Technical Specification Group Services and System Aspects ***TSGS#17(02)0532***

Meeting #17, Biarritz, France, 9-12 September 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 #17.
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**	**WI**	**S2 meeting**
S2-022542	Modification of IMS Signalling PDP context	23.207	36r1	F	5.4.0	IMS-CCR	26
S2-022001	SBLP Handling and TFT Processing	23.207	37r2	F	5.4.0	E2Eqos	25
S2-021948	Policy control procedures on PDP context modification	23.207	39r1	F	5.4.0	E2EQos	25
S2-022620	Source IP address filtering for Service Based Local Policy	23.207	040r4	F	5.4.0	E2EQos	26
S2-022504	Alignment with stage 3	23.207	43r1	F	5.4.0	E2EQos	26
S2-022293	Alignment with stage 3- RSVP	23.207	45	F	5.4.0	E2EQos	26

3GPP TSG-S2 #25 **Tdoc S2-~~021731~~021948**
Naantali, Finland, 24th - 28th June 2002

CR-Form-v5.1

CHANGE REQUEST

⌘ **23.207 CR 39** ⌘ **rev 1-** ⌘ Current version: **5.4.0** ⌘

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

Title:	⌘	Policy control procedures on PDP context modification
Source:	⌘	SK Telecom
Work item code:	⌘	E2EQOS
Date:	⌘	18th June 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 current section 6.3.8 “Indication of PDP Context Modification” shows the flows over Go interface when a PDP context is modified. It says that this procedure covers 2 different cases. Case 1 is that the requested QoS falls outside of the limits that were authorized at PDP context activation (or last modification). Case 2 is that the maximum bit rate (downlink and uplink) is downgraded to 0 kbit/s.

In the Case 2, However, the GGSN does not perform any resource authorization. It shall only indicate this state change to the PCF using the COPS RPT message instead of sending COPS REQ message to request an authorization decision. And the state change of MBR from 0 kbit/s is also needed to be indicated to the PCF.

And the Case 1 needs authorization procedures to be added. If the requested QoS exceeds the previously authorized QoS and/or the binding information is changed, the GGSN does need to send an authorization request(COPS REQ) to the PCF.

Summary of change: ⌘ Add “Authorization of PDP context modification” flows in section 6.3.7 and Modify the current section 6.3.7 “Indication of PDP context modification” flows into section 6.3.8

Consequences if not approved: ⌘ Misalignment between stage-2 and stage-3

Clauses affected: ⌘ 6.3.7

Other specs affected: ⌘
☐ Other core specifications ⌘
☐ Test specifications
☐ O&M Specifications

Other comments: ⌘

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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 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 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.

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6.3.7 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 PCF as described below. The following figures present the "Authorization of PDP Context Modification" procedure.

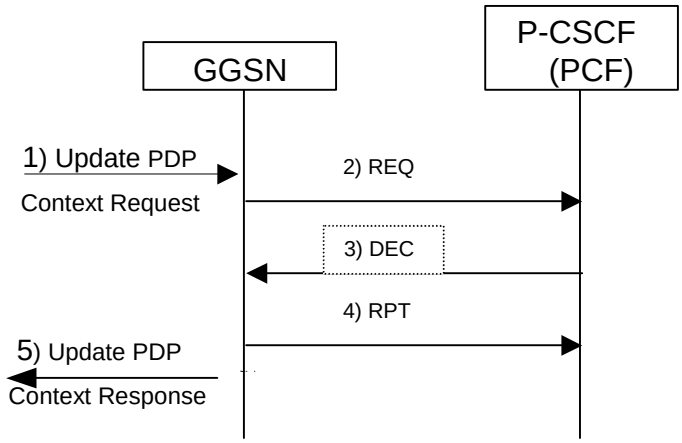

Figure 15: Authorization of PDP Context Modification

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(PCF). 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(PCF).

3) The P-CSCF(PCF) 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(PCF).

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

6.3.8~~7~~ Indication of PDP Context Modification

The “Indication 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~~ 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 PCF as described below. The following figures present the “Indication of PDP Context Modification” procedure.

