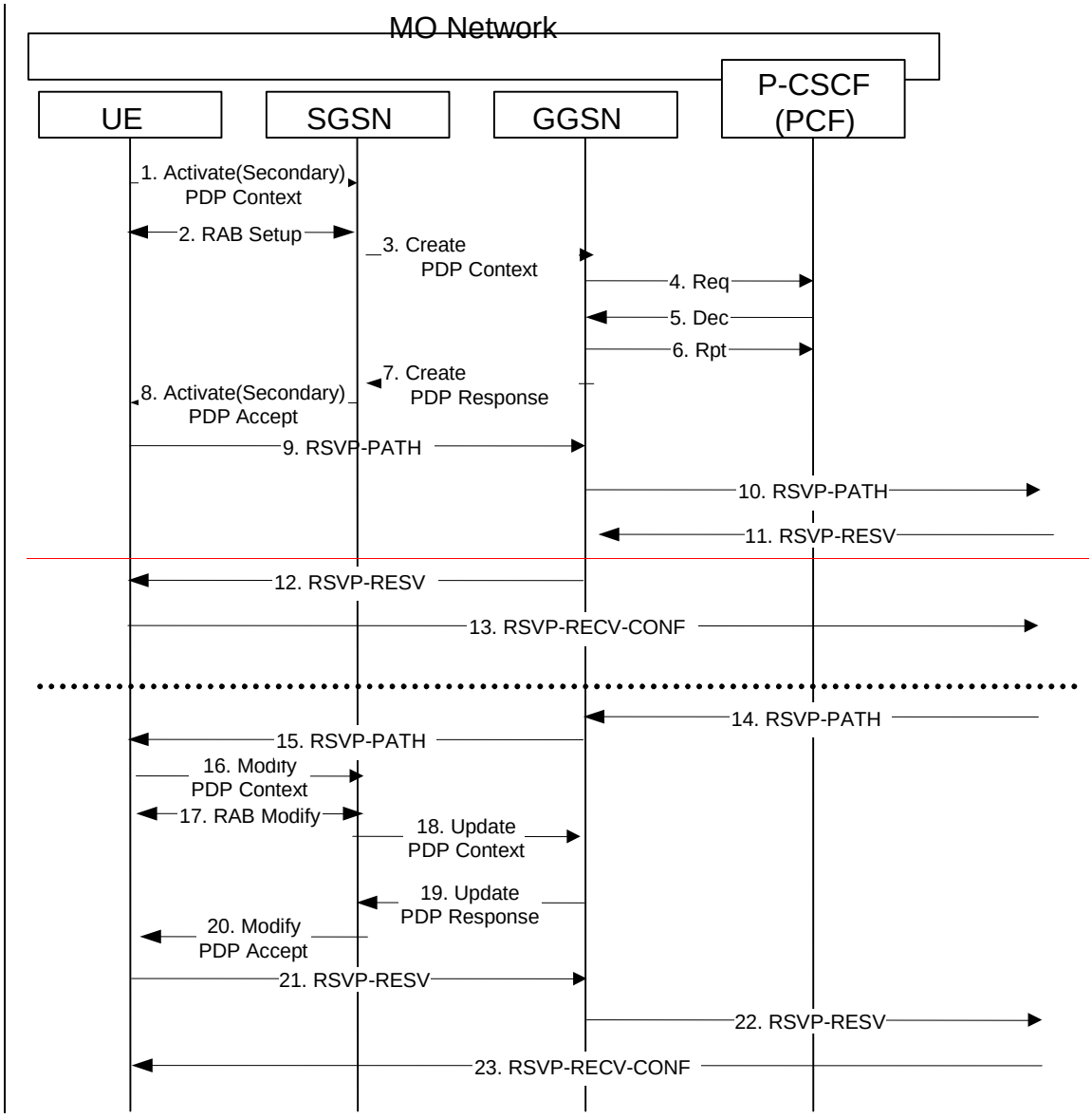


Figure 7: MO Resource Reservation with End-to-End RSVP and Service-based Local Policy

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 PCF in order to obtain relevant policy information.

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

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

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 PCF again. Otherwise the GGSN may have to query the PCF.

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 PCF again. Otherwise the GGSN may have to query the PCF.

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 PCF again. Otherwise the GGSN may have to query the PCF.

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 PCF again. Otherwise the GGSN may have to query the PCF.

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.

