Technical Specification Group Services and System Aspects Meeting #25, Palm Springs, USA

TSGS#25(04)0518

Source: TSG SA WG2
Title: CRs on 23.125 (IP flow based Charging)
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 #25.
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 doc #	Title	Spec	CR #	cat	Version in	Rel	WI	S2 meeting	Clauses affected
S2-042781	Add CCF and/or OCS address to charging rule	23.125	048r2	B	6.1.0	6	CH	S2 #41	5.2, 6.2.2
S2-042776	Add a definition of TPF/CRF instance	23.125	051r1	B	6.1.0	6	CH	S2 #41	3.1, 6.3.1.3, 6.3.1.4
S2-042533	Allowing specific charging rule selection for dedicated IMS signalling PDP contexts	23.125	055	F	6.1.0	6	CH	S2 #41	6.2.4, 6.3.1.2
S2-042780	Application Function Tag	23.125	056r2	B	6.1.0	6	CH	S2 #41	5.2, 6.2.5
S2-042914	Clarification on precedence of charging rules	23.125	059r2	B	6.1.0	6	CH	S2 #41	5.2
S2-042901	Rx/Gx functions and SBLP usage in IMS Charging	23.125	060r2	B	6.1.0	6	CH	S2 #41	Annex B
S2-042902	Policy control functions provided by FBC	23.125	061r2	B	6.1.0	6	CH	S2 #41	2, new section 5.8
S2-042783	Clarification of pre-defined charging rules	23.125	063r2	F	6.1.0	6	CH	S2 #41	3.1, 5.3, 6.2.4
S2-042542	Clarification on charging rules	23.125	064	F	6.1.0	6	CH	S2 #41	5.2
S2-042784	Traffic plane function behavior	23.125	065r2	F	6.1.0	6	CH	S2 #41	6.2.4
S2-042941	Termination action	23.125	066r2	F	6.1.0	6	CH	S2 #41	5.6
S2-042545	Re-authorization triggers	23.125	067	F	6.1.0	6	CH	S2 #41	5.5, 5.7
S2-042778	Gx reference point functions	23.125	068r1	F	6.1.0	6	CH	S2 #41	5.3, 6.3.1
S2-042786	Clarifications in message flows	23.125	069r2	F	6.1.0	6	CH	S2 #41	7.1, 7.1a, 7.2.1, 7.2.3, 7.3
S2-042785	Bearer service modification in case of online charging	23.125	070r2	F	6.1.0	6	CH	S2 #41	7.2.2
S2-042903	Policy functions of FBC ñ update of Annex D	23.125	071r2	F	6.1.0	6	CH	S2 #41	Annex D
S2-042775	Removal of superfluous FFS notes	23.125	072r1	D	6.1.0	6	CH	S2 #41	5.1, 5.5, 6.1, 6.2.4, 6.2.5, 6.3.1.2, 7, 7.2.2.4
S2-042913	FBC Control	23.125	074r2	C	6.1.0	6	CH	S2 #41	6.2.4
S2-042782	TPF performing no charging	23.125	075r1	F	6.1.0	6	CH	S2 #41	4.3.1, 5.2

3GPP TSG-WG2 Meeting #41
Montreal, Canada, August 16-20, 2004

Tdoc ⌘ S2-042781
Revised S2-042525 S2-02555

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.125** **CR** **48** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

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

Title:	⌘	Add CCF and/or OCS address to charging rule
Source:	⌘	SA2 (Huawei, China Mobile, Lucent Technologies)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Use one of the following releases:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	In the current TS 23.125, the CRF indicates the charging mechanism is online or offline. In case of offline charging, the TPF shall provide charging records to a CCF. In case of online charging, the TPF shall trigger the credit request to the OCS. But in the specification the TPF how to get the suitable CCF and/or OCS address is not clear. For a real PLMN, as is already supported for IMS, there may be multiple CCFs and/or OCSs to distribute the subscriber data into several entities. In this case, the TPF shall contact the appropriate CCF or OCS basing on UE identity information. However, there might be no such information be pre-configured in the TPF to be used to find the correct CCF and/or OCS for a specified UE. A preferable approach is the CRF may provide the CCF and/or OCS address to the TPF.
Summary of change:	⌘	The CCF and OCS addresses are sent to the TPFonly once per user session. Alternatively the CCF and OCS addresses are pre-configured in the TPF.
Consequences if not approved:	⌘	The TPF how to obtain the CCF or OCS address is unclear.

Clauses affected:	⌘	5.2, 6.2.2

Other specs affected:	⌘	Y	N		⌘
			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.

<< First changed clause >>

5.2 Charging rules

Charging rules contain information that allow for filtering of traffic to identify the packets belonging to a particular service data flow, and allow for defining how the service data flow is to be charged. The following apply to charging rules:

- The charging rules for bearer charging are defined by the operator.
- These charging rules are made available to the Traffic Plane function for both offline and online charging.
- Multiple charging rules are supported simultaneously per user.
- Filtering information within a charging rule is applied through filtering functionality at the Traffic Plane Function to identify the packets belonging to a particular service data flow.
- Charging rules with dynamically provisioned filtering information (i.e. made available to the Traffic Plane Function) are supported in order to cover IP service scenarios where the filtering information is dynamically negotiated (e.g. negotiated on the application level (e.g. IMS)).
- Pre-defined charging rules are supported. The pre-defined charging rules stored in the TPF shall have charging rule identifiers, which are different from the charging rule identifiers allocated by the CRF.
- Elements of charging rules may be statically configured at the Traffic Plane Function, or dynamically provisioned.

Note-i: The mechanism to support use of elements statically pre-defined in the TPF (e.g. filter information) is for stage 3 development.

Note-ii: The stage 3 development may also evaluate providing an optimisation to support dynamic provisioning of an entire charging rule pre-defined in the TPF.

- Pre-defined filters that are part of the pre-defined charging rules may support extended capabilities, including enhanced capabilities to identify packets associated with application protocols.
- There may be overlap between the charging rules that are applicable. Overlap can occur between:
    - multiple pre-defined charging rules in the TPF;
    - charging rules pre-defined in the TPF and rules from the Service Data Flow Based Charging Rules Function, which can overlay the pre-defined rules in the TPF.