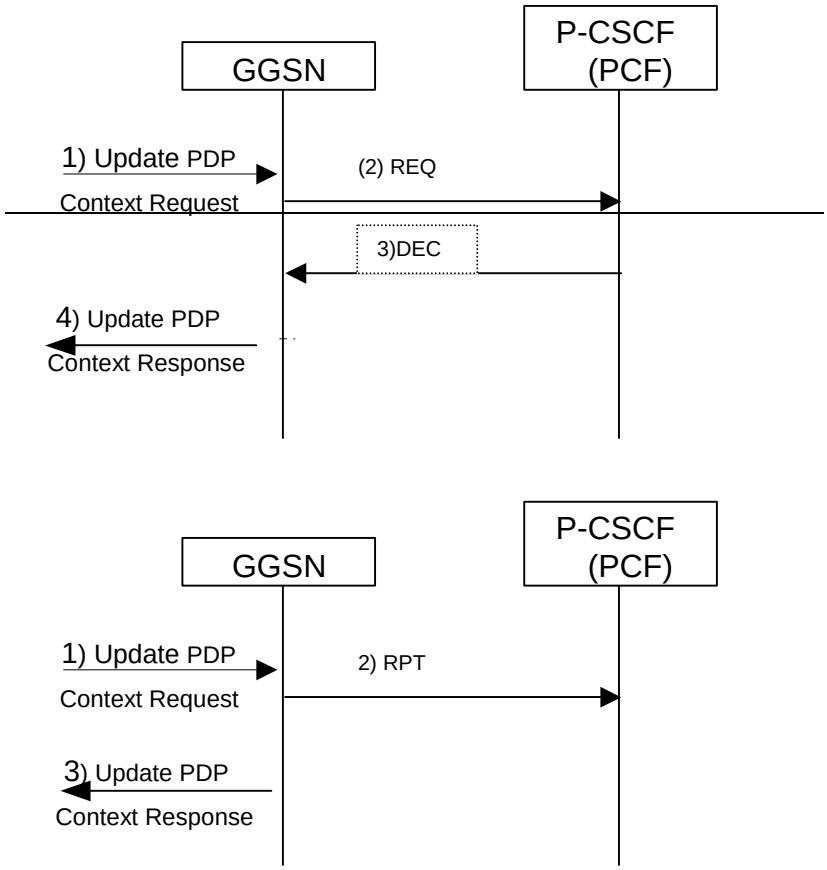

Figure 15~~5~~6: Indication of PDP Context Modification

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 ~~REQ~~ RPT message to the P-CSCF(PCF) to indicate the state changes of the PDP context..

~~3) The P-CSCF(PCF) receives the COPS REQ message, notes the requested modification and decides whether it should be accepted or rejected; and informs the GGSN of the decision. In case the maximum bit rate (downlink and uplink) were downgraded to 0 kbit/s the P-CSCF(PCF) shall accept the modification.~~

3~~4~~) ~~If the P-CSCF(PCF) accepted the modification, the~~The GGSN sends the Update PDP Context Response message to the SGSN to acknowledge the PDP context modification.

3GPP TSG-S2#25 ***Tdoc ⌘ S2-02001***
Naantali, Finland, 24th – 28th June 2002

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CHANGE REQUEST

⌘ **TS 23.207 CR 37** ⌘ **rev 2** ⌘ Current version: **5.4.0** ⌘

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

Title:	⌘	SBLP Handling and TFT Processing
Source:	⌘	Ericsson
Work item code:	⌘	E2EQoS
Date:	⌘	19/06/2002
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)*
Rel-6	*(Release 6)*

Reason for change:	⌘	To specify the interaction between SBLP based filters and the TFTs, and the changes to packet processing.
Summary of change:	⌘	The UE supplied TFT is disregarded when network based SBLP filters are supplied, and packets are processed against the SBLP based filters prior to the normal packet processing according to TS 23.060.
Consequences if not approved:	⌘	The stage 2 specification is not clear how the packet processing is altered from TS 23.060.

Clauses affected:	⌘	5.2.1

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

Other comments:	⌘	Dependent on agreement to S2-020xxx

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

RSVP/IntServ Function

[Editor's 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 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 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. 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.

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 shall populate the TFT filters with wildcard values.