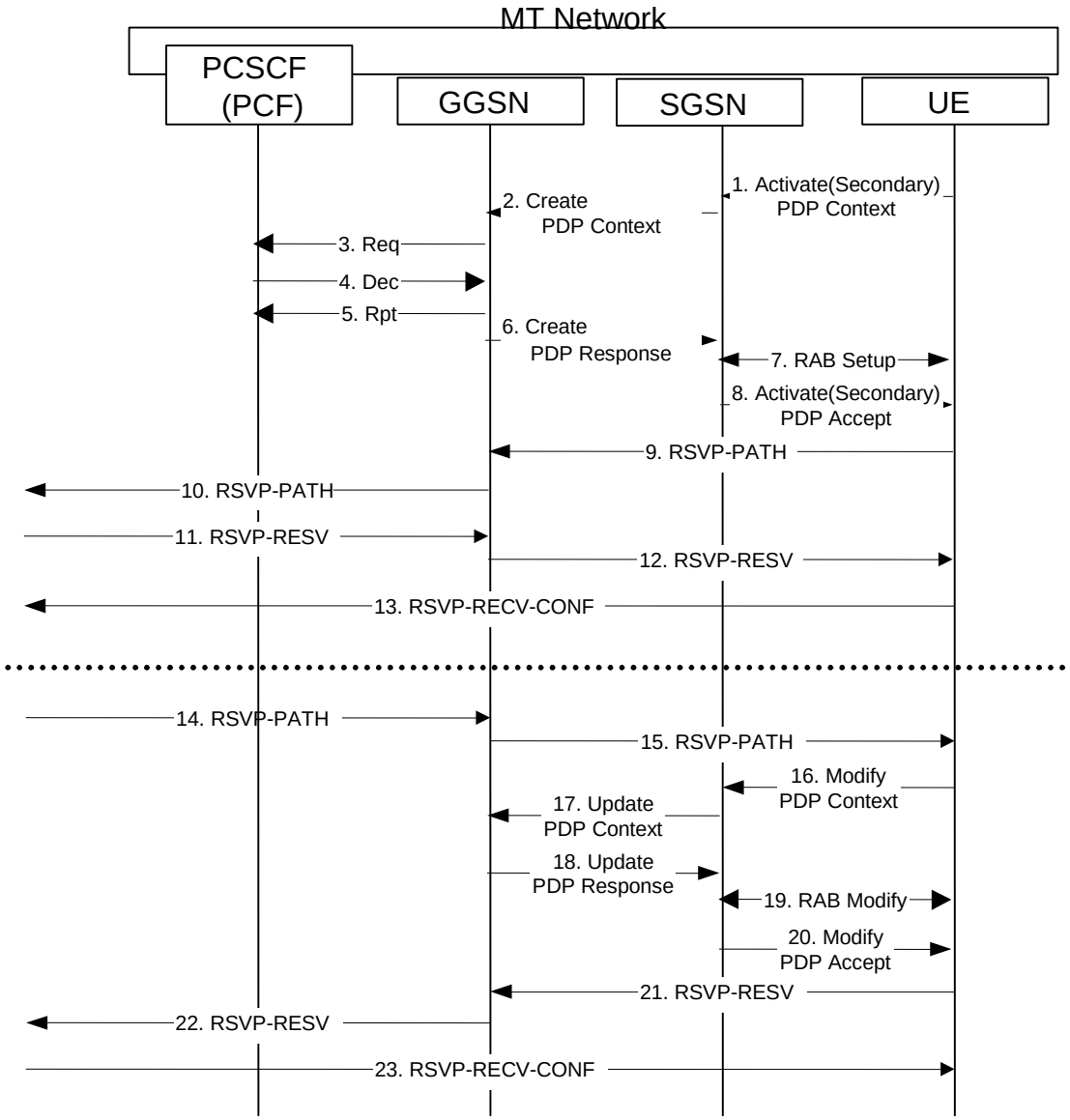


Figure 8: MT Resource Reservation with End-to-End RSVP and Service-based Local Policy

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

The Approval of QoS Commit procedure is triggered by

3GPP TSG-SA2 Meeting #24
Madrid, Spain, 22-26 April 2002

S2-021516rev3

CR-Form-v5

CHANGE REQUEST

⌘ **23.207** **CR** **34** ⌘ **rev** **3** ⌘ Current version: **5.3.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☒

Title:	⌘	Number of media components per PDP Context
Source:	⌘	Nokia, Nortel Networks, Ericsson, AT&T Wireless
Work item code:	⌘	E2E QoS ***Date:*** ⌘ 26.04.2002
Category:	⌘	**F** ***Release:*** ⌘ REL-5

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)

Reason for change:	⌘	A mechanism for the IMS network to control this has been added to 23.228 by CR#134, however this mechanism can be considerably simplified. This simplification ensures that the necessary stage-3 work can be completed with Rel5 timeframe. The corresponding text in 23.207 should be aligned with these simplifications.
Summary of change:	⌘	This CR proposes allignements to the corresponding simplifications implemented in TS 23.228.
Consequences if not approved:	⌘	Too complex mechanism endangering the timely completion of Rel5.
Clauses affected:	⌘	5.2.3 and 6.1.3
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	Corresponding changes are implemented to TS 23.228

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.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.

********** 1st modified section **********

5.2.3 P-CSCF(PCF)

This clause provides functional descriptions of capabilities in P-CSCF(PCF). Determination of exactly which functions are required to support interoperator and multi-vendor aspects are not addressed in this clause.

Service-based Local Policy Decision Point

- Authorize QoS resources (bandwidth, etc.) for the session. The P-CSCF (PCF) shall use the SDP contained in the SIP signaling message 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 IP packet flows and restrictions on IP destination address and port.

- The P-CSCF (PCF) shall be able to enforce the behaviour of the UE in respect to the assignment of IMS media components to the same PDP Context or to separate PDP Contexts. ~~This enforcement is based on an indication received by the UE on IMS level.~~ This behaviour of the UE is controlled by the IMS network using the indications described in Sections 4.2.5.1 of [4]. In case the UE violates ~~the IMS level~~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/PCF shall take care that such a PDP context would be rejected by the GGSN. To do so, ~~enforce the rejection of this PDP context. To enforce the rejection of such a PDP Context,~~ the P-CSCF/PCF uses the Go interface.

- The P-CSCF (PCF) 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 PCF functions as a Policy Decision Point for the service-based local policy control.