  The precedence identified with each charging rule shall resolve all overlap between the charging rules. When overlap occurs between a dynamically allocated charging rule and a pre-defined charging rule at the TPF, and they both share the same precedence, then the dynamically allocated charging rule shall be used.
- Charging rules contain information on:
    - How a particular service data flow is to be charged: online/offline;
    - In case of offline charging whether to record volume- or time-based charging information;
    - Charging key;
    - Service data flow filter(s);
    - Precedence.
    - Charging rule identifier.
- Event triggers and/or CCF/OCS addresses are associated with all charging rules for a user and IP network connection.

- The identifier of the charging rule allocated by the CRF shall be unique for a CRF/TPF instance.
- Once the charging rule is determined it is applied to the service data flow at the Traffic Plane Function and packets are counted and categorised per the rule set in the charging rule.
- Separate charging rules can be provided for downlink and uplink.
- Charging rules can be configured for both user initiated and network initiated flows.
- Charging rules can change and be overridden, e.g. for a previously established PDP context in the GPRS case, based on specific events (e.g. IM domain events or GPRS domain events, credit control events).
- Different charging rules can be applied for different users.
- The same charging rule can be applied for multiple users.
- Different charging rules can be applied based on the location of the user (e.g. based on identity of the roamed to network).
- Charging rule assignment can occur at bearer service establishment, modification and termination. For GPRS, charging rule assignment can occur at PDP context activation, modification and deactivation.

\- For GPRS, the charging rules can be dependent on the APN used.

<< Next changed clause >>

6.2.2 Service Data Flow Based Credit Control Function

The Service Data Flow Based Credit Control Function performs online credit control functions together with the Online Charging System. It provides a new function within the Online Charging System.

The Online Charging System is specified in 3GPP TS 32.200 [3]. The Service Data Flow Based Credit Control Function is considered as a new functional entity for release 6 within the Online Charging System.

The OCS can interact with the CRF, by using the Ry interface. This allows the OCS to provide input to the CRF for charging rules selection.

There may be several CCFs and/or OCSs in a PLMN. To allow for this case, CCF and/or OCS addresses (i.e. the primary address and secondary address) may be passed once per user and IP network connection from the CRF to the TPF. Alternatively this information may be locally pre-configured within the TPF. The addresses provided by the CRF have higher priority than the pre-configured ones.

<< End of changed clause >>

3GPP TSG-WG2 Meeting #41
Montreal, Canada, August 16-20, 2004

Tdoc ⌘ S2-042776
Revised S2-042529

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CHANGE REQUEST

⌘ **23.125** **CR** **051** ⌘ **rev** **001** ⌘ Current versi **6.1.0** ⌘

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

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

Title:	⌘	Add a definition of TPF/CRF instance
Source:	⌘	SA2 (Huawei, China Mobile)
Work item code:	⌘	CH
Date:	⌘	09/08/2004
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Use one of the following releases:
Ph2 (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)
Rel-7 (Release 7)

Reason for change: ⌘

The current specification states the connection between the TPF and the CRF should be established basing on a dialogue, i.e. TPF/CRF instance. For each TPF/CRF instance, an identifier shall be allocated when the dialogue is initiated and be maintained until the dialogue is ended.

Generally, the allocation of TPF/CRF instance identifier has the following different methods.

- the TPF allocates the identifier and provides it to CRF.
- the CRF allocates the identifier and provides it to TPF.
- The TPF locally allocates a part of identifier for itself use, and the CRF locally allocates the another part of identifier for itself use. The combination of the two parts is the whole identifier, which should be transmitted between the TPF and CRF.

Considering the TPF and CRF may be in different PLMNs, in this case the allocated instance identifer should be global unique. Whether the identifer is allocated by the TPF or by the CRF, the identifier always shall be defined as a long parameter to ensure it could be a global unique identifier.

To solve this problem, the third method is recommended. The TPF and CRF locally allocates the part of instance identifier respectively, thus the TPF and CRF only be required to ensure the allocated part of identifier is unique in the local entity. In this case, the parameter could be able to defined as short parameter.

Summary of change: ⌘ A definition of TPF/CRF instance is added, and the instance identifier is stated

		that it is allocated by the TPF and CRF.
Consequences if not approved:	⌘	Missing definition in the specification, and without a normative allocation of instance identifier, vendors may have viarous implementations, this may cause some TPF/CRF interworking problems.

Clauses affected:	⌘	3.1, 6.3.1.3, 6.3.1.4			
Other specs affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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<< First changed clause >>

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 21.905 [2] and in TS 32.225 [7] and the following apply:

Charging key: information used by the online and offline charging system for rating purposes.

Charging rule: a set of information comprising the service data flow filters, charging key, and the associated charging actions, for a single service data flow (further details can be found in 4.3).

Dynamic charging rule: Charging rule where some of the data within the charging rule (e.g. service data flow filter information) is assigned via real-time analysis, which may use dynamic application derived criteria.

Packet flow: a specific user data flow carried through the Traffic Plane Function. A packet flow can be an IP flow.

Predefined charging rule: Static charging rule which is defined in the Traffic Plane Function.

Service data flow: aggregate set of packet flows. In the case of GPRS, it shall be possible that a service data flow is more granular than a PDP context.

Service Data Flow Filter: a set of filter parameters used to identify one or more of the packet flows constituting a service data flow. At least the following means for the packet flow identification shall be supported: source and destination IP address+port, transport protocol, or application protocol.

Static charging rule: Charging rule where all of the data within the charging rule describing the service data flow is permanently configured throughout the duration of a userís data session. A static charging rule may be activated dynamically.

TPF/CRF instance: A dialogue between TPF and CRF, with a unique instance identifier per user and IP network connection to identify each established dialogue.

<< Next changed clause >>

6.3.1.3 Provision of Charging Rules (from CRF to TPF)

The CRF identifies the charging rules that are applicable to the TPF. The CRF then sends the charging rule information to the TPF to be installed.