3GPP TSG-S2#26 ***Tdoc ⌘ S2-022293***
Toronto, USA, 19th – 23rd August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **TS 23.207 CR 45** ⌘ **rev -** ⌘ Current version: **5.4.0** ⌘

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

Title:	⌘	Alignment with stage 3- RSVP
Source:	⌘	Ericsson
Work item code:	⌘	E2EQoS
Date:	⌘	14/08/2002
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),*
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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 stage 3 work has not defined any mechanisms for interworking between RSVP and PDP context. Also, no other details of RSVP support have been defined. Thus, although RSVP can be supported, the stage 3 documents do not define the standards for this support. Scenario 6 (appendix A) was defined for supporting the interwork between PDP context and RSVP. Although an RSVP proxy capability could be possible, it is noted that there is currently no specification for this RSVP proxy function, and the mechanism for the UE to request this proxy functionality has not been developed. Hence, the network has no means to determine whether the UE is an RSVP capable node or not. Therefore, this specific scenario cannot be used.
Summary of change:	⌘	The aspects related to generating/terminating RSVP signalling in the network when the UE only supports PDP context is removed.
Consequences if not approved:	⌘	The stage 2 specification is not aligned with the stage 3 specification.

Clauses affected:	⌘	4.1, 5.3.1, 6.1.1, A.2.6			
Other specs affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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First amended section

4.1 End-to-End QoS Negotiation Requirements

- The UMTS QoS negotiation mechanisms used for providing end-to-end QoS shall be backward compatible with UMTS Release 99.
- The UMTS QoS negotiation mechanisms used for providing end-to-end QoS shall not make any assumptions about the situation in external networks which are not within the scope of 3GPP specifications.
- The UMTS QoS negotiation mechanisms used for providing end-to-end QoS shall not make any assumptions about application layer signalling protocols.
- No changes to non-UMTS specific QoS negotiation mechanisms.
- The UMTS QoS negotiation mechanisms used for providing end-to-end QoS shall not make any assumptions about applications which may be used on terminal equipment attached to mobile terminals.
- Unnecessary signalling complexity and processing complexity in the network elements as well as the mobile terminal shall be avoided.
- Unnecessary signalling traffic due to end-to-end QoS negotiation shall be avoided.
- Methods for user authentication as well as billing and charging mechanisms related to the end-to-end QoS negotiation shall be kept as simple as possible.
- Minimum changes to network architecture and mechanisms due to introduction of end-to-end QoS negotiation.
- ~~The UMTS network shall be able to negotiate end-to-end QoS also for mobile terminals and applications which are not able to use QoS negotiation mechanisms other than the ones provided by UMTS.~~
- It shall be possible for an application on the external device to request end-to-end QoS.
- In order to enable the proper operation of service based local policy control, and to facilitate roaming in different networks, the mappings performed in various parts of the network need to be consistent.

Next amended section

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
- Charging 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.

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 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 optionally (dependent on operator policy) RSVP messages that are subject to service based local policy by sending an authorization request to the PCF. Alternatively, the GGSN may authorize PDP context activation/modification messages and optionally (dependent on operator policy) RSVP messages that are subject to service based local policy using the cached policy in the Local Decision Point. The GGSN shall map IP flow based policy information into PDP context based policy information.

Next amended section

~~A.2.6 Scenario 6~~

~~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, to enhance the interworking options to an RSVP function in the GGSN. The IP QoS bearer service towards the remote host is controlled from the GGSN.~~

~~The GGSN uses the authorization token to obtain a policy decision from the P-CSCF(PCF) which will be used to derive IP level information (e.g. destination IP address, TSpec, FilterSpec, PolicyData). 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.~~

~~In addition, IP level information may also be derived from PDP context (e.g. QoS parameters).~~

~~The scenario assumes that the GGSN supports DiffServ edge functions, and the backbone IP network is DiffServ enabled. This scenario does not preclude the backbone IP network from having RSVP non-transparent routers.~~

~~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 authorization token from the application layer is included in the PDP context parameters by the UE.~~

~~The GGSN may use the IP level information to invoke RSVP messages to setup the uplink as well as the downlink flows in the backbone IP network up to the remote host. For example, in the uplink direction, the GGSN may use the IP level information provided by service based local policy according to the authorization token to generate the RSVP Path messages, with the desired QoS / traffic specification, to the specified destination IP address. The information can also be used for DiffServ class admission control, e.g., for the GGSN DiffServ edge to determine if the flow can be allowed to a certain DiffServ class or to/from an ingress/egress point. Also, the GGSN DiffServ edge function may use the IP level information to select the appropriate DiffServ setting to apply. This is shown in the figure below.~~

~~In the uplink direction, the GGSN acts as a RSVP Sender Proxy and originates the Path message on behalf of the UE. It must also periodically refresh the Path message and correctly terminate the Resv, ResvTear and PathErr messages for the session.~~