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

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

- At IP multimedia session release, the PCF) shall revoke the QoS resource authorization for the session.

Binding Mechanism Handling

- The PCF generates an authorization token for each SIP session and send the authorization token to the UE in the SIP message. The authorization token may contain information that identifies its generator. 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.

- The PCF shall generate a new authorization token when a new authorization is required.

-

********** 2nd modified section **********

6.1.3 Procedures in the P-CSCF(PCF)

The QoS procedures in P-CSCF(PCF) are related to service based local policy control.

The QoS resource authorization procedure is triggered by the P-CSCF receiving a SIP message with SDP. The SDP contains sufficient information about the session, such as the end-points, bandwidth requirements and the characteristics of the media exchange. The P-CSCF initiates a policy setup in PCF for the session. The PCF shall authorize the required QoS resources and install the IP bearer level policy for the session.

The Authorization-Token is generated by the PCF and sent to the UE. For the originating UE, the Authorization-Token shall be included in the SIP message (183) from P-CSCF to the UE. For the terminating UE, the Authorization-Token shall be included in the SIP Invite message from P-CSCF to the UE.

The P-CSCF also ~~receives an indication from the S-CSCF and~~generates and forwards ~~the~~ an indication to the UE to assist the UE in deciding whether it can assign multiple media components to the same PDP Context, or separate PDP Contexts have to be used. This mechanism is described in Section 4.2.5.1 in [4].

Upon receiving the bearer authorization request from the GGSN, the PCF shall authorize the request according to the stored service based local policy for the session.

The PCF makes a final decision to enable the allocated QoS resource for the authorized media stream. This may be triggered by the receipt of the SIP 200 OK (Invite Response) message to the P-CSCF. Based on local policy, QoS resources may also be enabled at the time they are authorised by the PCF.

During the mid-call SIP signaling for media or codec change, the P-CSCF 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 session release, the PCF shall revoke the resource authorization.

3GPP TSG-SA WG2 Meeting #24 ***S2-021369***
Madrid, Spain, 22. – 26. April

CR-Form-v5.1

CHANGE REQUEST

⌘ **23.207** **CR** **28** ⌘ **rev** **1-** ⌘ Current version: **5.3.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☒ Radio Access Network ☐ Core Network ☒

Title:	⌘	Alignment of 23.207
Source:	⌘	Nokia
Work item code:	⌘	E2EqoS
Date:	⌘	16.04.2002
Category:	⌘	**F**
Release:	⌘	REL-5

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)

Reason for change:	⌘	The text in 23.207 is not consistent with other specifications and the aim of this CR is to make necessary alignments
Summary of change:	⌘	Several changes have done in order to align the text with other specifications and decisions
Consequences if not approved:	⌘	Inconsistent specification

Clauses affected:	⌘	5.1.1.1, 5.2.1, 5.2.2, 5.2.3, 5.3.1, 5.3.2, 6.1.3, 6.2, 6.3, 6.3.1
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ 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 MODIFIED SECTION **********

5.1.1 Description of functions

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 UMTS QoS parameters are mapped into IP QoS parameters and 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 Control Function (PCF) is a logical policy decision element which uses standard IP mechanisms to implement policy 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 PCF is effectively a Policy Decision Point (PDP). The PCF makes decisions in regard to network based IP policy using policy rules, and communicates these decisions to the IP BS Manager in the GGSN, which is the IP Policy Enforcement Point (PEP).

The Policy Control Function (PCF) is a logical entity of the P-CSCF. If the PCF is implemented in a separate physical node, the interface between the PCF and P-CSCF is not standardized.

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

The PCF makes policy decisions based on information obtained from the P-CSCF. In the P-CSCF(PCF), the application level parameters (e.g., SDP) are mapped into IP QoS parameters. The P-CSCF (PCF) is in the same domain as the GGSN ~~or has a trust relationship with the GGSN~~.

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

********** NEXT MODIFIED SECTIONS **********

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. The IETF Differentiated Services architecture will be used to provide QoS for the external bearer service.

RSVP/IntServ Function

[Editors note: Detailed functional description of RSVP/IntServ Function is FFS]

The **Service-based Local Policy Enforcement Point** controls the quality of service that is provided to a set of IP packets (or IP "flows") defined by a packet classifier. The policy enforcement function includes policy-based admission control that is applied to the IP bearers associated with the flows, and configuration of the packet handling and 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 IP flow 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 an IP flow. The authorized resources may be expressed as an Intserv-style Flowspec. 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 PCF 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 define the control and to 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, a traffic metering function, and user plane actions to be taken for the set of packets matching the classifier. When a gate is enabled, the packets in a flow are subject to the Diffserv edge treatment (policing or marking) as determined by traffic metering and user plane actions. When a gate is disabled, all of the packets in the flow are dropped.

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[1].

Elements of the 5-tuple may be wild-carded. This is FFS in Stage 3 work. It is possible for a set of packets to match more than one classifier. When this happens, the sequence of actions associated with the gates are executed in sequence. Packets that are marked by a gate may not be (re)marked by a subsequent gate to a Diffserv Code Point corresponding to a better service class.