Note: The stage 3 development shall support provisioning cases where:

- charging rules are to be installed in the TPF;
- charging rules are to be removed in the TPF;
- charging rules are to be installed and removed in the TPF;
- charging rules are neither installed nor removed in the TPF (only relevant in the response to a request for charging rules).

The provisioning may be a response to a Request for Charging Rules, or it may be unsolicited.

The charging rule provision includes information about the instance it relates to (i.e. identifier for the relevant ~~CRF/TPF~~ TPF/CRF instance), charging mechanism (online/offline), volume- or time-based charging indication, charging key, service data flow filter(s), and precedence.

The service data flow filters are specified separately for the uplink and downlink direction.

Note: A charging rule may provide information for service data flows for one direction, or for both directions.

<< Next changed clause >>

6.3.1.4 Indication of Bearer Termination (from TPF to CRF)

The TPF indicates to the CRF that a bearer is terminated.

The bearer termination indication includes information to identify the instance it relates to (i.e. an identifier for the relevant ~~CRF/TPF~~ TPF/CRF instance), and an indication of the bearer being removed (the PDP context in the case of GPRS). The termination also indicates if this is the last bearer for that TPF/CRF instance.

<< End of changed clause >>

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CHANGE REQUEST

⌘ **23.125** **CR** **055** ⌘**rev** **-** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Allowing specific charging rule selection for dedicated IMS signalling PDP contexts
Source:	⌘	SA2 (Vodafone UK)
Work item code:	⌘	CH
Date:	⌘	04/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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F *(correction)*
A *(corresponds to a correction in an earlier release)*
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Use one of the following releases:

2	*(GSM Phase 2)*
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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:	⌘	During bearer establishment (PDP context activation in GPRS), the TPF triggers a request for charging rules. For a PDP context that is dedicated for IMS signalling (SIP), an operator may configure this to incur different charging. It is currently not possible to define a charging rule that separates out the traffic for this IMS signalling context and applies different charging. The addition of the IM CN Subsystem Signalling Flag that is to be sent in the downlink towards the UE, indicates to the CRF that a dedicated signalling context has been allowed (see TS 24.229 section B.2.2.1 bullet b.) and that "special" charging should be applied. In its absence, the PDP context should be treated as any other PDP context.
Summary of change:	⌘	Add the IM CN Subsystem Signalling Flag to information passed to the CRF for charging rule selection during bearer establishment procedures.
Consequences if not approved:	⌘	Flow Based Charging would not be able to apply correct charging to PDP contexts used for IMS signalling.

Clauses affected:	⌘	6.2.4, 6.3.1.2

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

Other comments:	⌘	

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******** FIRST MODIFIED SECTION *********

6.2.4 Traffic Plane Function

The Traffic Plane Function shall be capable of differentiating user data traffic belonging to different service data flows for the purpose of collecting offline charging data and performing online credit control.

The Traffic Plane Function shall support pre-defined charging rules, and pre-defined filters. See subclause 5.3 for further filtering and counting requirements.

In the case of online charging, the Traffic Plane Function shall not allow traffic unless network resource usage has been granted by the OCS.

For online charging, the Traffic Plane Function shall be capable of managing a pool of credit used for some or all of the service data flows of a user. The Traffic Plane Function shall also be capable of managing the credit of each individual service data flow of the user.

A TPF may be served by one or more CRF nodes. The appropriate CRF is contacted based on UE identity information.

Editorís note: The specific identity information used to identify the appropriate CRF is FFS.

For GPRS, it shall be possible to provide flow based charging functions for different service data flows even if they are carried in the same PDP Context. For GPRS, the traffic Plane Function is a logical function allocated to the GGSN.

Editorís Note: The effects of this co-location to the interfaces still needs to be studied e.g. Gy, Gz, Gi. Gi radius extensions for charging purposes are not precluded.

For GPRS, the TPF/GGSN shall be able to do separate counts per PDP context for a single service data flow if it is transferred on more than one PDP context.

Editorís note: How this can be achieved is FFS.

For each PDP context, the TPF shall accept information during bearer establishment and modification relating to:

- The user and terminal (e.g. MSISDN, IMEISV)
- Bearer characteristics (e.g. QoS negotiated, APN, IM CN Subsystem signaling flag)
- Network related information (e.g. MCC and MNC)

The TPF may use this information in the OCS request/reporting or request for charging rules.

For each PDP context, there shall be a separate OCS request/reporting, so this allows the OCS and offline charging system to apply different rating depending on the PDP context.

The Traffic Plane Function shall identify packets that are charged according to service data flow based charging. The Traffic Plane Function shall report the data volume(s) charged according to service data flow based charging. In case of GPRS, the Traffic Plane Function shall report the service data flow based charging data for each charging rule on a per PDP context basis.

At initial bearer establishment the Traffic Plane Function shall request charging rules applicable for this bearer from the charging rules function. As part of the request, the Traffic Plane Function provides the relevant information to the charging rules function. The Traffic Plane Function shall use the charging rules received in the response from the charging rules function. In addition, the Traffic Plane Function shall use any applicable pre-defined static charging rules. Pre-defined charging rules may apply for all users or may be activated by the CRF.

If the bearer is modified by changing the bearer characteristics, the TPF shall use the re-authorisation triggers in order to determine whether to require re-authorisation. The TPF shall use the event triggers to determine whether to request the charging rules for the new bearer characteristics from the charging rules function.

If the Traffic Plane Function receives an unsolicited update of the charging rules from the charging rules function, the new charging rules shall be used.

If another bearer is established by the same user (e.g. for GPRS a secondary PDP context), the same procedures shall be applied by the Traffic Plane Function as described for the initial bearer.

The Traffic Plane Function shall evaluate received packets against the service data flow filters in the order according to the precedence for the charging rules. When a packet is matched against a SDF filter, the packet matching process for that packet is complete, and the charging rule for that SDF filter shall be applied.

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

6.3.1 Gx reference point

The Gx reference point enables the use of service data flow based charging rules such as counting number of packets belonging to a rate category in the IP-Connectivity Network. This functionality is required for both offline and online charging.

Note: The reuse of existing protocols over the Gi reference point for Gx shall be evaluated in stage 3.