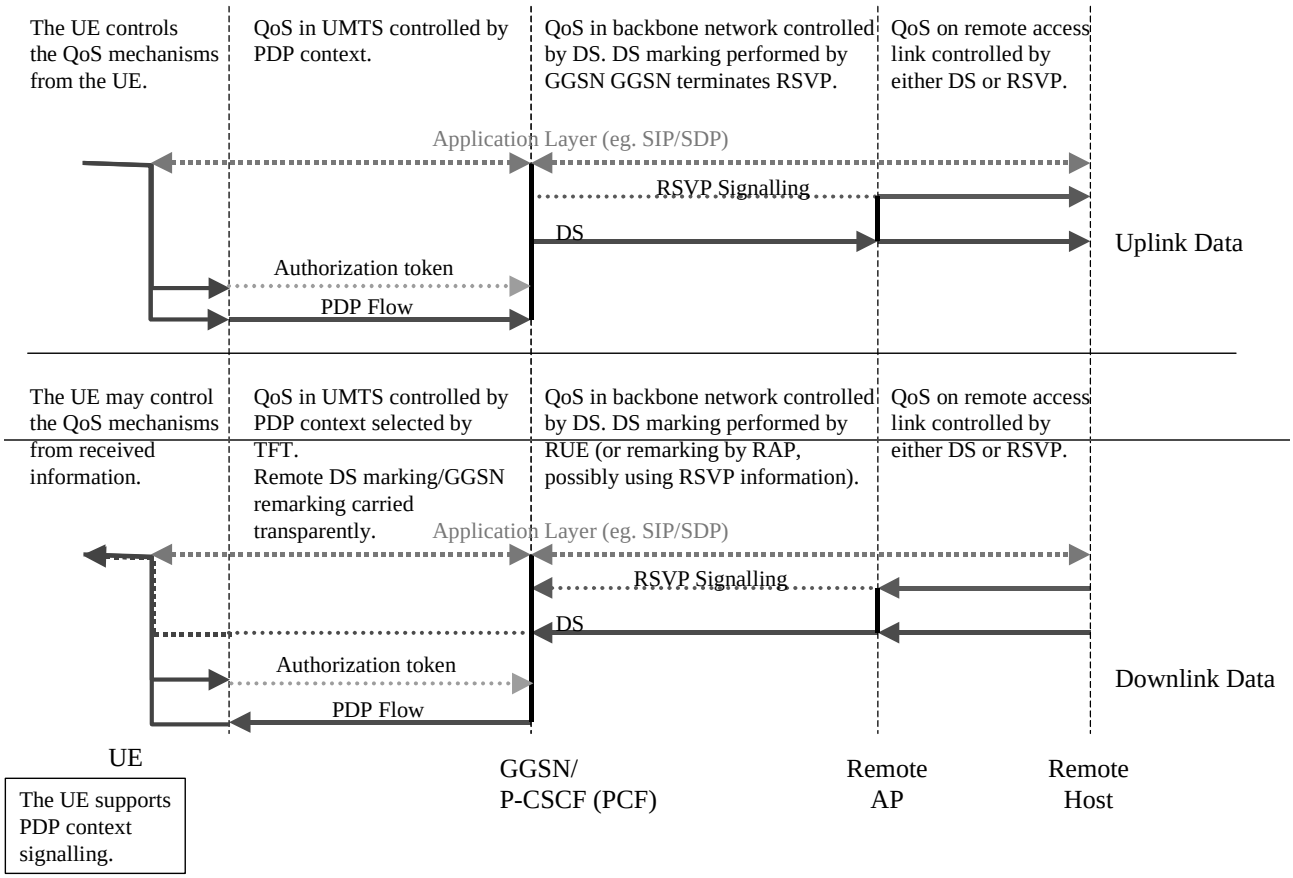
~~In the downlink direction, the GGSN acts as a RSVP Receiver Proxy and generates the Resv message on behalf of the UE. The GGSN should install a Resv Proxy state and act as if it has received a Resv from the true endpoint (UE). This involves reserving resource (if required), sending periodic refreshes of the Resv message and tearing down the reservation if the Path is torn down.~~

~~The decision on whether to proxy a RSVP session may be done under policy control. Policy control can be performed using policy that has either been locally specified or specified by a policy server via a protocol such as COPS for RSVP~~