The **Binding Mechanism Handling** associates the PDP context bearer with one or more IP flows in order to support service-based local policy enforcement and QoS inter-working. Binding information is included in PDP Context Activation or Modification messages to associate the PDP context bearer with QoS and policy decision information provided by the PCF and associated with IP flows. ~~The PDP Configuration Options parameter shall be used to carry the binding information. The PDP Configuration Options parameter is one of the optional parameters signaled in PDP~~

[1] ~~This packet classifier should not be confused with the Traffic Flow Template (TFT), which serves a different purpose from the gate.~~

~~Context Activation/Modification messages.~~ In order to allow QoS and 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.

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/Intserv 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 to support IP policy enforcement and QoS inter-working in the GGSN. The authorization token and flow identifiers are used to provide the binding mechanism and is included by the UE in the PDP Context Activation or Modification messages. ~~The PDP Configuration Options parameter shall be used for this purpose. The PDP Configuration Options parameter is one of the optional parameters signaled in PDP Context Activation/Modification.~~ 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. For IMS services, the authorization token is provided to the UE by the P-CSCF during SIP session establishment.

The manner in which QoS preconditions for a SIP session shall be met are as stated in TS 23.228. The functionality shall be compliant to the IETF specification on Integration of Resource Management and SIP.

~~The **Pre-conditions for SIP QoS Assured Sessions** shall be according to the principles for when a UE shall regard the SIP QoS preconditions to be met, as stated in TS23.228. The functionality shall be compliant to the IETF specification on Integration of Resource Management and SIP.~~

5.2.3 P-CSCF(PCF)

This clause provides functional descriptions of capabilities in P-CSCF(PCF). Determination of exactly which functions are required to support interoperator and multi-vendor aspects are not addressed in this clause.

Service-based Local Policy Decision Point

- Authorize QoS resources (bandwidth, etc.) for the session. The P-CSCF (PCF) shall use the SDP contained in the SIP signaling message 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 IP packet flows and restrictions on IP destination address and port.

- The P-CSCF (PCF) shall be able to enforce the behaviour of the UE in respect to the assignment of IMS media components to the same PDP Context or to separate PDP Contexts. This enforcement is based on an indication received by the UE on IMS level. In case the UE violates the IMS level 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/PCF shall enforce the rejection of this PDP context. To enforce the rejection of such a PDP Context, the P-CSCF/PCF uses the Go interface.

- The P-CSCF (PCF) 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 PCF functions as a Policy Decision Point for the service-based local policy control.

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

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

- At IP multimedia session release, the PCF) shall revoke the QoS resource authorization for the session.

Binding Mechanism Handling

- The PCF generates an authorization token for each SIP session and send the authorization token to the UE in the SIP message. The authorization token may contain information that identifies its generator. 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.

- ~~The PCF shall generate a new authorization token when a new authorization is required.~~

***************** NEXT MODIFIED SECTIONS *******************

5.3 Go interface (PCF – GGSN)

5.3.1 Go Functional Requirements

The Go interface allows service-based local policy and QoS inter-working information to be "pushed" to or requested by the GGSN from a Policy Control Function (PCF). The Go interface provides information to support the following functions in the GGSN:

- Control of Diffserv inter-working
- Control of RSVP admission control and inter-working
- Control of service-based policy "gating" function in GGSN
- UMTS bearer authorization
- ~~QoS~~ Ccharging correlation related function

The Common Open Policy Service (COPS) protocol supports a client/server interface between the Policy Enforcement Point in the GGSN and Policy Control Function (PCF). The Go interface shall conform to the IETF COPS framework as a requirement and guideline for Stage 3 work.

The COPS protocol allows both push and pull operations. For the purpose of the initial authorisation of QoS resources the pull operation shall be used. Subsequently the interactions between the PCF and the GGSN may use either pull or push operations.

Policy decisions may be stored by the COPS client in a local policy decision point allowing the GGSN to make admission control decisions without requiring additional interaction with the PCF.

5.3.2 Information Elements Exchanged via Go Interface

The COPS protocol supports several messages between a client and server. These messages consist of the following operations that may be performed:

- Client-Open/Client-Accept/Client-Close
- Request
- Decision
- Report State
- Delete Request State

- Keep Alive
- Synchronize State Request/Synchronize State Complete

Additional UMTS-specific information elements must be included in COPS messages to support the policy and QoS inter-working functions identified in Section 5.3.1. Consistent with the COPS framework, the Go interface is identified by a "client type" allocated for a UMTS COPS client (GGSN).

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

A **Request** (REQ) message from the GGSN to the PCF shall allow the GGSN to request policy and QoS inter-working information for an IP flow identified by binding information (described below).

Binding information associates the policy and QoS inter-working information in the message with a PDP context. The binding information includes 1) an authorization token sent by the P-CSCF to the UE during SIP signaling. , and ~~may include~~ 2) one or more flow identifiers used by the UE, GGSN and PCF to uniquely identify an IP media flow.

The authorization token shall be unique within the scope of the operator's domain ~~locally~~. The authorization token conforms to relevant~~the~~ IETF standards~~specification~~ 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 ~~flows~~components (media description structure defined by a single 'm=' line) ~~-~~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 PCF to the GGSN contains decision objects. A Decision object shall include one of the following commands:

- NULL Decision (No configuration data available)
- 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 PCF 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 PCF indicates that the request state identified by the client handle is no longer available/relevant at the GGSN so the corresponding state may likewise be removed at the PCF. The DRQ message includes the reason why the request state was deleted.