The Gx reference point supports the following functions:

1. Initialisation and maintenance of connection
2. Request for Charging Rules (from TPF to CRF)
3. Provision of Charging Rules (from CRF to TPF)
4. Indication of Bearer Termination (from TPF to CRF)

6.3.1.1 Initialisation and Maintenance of Connection

A single connection shall be established between each interworking CRF and TPF pair. The connection can be direct, or established via a relay/proxy node. A connection may be redirected to an alternate CRF.

At a failover, commands which have not been successfully received shall be queued to an alternate CRF.

Only CRFs responsible for the same UE identity information may be selected as alternate CRF.

The detail specification of the connection establishment and maintenance is for specification in stage 3.

6.3.1.2 Request for Charging Rules (from TPF to CRF)

The TPF requests the charging rules to be applied:

- At a bearer establishment (PDP context establishment for GPRS) or,
- At bearer modification (PDP context modification for GPRS) if the Event trigger is met, or
- When the specific event of the Event trigger is detected.

The request must identify whether it is an initial request (primary context establishment for GPRS), or a subsequent request (i.e. for GPRS, a secondary PDP context establishment, or a PDP context modification). For an initial request for GPRS, the request shall include APN, PDP address information, and at least one of IMSI or MSISDN. Other relevant network and terminal information should also be included.

Editorís Note: Where the relevant network and terminal information is defined is FFS (either in this TS or 32.xyz).

An identifier is required to allow the specific instance in the TPF/CRF to be identified for subsequent data exchange. The identifier for the communication must be provided.

The request must provide further information used for the charging rule selection. The request shall include an identifier for the bearer, the QoS information, and flow identifier information allocated to the bearer. For GPRS, this information would include the traffic class, IM CN Subsystem Signalling Flag (if present in the downlink), and the TFT.

Where the charging rule selection data for a bearer is modified, the TPF sends the request to the CRF indicating it is for a bearer modification, and providing the modified data.

****** END OF CHANGES *******

3GPP TSG-SA WG2 Meeting #41
Montreal, Canada, 16-20 August, 2004

Tdoc ⌘S2-042780

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **056** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Application Function Tag
Source:	⌘	SA2 (Lucent Technologies)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**B**
Release:	⌘	Rel-6

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

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

Reason for change:	⌘	Currently the Service Based Local Policy capabilities may be used to exchange a correlation identifier between the IMS application (P-CSCF) and the bearer charging information generation entity (GGSN). One functionality provided by this correlation identifier is to allow appropriate rating for the charging data that has been collected. In FBC this rating is provided directly by the Charging Key included in the Charging Rule to the TPF. Another functionality provided by the correlation identifier is the abiltiy to associate specific bearer charging records with specific application charging records for the purpose of post processing audits. This capability is not provided by the FBC Charging Key. This CR proposes to add optional Application Function Record information that can be passed over the Rx and subsequently included in charging rules associated with specific AF based flow definitions so that the TPF may include it in charging records generated based on the associated rule.
Summary of change:	⌘	Add optional Application Function information to the list of information transferred over the Rx and in a charging rule.
Consequences if not approved:	⌘	The ability to associate application generated charging data and bearer generated charging data for audit purposes will not be available with Flow Based Charging.

Clauses affected:	⌘	5.2, 6.2.5

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

Other comments:	⌘

How to create CRs using this form:

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

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

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

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

******** First Change ********

5.2 Charging rules

Charging rules contain information that allow for filtering of traffic to identify the packets belonging to a particular service data flow, and allow for defining how the service data flow is to be charged. The following apply to charging rules:

- The charging rules for bearer charging are defined by the operator.
- These charging rules are made available to the Traffic Plane function for both offline and online charging.
- Multiple charging rules are supported simultaneously per user.
- Filtering information within a charging rule is applied through filtering functionality at the Traffic Plane Function to identify the packets belonging to a particular service data flow.
- Charging rules with dynamically provisioned filtering information (i.e. made available to the Traffic Plane Function) are supported in order to cover IP service scenarios where the filtering information is dynamically negotiated (e.g. negotiated on the application level (e.g. IMS)).
- Pre-defined charging rules are supported. The pre-defined charging rules stored in the TPF shall have charging rule identifiers, which are different from the charging rule identifiers allocated by the CRF.
- Elements of charging rules may be statically configured at the Traffic Plane Function, or dynamically provisioned.

Note-i: The mechanism to support use of elements statically pre-defined in the TPF (e.g. filter information) is for stage 3 development.

Note-ii: The stage 3 development may also evaluate providing an optimisation to support dynamic provisioning of an entire charging rule pre-defined in the TPF.

- Pre-defined filters that are part of the pre-defined charging rules may support extended capabilities, including enhanced capabilities to identify packets associated with application protocols.
- There may be overlap between the charging rules that are applicable. Overlap can occur between:
    - multiple pre-defined charging rules in the TPF;
    - charging rules pre-defined in the TPF and rules from the Service Data Flow Based Charging Rules Function, which can overlay the pre-defined rules in the TPF.

  The precedence identified with each charging rule shall resolve all overlap between the charging rules. When overlap occurs between a dynamically allocated charging rule and a pre-defined charging rule at the TPF, and they both share the same precedence, then the dynamically allocated charging rule shall be used.
- Charging rules contain information on:
    - How a particular service data flow is to be charged: online/offline;
    - In case of offline charging whether to record volume- or time-based charging information;
    - Charging key;
    - Service data flow filter(s);
    - Precedence~~.~~;
    - Charging rule identifier;
    - Application Function Record Information.