~~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 PDP context between the UE and the GGSN. The GGSN terminates the RSVP signalling received from the remote host, and may use the IP level information when processing RSVP. The QoS in the uplink direction is controlled by the PDP context up to the GGSN. The GGSN may use the IP level information to provide the interworking with RSVP towards the remote host. The IP level information may allow for the establishment of the RSVP session.~~

~~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.~~



~~Figure A.8: Local UE provides authorization token in PDP context activation/modification message and GGSN provides interworking with RSVP~~

3GPP TSG-S2#26 ***Tdoc ⌘ S2-022504***
Toronto, USA, 19th – 23rd August 2002

CR-Form-v7

CHANGE REQUEST

⌘ **TS 23.207 CR 43** ⌘ **rev 1** ⌘ Current version: **5.4.0** ⌘

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

Title:	⌘	Alignment with stage 3
Source:	⌘	Ericsson
Work item code:	⌘	E2EQoS
Date:	⌘	14/08/2002
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)
Rel-6 (Release 6)

Reason for change:	⌘	Some text improvements are required to the specification to improve the text, and align with stage 3 and previous decisions as follows: 1) In stage 3, the PIB name is defined as 3GPP Go PIB. The name was chosen to be non UMTS specific, while still supporting other 3GPP pibs. 2) The term SBLP includes all policy controls over the Go interface. In many places the specification refers to policy and QoS interworking, which are all part of SBLP (see P-CSCF/PCF functions in chapter 5.2.3). SBLP is used instead of policy and QoS interworking. 3) The QoS mapping only occurs to the UMTS level. There is no mapping from the UMTS parameters to IP or application level parameters. Also, the parameter mapping is specified in stage 3 specifications. 4) Other minor corrections, clarifications and text improvements eg. - Remove information about COPS protocol messages in section 5.3.2 as it is unnecessary. - NULL decision is not used to indicate no data available - correcting places to indicate “IP flow(s)” instead of “IP Flow” - extra spaces deleted
Summary of change:	⌘	Text improvements according to reasons above.
Consequences if not approved:	⌘	The stage 2 specification is not clear, misleading, and not aligned with the stage 3 specification.

Clauses affected:	⌘	5.1.1.1, 5.2.1, 5.2.2, 5.3.2, 5.4, 5.5, 6.1.1, 6.1.3, 6.2

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

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

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 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 Service Based Local Policy (SBLP) ~~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 SBLP~~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.

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

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

RSVP/IntServ Function

[Editor's 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 gate status (open/closed), a traffic metering function, and user plane actions to be taken for the set of packets matching the classifier. When a gate is ~~enabled~~open, 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~~closed, 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.

Elements of the 5-tuple that cannot be derived from the SDP according to a set of rules shall ~~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 SBLP~~QoS and~~ policy decision information provided by the PCF ~~and~~ associated with the IP flow(s). In order to allow SBLP~~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.

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/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(s) to support SBLP~~IP~~ policy enforcement ~~and QoS inter-working~~ in the GGSN. The binding information containing the authorization token and flow identifier(s) ~~are used to~~ provides the binding mechanism, and is included by the UE in the PDP Context Activation and~~or~~ 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. 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.

Next amended 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 3GPP Go~~UMTS~~-specific information elements must be included in COPS messages to support the SBLP ~~policy and QoS inter-working~~ 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~~UMTS~~ COPS -client (GGSN).

All of the information described in the remainder of this section applies specifically to the 3GPP Go~~GGSN~~ COPS client type. The events specific to the UMTS or IP bearer service would trigger the request messages from the GGSN~~UMTS~~ PEP to the PCF. The information elements specific to UMTS would be standardized and carried in the 3GPP Go~~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 SBLP policy ~~and QoS inter-working~~ information for the~~an~~ IP flow(s) identified by binding information (described below).