The Install command used to Authorize QoS contains the following policy and QoS inter-working information associated with an IP flow:

- ~~UMTS specific Binding information (e.g. Token)~~
- Packet classifier (e.g. RSVP filterspec)
- Authorized QoS information ~~flowspec~~
- Packet handling action
- ~~DSCP~~
- Event generation information

~~Binding information associates the policy and QoS inter-working information in the message with a PDP context. The binding information includes 1) an authorization token sent by the P-CSCF to the UE during SIP signaling. , and may include 2) one flow identifier used by the UE, GGSN and PCF to uniquely identify an IP media flow.~~

~~The authorization token shall be unique locally. The authorization token conforms to the IETF specification 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 flows in the SDP. A flow identifier combined with the authorization token shall be sufficient to uniquely identify an IP media flow.~~

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~~flowspec~~ provides an upper bound on the resources that can be reserved or allocated for an IP flow. The authorized QoS information shall contain the DiffServ class and Data rate parameters. The DiffServ class is used only to identify the maximum allowed traffic class. ~~flowspec is expressed as an Intserv-style flowspec .~~

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 in-profile and out-of-profile packets matching the packet classifier. In-profile traffic is defined as traffic that is within the authorized ~~flowspec~~QoS information~~-~~. The packet handling action may be ignored by the GGSN.

~~The DSCP from the PCF shall determine the highest QoS class that can be applied to this IP flow.~~

Event generation information contains ~~opaque information that the GGSN includes in usage records (e.g. CDR)associated with the authorized UMTS bearers. The event generation information includes information identifying the authorized IP flow. It also includes~~ information used to correlate usage records (e.g. CDRs) of ~~from~~ the GGSN with SIP session records from the P-CSCF.

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 MODIFIED SECTIONS *******************

6.1.3 Procedures in the P-CSCF(PCF)

The QoS procedures in P-CSCF(PCF) are related to service based local policy control.

The QoS resource authorization procedure is triggered by the P-CSCF receiving a SIP message with SDP. The SDP contains sufficient information about the session, such as the end-points, bandwidth requirements and the characteristics of the media exchange. The P-CSCF initiates a policy setup in PCF for the session. The PCF shall authorize the required QoS resources and install the IP bearer level policy for the session.

The Authorization-Token is generated by the PCF and sent to the UE. For the originating UE, the Authorization-Token shall be included in the first available reliable SIP message (e.g. 183 Session Progress)) from P-CSCF to the UE. For the terminating UE, the Authorization-Token shall be included in the SIP Invite message from P-CSCF to the UE.

The P-CSCF also receives an indication from the S-CSCF and forwards the indication to the UE to assist the UE in deciding whether it can assign multiple media components to the same PDP Context, or separate PDP Contexts have to be used. This mechanism is described in Section 4.2.5.1 in [4].

Upon receiving the bearer authorization request from the GGSN, the PCF shall authorize the request according to the stored service based local policy for the session.

The PCF makes a final decision to enable the allocated QoS resource for the authorized media stream. This may be triggered by the receipt of the SIP 200 OK (Invite Response) message to the P-CSCF. Based on local policy, QoS resources may also be enabled at the time they are authorised by the PCF.

During the mid-call SIP signaling for media or codec change, the P-CSCF 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 session release, the PCF shall revoke the resource authorization.

***************** NEXT MODIFIED SECTIONS *******************

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 and QoS inter-working. The policy and QoS 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 or Modification messages to associate the PDP context bearer with policy information .~~ The PDP Configuration Options parameter shall be used for this purpose. The PDP Configuration Options parameter is one of the optional parameters signalled in PDP Context Activation/Modification.~~ The binding information includes 1) an Authorization Token sent by the P-CSCF to the UE during SIP signaling, and 2) one or more Flow Identifiers which are used by the UE, GGSN and PCF to uniquely identify the IP media flow(s). If the session has only one IP flow, then the Flow Identifier may not be needed.

The authorization token shall be unique within the scope of the operator's domain~~locally~~. The Authorization Token conforms to ~~the~~ relevant IETF standards~~recommendations~~specification 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 sequence of media ~~flows~~ components (media description structure defined by a single 'm=' line) in the SDP. A Flow Identifier combined with the Authorization Token shall be sufficient to uniquely identify an IP media flow.

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

~~When the SDP changes during a SIP session, the PCF shall generate a new authorization token to be used by the UE in subsequent PDP context activation/modification requests.~~

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, 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, and the Indication of PDP Context Modification sub-procedure blocks are effectively non-existent in TS23.228.

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

- the successful setup of RSVP signalling.

- ~~bi-directional PDP contexts are being set up.~~

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

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

The PCF shall authorize the required QoS resources for the session and install the IP bearer level policy based on information from the P-CSCF. ~~In order to ensure that the IP bearer flow correlates to the one approved during the SIP session establishment, the SIP extensions for media authorization proposed in IETF shall be used.~~

~~The PCF makes decision and communicates these decisions to the IP BS Manager in the GGSN, which is the Policy Enforcement Point (PEP) for the IP bearer service. The interface between the PCF and PEP is the COPS protocol defined by IETF.~~

~~For the purpose of the initial authorization of QoS resources the pull operation shall be used. (Reference Section 5.3 Go interface for details.)~~

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

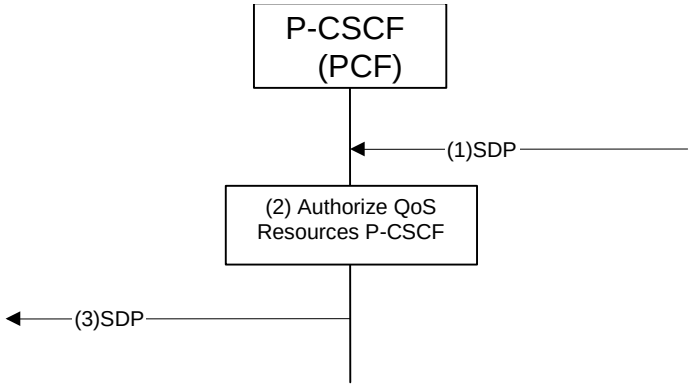


Figure 3: Authorize QoS Resources

1) The SIP "SDP" message is received by the P-CSCF.
2) The PCF 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 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 MODIFIED 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 ~~message~~.