- Event triggers are associated with all charging rules for a user and IP network connection.
- The identifier of the charging rule allocated by the CRF shall be unique for a CRF/TPF instance.
- The Application Function Record information (e.g. ICID and flow ID(s)) is included in the charging rule, and in subsequently generated charging information generated as a result of the rule, if it is provided by an Application Function and the rule filters are based on the Application Function provided information. It should be noted that, in order to associate a single Application Function Record with specific counts/credits, it is necessary that new counts/credits be generated for the user by the TPF each time the AF generates new Application Function Record information.
- Once the charging rule is determined it is applied to the service data flow at the Traffic Plane Function and packets are counted and categorised per the rule set in the charging rule.
- Separate charging rules can be provided for downlink and uplink.
- Charging rules can be configured for both user initiated and network initiated flows.
- Charging rules can change and be overridden, e.g. for a previously established PDP context in the GPRS case, based on specific events (e.g. IM domain events or GPRS domain events, credit control events).
- Different charging rules can be applied for different users.
- The same charging rule can be applied for multiple users.
- Different charging rules can be applied based on the location of the user (e.g. based on identity of the roamed to network).
- Charging rule assignment can occur at bearer service establishment, modification and termination. For GPRS, charging rule assignment can occur at PDP context activation, modification and deactivation.
- For GPRS, the charging rules can be dependent on the APN used.

******** Next Change ********

6.2.5 Application Function

The Application Function provides information to the service data flow based charging rules function, which can then be used for selecting the appropriate charging rule, and also used for configuring some of the parameters for the charging rule. The operator configures the charging rules in the service data flow based charging rules function, and decides what data from the application function shall be used in the charging rule selection algorithm.

An AF may communicate with multiple CRFs. The AF contacts the appropriate CRF for a user at any time based on UE identity information.

Editorís note: The specific identity information used to identify the appropriate CRF is FFS.

The Application Function shall provide information to allow the service data flow to be identified. The Application Function shall also provide some other information that may be used in the charging rule selection process.

The information provided by the application function is as follows:

- Information to identify the service data flow: refer to subclause 5.3.
  The application function may use wildcards to identify an aggregate set of IP flows.
- Optional Application Function Record information that would be included in charging data generated by the AF and by the TPF and could be used to associate the records for post processing.
- Information to support charging rule selection:
  - Application identifier;

- Application event identifier;
- Type of Stream (e.g. audio, video) (optional);
- Data rate of stream (optional);
- User information (such as user identity).

Editorís Note: Additional information is FFS.

The ì Application Identifierî is an identifier associated with each service that an AF provides for an operator (e.g. a packet streaming service application function would have one application identifier for the service).

The ì Application event identifierî is an identifier within an Application identifier. It is used to notify the Service Data Flow Based Charging Rules Function of such a change within a service session that affects the charging rules, e.g. triggers the generation of a new charging rule.

3GPP TSG-SA WG2 Meeting #41
Montreal, Canada, August 16-20, 2004

Tdoc ⌘ S2-042914
Revised S2-042537、S2-042779

CR-Form-v7

CHANGE REQUEST

⌘ **23. 125** **CR** **059** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

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

Title:	⌘	Clarification on precedence of charging rules
Source:	⌘	SA2 (China Mobile, Huawei)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**B**
Release:	⌘	REL-6

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

Use one of the following releases:

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

Reason for change:	⌘	TS 23.125 v6.1.0 describes that the precedence identified with each charging rule shall resolve all overlap between the charging rules, but doesnít specify which entity should ensure that precedence of each charging rules will resolve all overlap between the charging rules,which may cause some deficiency in the future deployment.
Summary of change:	⌘	It is proposed to add such words after the description of precedence: Note:Itís operatorsí responsibity to ensure that overlap between the pre-defined charging rules can be resolved based on precedence of each pre-defined charging rule in the TPF. Itís CRFís responsibity to ensure that overlap between the dynamically allocated charging rules can be resolved based on precedence of each dynamically allocated charging rule.
Consequences if not approved:	⌘	Current TS may may cause some deficiency in the future deployment..

Clauses affected:	⌘	5.2

		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.

<< Begin of modification >>

5.2 Charging rules

Charging rules contain information that allow for filtering of traffic to identify the packets belonging to a particular service data flow, and allow for defining how the service data flow is to be charged. The following apply to charging rules:

- The charging rules for bearer charging are defined by the operator.
- These charging rules are made available to the Traffic Plane function for both offline and online charging.
- Multiple charging rules are supported simultaneously per user.
- Filtering information within a charging rule is applied through filtering functionality at the Traffic Plane Function to identify the packets belonging to a particular service data flow.
- Charging rules with dynamically provisioned filtering information (i.e. made available to the Traffic Plane Function) are supported in order to cover IP service scenarios where the filtering information is dynamically negotiated (e.g. negotiated on the application level (e.g. IMS)).
- Pre-defined charging rules are supported. The pre-defined charging rules stored in the TPF shall have charging rule identifiers, which are different from the charging rule identifiers allocated by the CRF.
- Elements of charging rules may be statically configured at the Traffic Plane Function, or dynamically provisioned.

Note-i: The mechanism to support use of elements statically pre-defined in the TPF (e.g. filter information) is for stage 3 development.

Note-ii: The stage 3 development may also evaluate providing an optimisation to support dynamic provisioning of an entire charging rule pre-defined in the TPF.

- Pre-defined filters that are part of the pre-defined charging rules may support extended capabilities, including enhanced capabilities to identify packets associated with application protocols.
- There may be overlap between the charging rules that are applicable. Overlap can occur between:
    - multiple pre-defined charging rules in the TPF;
    - charging rules pre-defined in the TPF and rules from the Service Data Flow Based Charging Rules Function, which can overlay the pre-defined rules in the TPF.

  The precedence identified with each charging rule shall resolve all overlap between the charging rules. When overlap occurs between a dynamically allocated charging rule and a pre-defined charging rule at the TPF, and they both share the same precedence, then the dynamically allocated charging rule shall be used.

  Note: Itís operatorsí responsibity to ensure that overlap between the pre-defined charging rules can be resolved based on precedence of each pre-defined charging rule in the TPF. Itís CRFís responsibity to ensure that overlap between the dynamically allocated charging rules can be resolved based on precedence of each dynamically allocated charging rule.

-

Charging rules contain information on:

- How a particular service data flow is to be charged: online/offline;
- In case of offline charging whether to record volume- or time-based charging information;
- Charging key;
- Service data flow filter(s);

  - Precedence.
  - Charging rule identifier.