Binding information associates the PDP context to the IMS session and IP flows, and is used by the GGSN to request SBLP policy information from the PCF~~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 signalling, and 2) one or more flow identifiers used by the UE, GGSN and PCF to uniquely identify the~~an~~ 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 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~~ of a previously authorised bearer resource is no longer available/relevant at the GGSN so the corresponding COPS policy state shall~~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 the~~an~~ IP flow(s):

- Packet classifier(s) ~~(e.g. RSVP filterspec)~~
- Authorized QoS information
- Packet handling action
- Event generation information (e.g. charging identity)

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

-

Event generation information contains information used to correlate usage records (e.g. CDRs) of the GGSN with IMS session records from the P-CSCF. The PCF shall send the ICID provided by the P-CSCF as part of the authorisation (Install) decision. The GGSN shall send the GCID of the PDP context and the GGSN address to the PCF 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

5.4 QoS Parameters

Note that the details for this section are ~~[Editor's note: Details for this section are for further study~~specified in stage 3 specification TS 29.207.~~]~~

Next amended section

5.5 QoS Parameter Mapping

Note that the details for this section are ~~[Editor's note: Details for this section are for further study~~ specified in stage 3 specification TS 29.208.~~]~~

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 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~~ 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~~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 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 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

6.1.3 Procedures in the P-CSCF(PCF)

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

The authorize QoS resources procedure is triggered by the P-CSCF receiving a SIP message containing 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 by the P-CSCF. 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 generates and forwards 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 SBLP~~service based local policy~~ for the session.

The PCF makes a final decision to enable the allocated QoS resource for the authorized IP flows~~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-~~CS~~CF 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 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~~ and QoS inter-working~~. The SBLP 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 and~~or~~ Modification messages to associate the PDP context bearer with policy information . 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.~~ 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 ~~QoS and~~ SBLP 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.

3GPP TSG-SA WG2 Meeting #26 ***Tdoc S2-022542***
Toronto, Canada, 19th – 23rd August

CR-Form-v7

CHANGE REQUEST

⌘ **23.207** **CR** **36** ⌘ **rev** **1** ⌘ Current version: **5.4.0** ⌘

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

Title:	⌘	Modification of IMS signalling PDP context
Source:	⌘	Ericsson
Work item code:	⌘	IMS-CCR
Date:	⌘	21-08-2002
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)
Rel-6 (Release 6)

Reason for change:	⌘	Alignment with stage 3. It has been agreed in CN1#25 that it shall not be possible to modify a PDP context from a PDP context dedicated for IMS signalling to a general purpose PDP context and vice versa.
Summary of change:	⌘	The possibility to include the IMS signalling flag in the PDP Context Modification Procedure is removed. The statement to use PCO IE is removed.
Consequences if not approved:	⌘	Misalignment with stage 3.

Clauses affected:	⌘	6.4

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

Other comments: ⌘

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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 ~~or modification~~ procedure~~s~~. This indicates to the network the intention of using the PDP context for application level signalling. ~~The PDP Configuration Options parameter shall be used to carry this flag. The PDP Configuration Options parameter is one of the optional parameters signalled in PDP Context Activation/Modification.~~ The signalling flag shall be a standardi~~s~~z~~z~~ed static information.

In the case of IMS, the signalling flag 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 signalling flag and the QoS profile parameters detailed in TS23.107 may be used independently of each other.

Annex A (informative): QoS Conceptual Models

CR-Form-v7

CHANGE REQUEST

⌘ **23.207** **CR** **40** ⌘**rev** **4** ⌘ Current version: **5.4.0** ⌘

*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:	⌘	Source IP address filtering for Service Based Local Policy
Source:	⌘	AWS
Work item code:	⌘	E2E QoS
Date:	⌘	01/08/2002
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),*
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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:	⌘	An issue has been identified in the lack of source address information available to the nodes enforcing service based local policy
Summary of change:	⌘	Introduces restriction that a user's source IP address uses the same 64 bit prefix for the address they receive their data on and provides the operator a mechanism for identifying this information in its packet filters in service based local policy over the Go interface .
Consequences if not approved:	⌘	Lack of source information would allow for misuse of service and negative service experience for the user

Clauses affected:	⌘	5.2.2 and 5.2.3			
		Y	**N**		
Other specs Affected:	⌘	**Y**		Other core specifications	⌘ 29.207 CR 22 rev1
			N	Test specifications	
			N	O&M Specifications	
Other comments:	⌘				

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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.

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5.2 Capabilities of Functional Elements

This section provides functional descriptions of capabilities in GGSN, UE, and P-CSCF(PCF).

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

[Editor's 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.

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. 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 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.

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.

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. For bi-directional media flows, the P-CSCF(PCF), 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(PCF) assumption would be determined by operator policy in order to reduce the possibilites of bearer misuse In the filters supplied by the PCF 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 (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 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 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, 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 SIP signalling. 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.