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

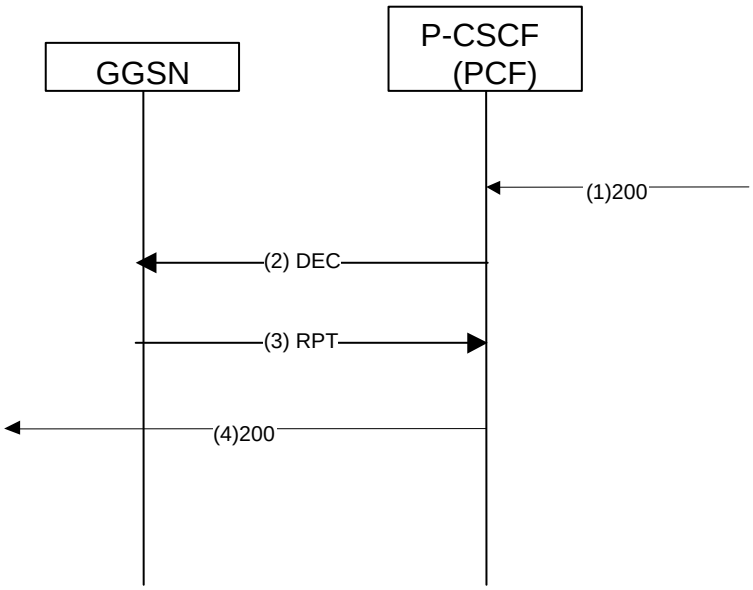


Figure 11: Approval of QoS Commit

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

2) The PCF 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 PCF.

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 MODIFIED SECTION **********

6.3.5 Revoke Authorization for GPRS and IP Resources

The "Revoke Authorization for GPRS and IP resources" procedure is used e.g. upon session release. The PCF 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).

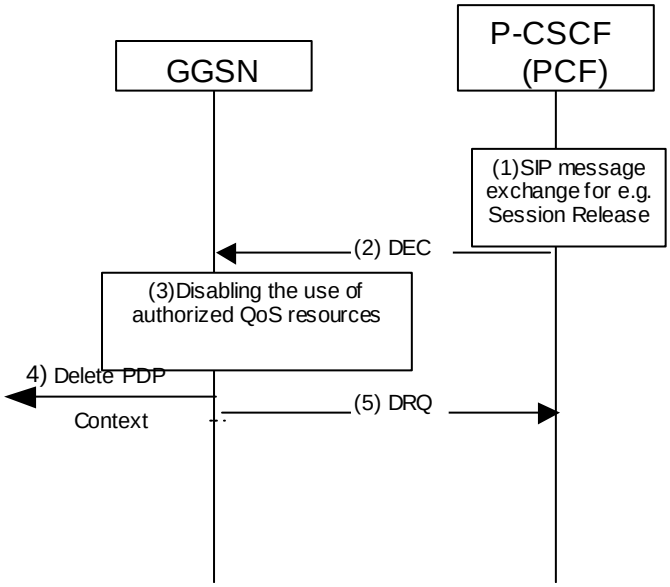


Figure 13: Revoke Authorization for GPRS and IP Resources

1) SIP message exchanges for e.g. session release are carried out.

2) The PCF shall send a COPS DEC (Decision) message containing revoke command to the GGSN. ~~It includes binding information which identifies the PDP context to be deactivated.~~

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

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

5) Upon deactivation of the PDP Context, ~~T~~the GGSN sends a COPS DRQ (Delete Request State) message back to the PCF.

3GPP TSG-SA WG2 Meeting #24 ***S2-021368~~117~~***
Madrid, Spain, 22. – 26. April ~~Location, Country, Date~~

CR-Form-v5.1

CHANGE REQUEST

⌘ **23.207** **CR** **27** ⌘ **rev** **1-** ⌘ Current version: **5.3.0** ⌘

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

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [ ] Core Network [X]

Title:	⌘	Clarifications to 23.207
Source:	⌘	Nokia
Work item code:	⌘	E2EQoS
Date:	⌘	16.04.2002
Category:	⌘	**F~~D~~**
Release:	⌘	REL-5

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)

Reason for change:	⌘	The Intention of this CR is to clarify the text in 23.207
Summary of change:	⌘	Clarifications have been made for several places in order to avoid unclear text
Consequences if not approved:	⌘	Unclear text in 23.207

Clauses affected:	⌘	5.2.3, 5.3.2, 6.1.1, 6.1.2, 6.1.3, 6.3, 6.3.1, 6.3.5
Other specs affected:	⌘	[ ] Other core specifications ⌘ [ ] Test specifications [ ] 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 MODIFIED SECTION **********

5.2.3 P-CSCF(PCF)

This clause provides functional descriptions of capabilities in P-CSCF(PCF). Determination of exactly which functions are required to support interoperator and multi-vendor aspects are not addressed in this clause.