- Event triggers are associated with all charging rules for a user and IP network connection.
- The identifier of the charging rule allocated by the CRF shall be unique for a CRF/TPF instance.
- Once the charging rule is determined it is applied to the service data flow at the Traffic Plane Function and packets are counted and categorised per the rule set in the charging rule.
- Separate charging rules can be provided for downlink and uplink.
- Charging rules can be configured for both user initiated and network initiated flows.
- Charging rules can change and be overridden, e.g. for a previously established PDP context in the GPRS case, based on specific events (e.g. IM domain events or GPRS domain events, credit control events).
- Different charging rules can be applied for different users.
- The same charging rule can be applied for multiple users.
- Different charging rules can be applied based on the location of the user (e.g. based on identity of the roamed to network).
- Charging rule assignment can occur at bearer service establishment, modification and termination. For GPRS, charging rule assignment can occur at PDP context activation, modification and deactivation.
- For GPRS, the charging rules can be dependent on the APN used.

<< End of modification >>

3GPP TSG-SA WG2 Meeting #41
Montreal, Canada, 16th ñ 20th August, 2004

Tdoc ⌘ S2-042901
Revised S2-042538、S2-042819

CR-Form-v7

CHANGE REQUEST

⌘ **23. 125** **CR** **060** ⌘**rev** **2** ⌘ Current version: **6.1.0** ⌘

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

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

Title:	⌘	Rx/Gx functions and SBLP usage in IMS Charging
Source:	⌘	SA2 (China Mobile, Huawei)
Work item code:	⌘	CH
Date:	⌘	20/08/2004
Category:	⌘	**B**
Release:	⌘	REL-6

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

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

Reason for change:	⌘	TS 23.125 v6.1.0 describes that Rx/Gx functions and SBLP usage are independent and thus can be provided separately. That is, dynamic media stream filter information for QoS policy and charging correlation may be provided to the GGSN via the Gq and Go interfaces, while dynamic and static media stream filter information for charging (data for the charging rules) may be provided to the Traffic Plane Function (GGSN in the case of GPRS) via the Rx and Gx interfaces. In TS 23.125 v6.1.0 7.2.1 Bear Service Establishment, charging rules must be requested by TPF(GGSN, in case of GPRS) to ensure flow based charging based on dynamic media stream filter. But since information for selecting media stream filter may be dynamically provided by AF(P-CSCF, in case of IMS) during bear service establishment(PDP Context Activation), GGSN doesnít know when it should request the related charging rules as it doesnít know when P-CSCF completes providing charging rules selection information to CRF. This may be unfavourable for Flow based charging in IMS.
Summary of change:	⌘	It is proposed to add some descriptions in Annex B of the TS to illustrate Rx/Gx functions and SBLP usage in IMS Charging.
Consequences if not approved:	⌘	There may be inefficiency for Rx/Gx functions and SBLP usage in IMS Charging.

Clauses affected:	⌘	Annex B

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

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<< Begin of modification >>

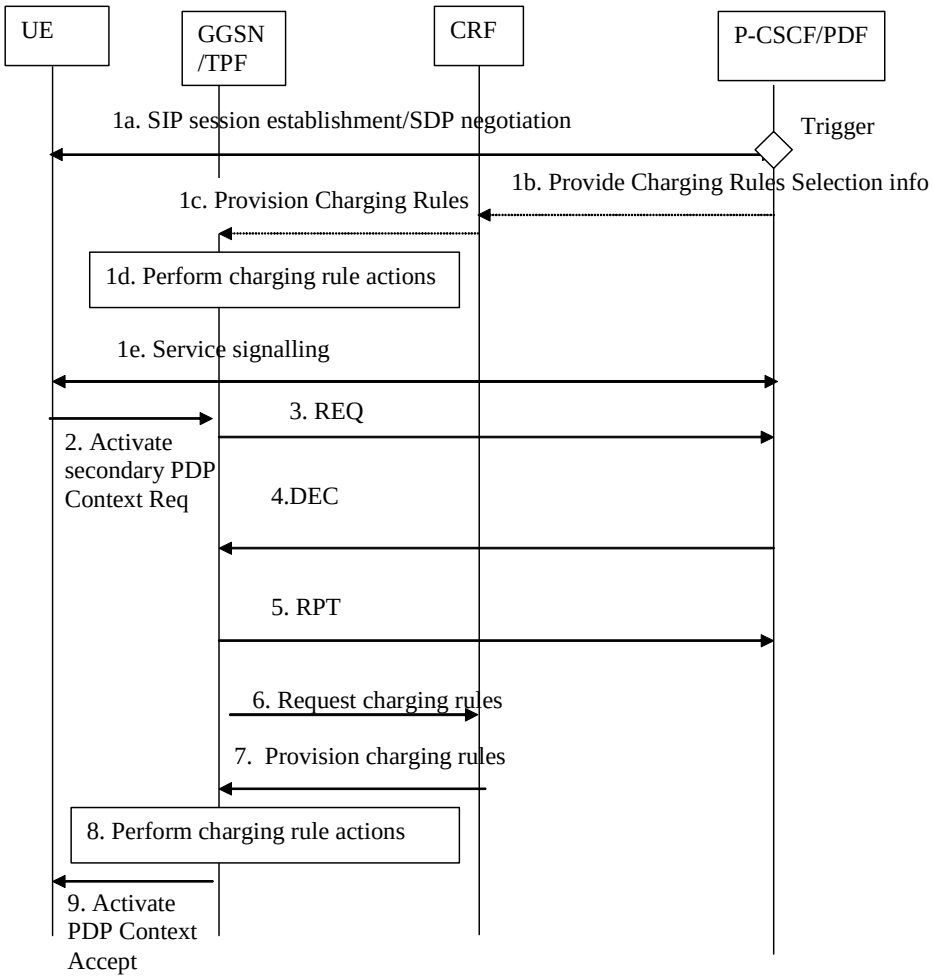
Annex B (informative): IMS and Flow based Charging

B.4 Rx/Gx functions and SBLP usage

Dynamic media stream filter information for QoS policy and charging correlation may be provided to the GGSN via the Gq and Go interfaces. This is described in TS 23.207 and TR 23.917.
Dynamic and static media stream filter information for charging (data for the charging rules) may be provided to the Traffic Plane Function (GGSN in the case of GPRS) via the Rx and Gx interfaces. This is described in this TR.
These two functions are independent and thus can be provided separately.