Service-based Local Policy Decision Point

- Authorize QoS resources (bandwidth, etc.) for the session. The P-CSCF (PCF) shall use the SDP contained in the SIP signaling message 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 IP packet flows and restrictions on IP destination address and port.

- The P-CSCF (PCF) shall be able to enforce the behaviour of the UE in respect to the assignment of IMS media components to the same PDP Context or to separate PDP Contexts. This enforcement is based on an indication received by the UE on IMS level. In case the UE violates the IMS level 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/PCF shall enforce the rejection of this PDP context. To enforce the rejection of such a PDP Context, the P-CSCF/PCF uses the Go interface.

- The P-CSCF (PCF) 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 PCF functions as a Policy Decision Point for the service-based local policy control.

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

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

- At IP multimedia session release, the PCF~~)~~ shall revoke the QoS resource authorization for the session.

Binding Mechanism Handling

- The PCF generates an authorization token for each SIP session and the P-CSCF sends the authorization token to the UE in ~~the~~ SIP signalling ~~message~~. The authorization token may contain information that identifies its generator. 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.

- The PCF shall generate a new authorization token when a new authorization is required.

********** NEXT MODIFIED SECTION **********

5.3.2 Information Elements Exchanged via Go Interface

The COPS protocol supports several messages between a client and server. These messages consist of the following operations that may be performed:

- Client-Open/Client-Accept/Client-Close
- Request
- Decision

- Report State
- Delete Request State
- Keep Alive
- Synchronize State Request/Synchronize State Complete

Additional UMTS-specific information elements must be included in COPS messages to support the policy and QoS inter-working functions identified in Section 5.3.1. Consistent with the COPS framework, the Go interface is identified by a "client type" allocated for a UMTS COPS client (GGSN).

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

A **Request** (REQ) message from the GGSN to the PCF shall allow the GGSN to request policy and QoS inter-working information for an IP flow identified by binding information (described below).

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

- NULL Decision (No configuration data available)
- 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 PCF 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 PCF indicates that the request state identified by the client handle is no longer available/relevant at the GGSN so the corresponding state may likewise be removed at the PCF. The DRQ message includes the reason why the request state was deleted.

The Install command used to Authorize QoS contains the following policy and QoS inter-working information associated with an IP flow:

- UMTS specific Binding information (e.g. Token)
- Packet classifier (e.g. RSVP filterspec)
- Authorized flowspec
- Packet handling action
- DSCP
- Event generation information

Binding information associates the policy and QoS inter-working information in the message with a PDP context. The binding information includes 1) an authorization token sent by the P-CSCF to the UE during SIP signaling. , and may include 2) one flow identifier used by the UE, GGSN and PCF to uniquely identify an IP media flow.

The authorization token shall be unique locally. The authorization token conforms to the IETF specification 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 flows in the SDP. A flow identifier combined with the authorization token shall be sufficient to uniquely identify an IP media flow.

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 flowspec provides an upper bound on the resources that can be reserved or allocated for an IP flow. The authorized flowspec is expressed as an Intserv-style flowspec .

The packet handling action defines the packet handling that should be accorded to in-profile and out-of-profile packets matching the packet classifier. In-profile traffic is defined as ~~to be~~ traffic that is within the authorized ~~-~~. The packet handling action may be ignored by the GGSN.

The DSCP from the PCF shall determine the highest QoS class that can be applied to this IP flow.

Event generation information contains opaque information that the GGSN includes in usage records (e.g. CDR)associated with the authorized UMTS bearers. The event generation information includes information identifying the authorized IP flow. It also includes information used to correlate usage records from the GGSN with IMS~~SIP~~ session records from the P-CSCF.

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 MODIFIED 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 IP level information (e.g., addressing 5-tuple) provided by service based local policy according to the authorization token to configure the DiffServ classifier 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 GGSN may use IP level information provided by service based local policy according to authorization token to authorize the RSVP session and configure the DiffServ classifier functionality. The authorization token is included in the RSVP signaling and the PDP context activation/modification messages. Alternatively, the RSVP messages may pass transparently through the GGSN.

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

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. If the UE received the Authorization Token in ~~the~~ SIP signalling~~messages~~, the UE shall include the Authorization Token in the PDP Context Activation ~~message~~request for the PDP Context(s) that are activated to carry the media flows of the IMS~~SIP~~ session. ~~if the PDP Context is associated to the session.~~

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. ~~or to the PDP context QoS parameters~~. The IP layer parameters are further mapped down to the PDP context parameters in the UE. –If the UE received the Authorization Token in ~~the~~ SIP ~~messages~~ signalling, the UE shall include the 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.~~message if the PDP context is associated to the session.~~

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. If the UE received the Authorization Token in ~~the~~ SIP signalling~~messages~~, the UE shall include the Authorization Token in both the PDP Context Activation request for the PDP Context(s) that are activated to carry the media flows of the IMS session, ~~message~~ and the RSVP messages if the PDP Context/RSVP is associated to the session.

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

6.1.3 Procedures in the P-CSCF(PCF)

The QoS procedures in P-CSCF(PCF) are related to service based local policy control.

The ~~QoS resource~~ authori~~z~~ze~~zation~~ QoS resources procedure is triggered by the P-CSCF receiving a SIP message containing ~~with~~ SDP information. The SDP contains sufficient information about the session, such as the end-points, bandwidth requirements and the characteristics of the media exchange. The P-CSCF initiates a policy setup in PCF for the IMS session. The PCF shall authorize the required QoS resources and install the IP bearer level policy for the IMS session.

The Authorization-Token is generated by the PCF and sent to the UE. For the originating UE, the Authorization-Token shall be included in the SIP message (183) from P-CSCF to the UE. For the terminating UE, the Authorization-Token shall be included in the SIP Invite message from P-CSCF to the UE.

The P-CSCF also receives an indication from the S-CSCF and forwards the indication to the UE to assist the UE in deciding whether it can assign multiple media components to the same PDP Context, or separate PDP Contexts have to be used. This mechanism is described in Section 4.2.5.1 in [4].

Upon receiving the bearer authorization request from the GGSN, the PCF shall authorize the request according to the stored service based local policy for the session.

The PCF makes a final decision to enable the allocated QoS resource for the authorized media stream. This may be triggered by the receipt of the SIP 200 OK (Invite Response) message to the P-CSCF. Based on local policy, QoS resources may also be enabled at the time they are authorised by the PCF.

During the mid-call SIP signaling for media or codec change, the P-CSCF 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 PCF shall revoke the resource authorization.

********** NEXT MODIFIED 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, 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, and the Indication of PDP Context Modification sub-procedure blocks defined in TS23.228 are not applied.~~are effectively non-existent in TS23.228.~~

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

- the successful setup of RSVP signalling.
- bi-directional PDP contexts are being set up.

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

The Authorize QoS Resources procedure is triggered by the P-CSCF receiving a SIP message containing SDP information ~~message~~. The SDP payload ~~message~~ contains sufficient information about the session, such as the end-points, bandwidth requirements, and the characteristics of the media exchange.

The PCF shall authorize the required QoS resources for the session and install the IP bearer level policy based on information from the P-CSCF. In order to ensure that the IP bearer flow correlates to the one approved during the SIP session establishment, the SIP extensions for media authorization proposed in IETF shall be used.

The PCF makes decision and communicates these decisions to the IP BS Manager in the GGSN, which is the Policy Enforcement Point (PEP) for the IP bearer service. The interface between the PCF and PEP is the COPS protocol defined by IETF.

For the purpose of the initial authorization of QoS resources the pull operation shall be used. (Reference Section 5.3 Go interface for details.)

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

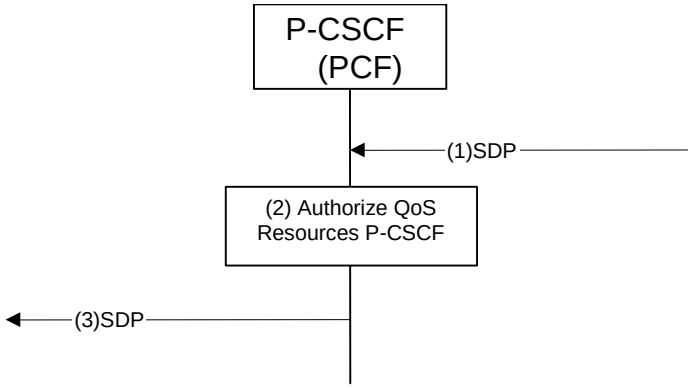


Figure 3: Authorize QoS Resources

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

2) The PCF 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 ~~message~~ to the UE for the originating side. For the terminating side, the P-CSCF forwards the SDP payload~~message~~ to the terminating S-CSCF.

***************** NEXT MODIFIED SECTION ********************

6.3.5 Revoke Authorization for GPRS and IP Resources

The "Revoke Authorization for GPRS and IP resources" procedure is used e.g. upon IMS session release. The PCF 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).

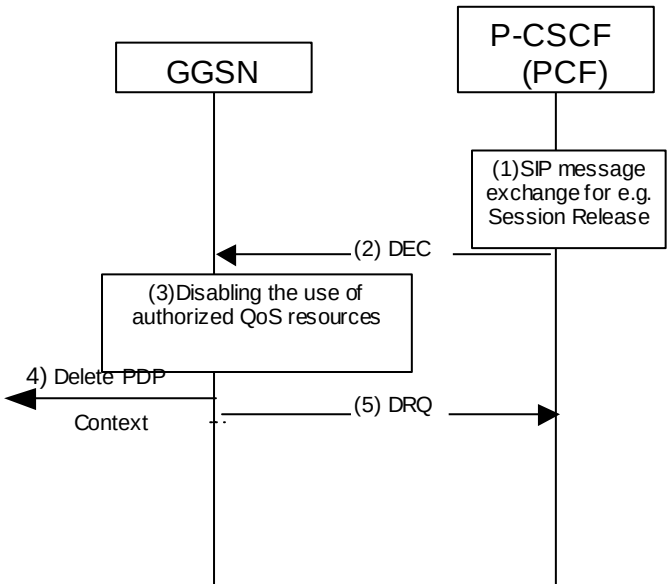


Figure 13: Revoke Authorization for GPRS and IP Resources

1) SIP message exchanges for e.g. session release are carried out.

2) The PCF shall send a COPS DEC (Decision) message to the GGSN. It includes binding information which identifies the PDP context to be deactivated.

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

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

5) The GGSN sends a COPS DRQ (Delete Request State) message back to the PCF.