Mechanisms used for Rx/Gx functions and SBLP can be efficiently used for IMS bearer flow charging as the following description shows.

Scenario 1. PDF is co-located with P-CSCF



1a. The UE interacts with P-CSCF to establish a SIP session and negotiates the SDP parameters end to end.
1b. During SIP session establishment, P-CSCF may be triggered to provide charging rules selection info to CRF .

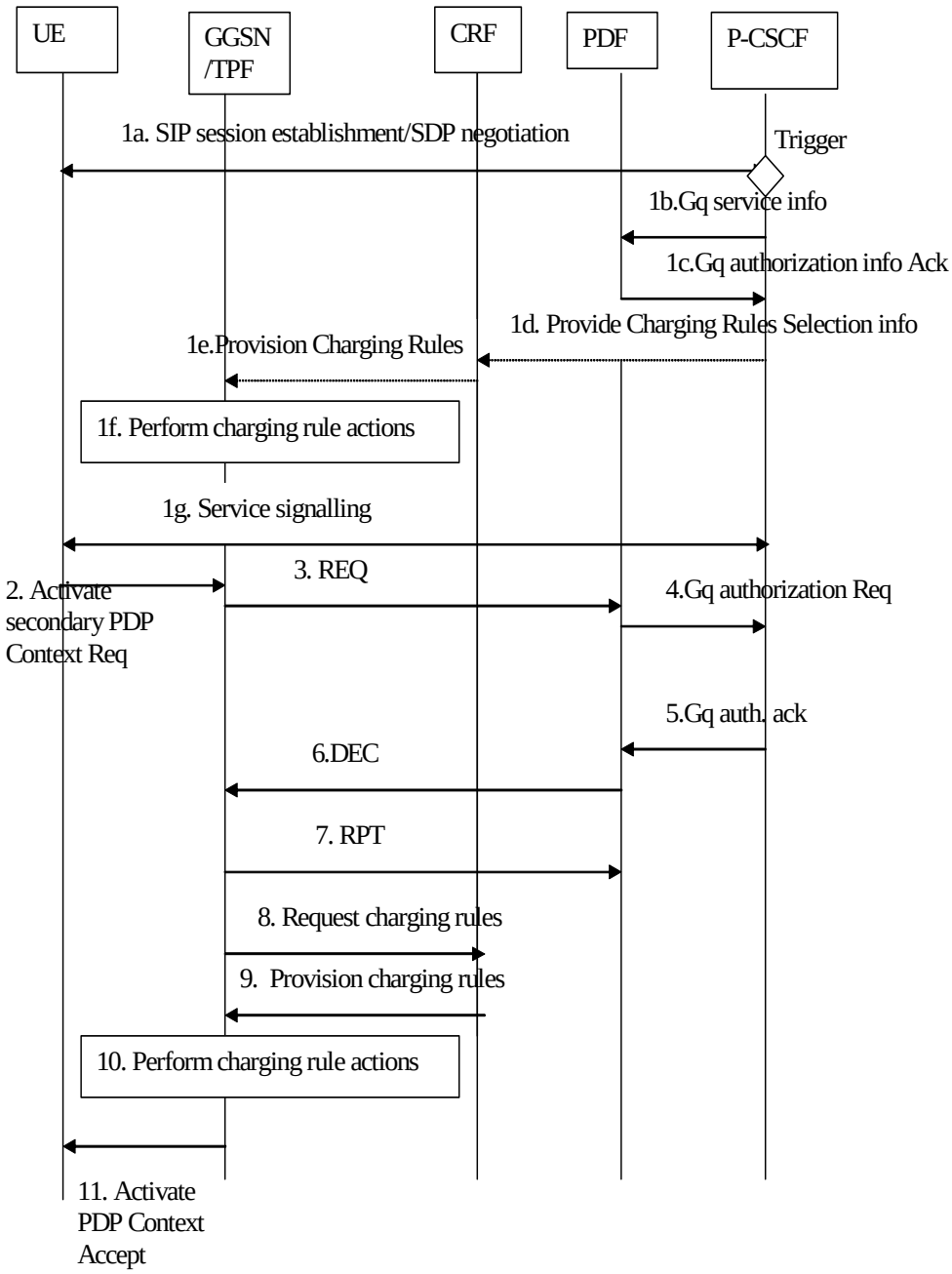
1c. If required, the CRF installs charging rules for the sessionís media components for the already active bearers (PDP Contexts) to the TPF.

1d. The TPF performs charging rule actions as indicated.

1e. The P-CSCF forwards the service signaling message containing the session description. The P-CSCF shall include the authorization token in this service signaling message.

2. UE sends activate secondary PDP Context request.
3. The GGSN sends a COPS REQ message with the Binding Information to the PDF in order to obtain relevant policy information.
4. The PDF sends a COPS DEC message back to the GGSN/TPF.
5. The GGSN sends a COPS RPT message back to the PDF.
6. GGSN/TPF requests charging rules from CRF.
7. CRF provides charging rules to GGSN/TPF.
8. The TPF performs charging rule actions as indicated.
9. GGSN sends activate PDP context accept to confirm that bearer service is ready.

Scenario 2. Gq interface is used



1a. The UE interacts with P-CSCF to establish a SIP session and negotiates the SDP parameters end to end.
1b~1c. During SIP session establishment, P-CSCF may be triggered to send a request for authorization token to the PDF with full service information, which includes session description information based on the session signaling.

1d.Based on SIP session information and local policy, P-CSCF may provide charging rules selection info to CRF immediately after Gq interface interaction.

1e If required, the CRF installs charging rules for the sessionís media components for the already active bearers (PDP Contexts) to the TPF.

1f. The TPF performs charging rule actions as indicated.

1g. The P-CSCF forwards the service signaling message containing the session description. The P-CSCF shall include the authorization token in this service signaling message.

2. UE sends activate secondary PDP Context request.
3. The GGSN sends a COPS REQ message with the Binding Information to the PDF in order to obtain relevant policy information.
4. Further interaction between the P-CSCF and the PDF to provide the full service information is needed. PDF sends an authorisation request to P-CSCF.
5. P-CSCF responds to PDFís request.

Note: step 4,5 only happen when further interaction between PDF and P-CSCF is needed.

6. PDF sends a COPS DEC message back to the GGSN/TPF.
7. GGSN sends a COPS RPT message back to the PDF.
8. GGSN/TPF requests charging rules from CRF.
9. CRF provides charging rules to GGSN/TPF.
10. The TPF performs charging rule actions as indicated.
11. GGSN sends activate PDP context accept to confirm that bearer service is ready.

<< End of modification >>

3GPP TSG-SA WG2 Meeting #41
Montreal, Canada, 16-20 August 2004

Tdoc ⌘S2-042902

CR-Form-v7.1

CHANGE REQUEST

⌘ **23.125** **CR** **061** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

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

Title:	⌘	Policy control functions provided by FBC
Source:	⌘	SA2 (Nokia, Nortel)
Work item code:	⌘	CH
Date:	⌘	16/08/2004
Category:	⌘	**B**
Release:	⌘	Rel-6

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

Use one of the following releases:
Ph2 (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)
Rel-7 (Release 7)

Reason for change:	⌘	Within Annex D of the specification a temporary study has been conducted regarding the policy control functions provided by the Flow Based Charging architecture. In order to progress this issue towards conclusion there is a need to document these functions of the main body of the specification to allow stage-3 development to take these aspects into account.
Summary of change:	⌘	A new section is introduced in the normative body of the specification documenting the means FBC provides in the area of policy control.
Consequences if not approved:	⌘	

Clauses affected:	⌘	2, new section 5.8

Other specs affected:	⌘	Y	N	
			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.

2 References

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

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

[1] 3GPP TR 41.001: "GSM Release specifications".

[2] 3GPP TS 21.905: "Vocabulary for 3GPP Specifications".

[3] 3GPP TS 32.200: "Charging Principles".

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

[5] 3GPP TS 23.002: "Network architecture".

[6] 3GPP TS 23.060: "General Packet Radio Service (GPRS); Service description; Stage 2".

[7] 3GPP TS 32.225: ì Telecommunication management; Charging management; Charging data description for the IP Multimedia Subsystem (IMS)î .

[8] 3GPP TS 23.078: ì Customised Applications for Mobile network Enhanced Logic (CAMEL); Stage 2î .

[9] DIAMETER Credit Control, draft-ietf-aaa-diameter-cc-03.txt, work in progress

Editor's note: The above document cannot be formally referenced until it is published as an RFC.

[10] 3GPP TS 23.234: ì 3GPP system to Wireless Local Area Network (WLAN) Interworkingî

[11] 3GPP TR 33.919: ì Generic Authentication Architecture (GAA)î

[12] 3GPP TS 23.207: ì End-to-end Quality of Service (QoS) concept and architectureî

********** Next change **********

5.8 Policy functions provided by FBC architecture

5.8.1 General

Service Based Local Policy (SBLP) specified in 3GPP TS 23.207[12] provides policy control functions for PS traffic. Some of these policy control functions are also provided by the FBC architecture to a certain extent, as described in the following sub-clauses. Note that there is no intention to duplicate the same SBLP functionalities with FBC, instead an overall description is given how FBC may provide policy like functions.

5.8.2 Charging correlation

SBLP provides means to correlate bearer charging and application level charging by passing Charging Identifiers on the Go interface.

The FBC architecture passes the charging key applicable for the AF media flow to the OCS/CCF which is the input to the rating logic. Hence, AF media flows will be rated accordingly, but this provides no direct charging correlation between an AF session and the IP-CAN bearer its media flows use.

FBC provides the capability for charging correlation through the usage of Application Function Record information.

5.8.3 Gating

The Gating functionalilty of SBLP provides the ability to control blocking or allowing packets of a service flow to pass through. FBC achieves this functionality by discarding the packets for the service data flow in case of there is no other applicable filter available in the TPF for this service data flow.

For peer-to-peer traffic, special rates may apply. The gate could therefore be either closed for this traffic before the applicable filters are available, or the gate could be opened with a more generic charging rule which does not allow for this special rate to apply yet.

The AF controls the point of time where Rx input is given to the CRF which then sends this information down to the TPF, allowing for the filters for this peer-to-peer traffic to form a new charging rule. This allows the AF and CRF to control whether flows can pass through a particular bearer (PDP Context in case of GPRS):

- If the bearer has a charging rule installed that matches the flow, the flow is allowed to pass through on the bearer;
- If the bearer does not have a charging rule installed that matches the flow, the flow is not allowed to pass through on the bearer. If none of the bearers have a charging rule installed matching the flow, the flow is not allowed to pass through on any of the bearers.

5.8.4 QoS control

The QoS control functionality of SBLP provides control and authorization of the QoS parameters of the bearer that carries the service flow.

FBC provides means to control what bearer a service flow is allowed to be carried on. This implicitly allows the CRF to control what type of bearer (to the extent of QoS parameters) a service flow is allowed to use. A charging rule may apply to one or more particular bearer(s) (to a particular PDP Context in case of GPRS). Hence, the QoS the service flow is allowed to use is restricted to the QoS of a particular bearer(s).

5.8.5 Bearer events

SBLP provides means for the Policy Enforcement Function to indicate certain bearer events (e.g. sudden loss of bearer connection) to the Application Function via the Go and Gq interfaces.

In the FBC architecture charging rules are downloaded to the TPF upon bearer events, see clause 7.2 for details. A charging rule either only applies to that particular bearer, or may apply to two or more bearers of a UE IP address:

- In case a charging rule for an AF service flow applies to a particular bearer, it is possible for the CRF to inform the AF about events related to that bearer. Hence, it is possible for the AF to initiate AF session actions accordingly.
- In case a charging rule for an AF service flow applies to more than one bearer of a UE IP address, the CRF informs the AF when all these bearers of a UE IP address have been removed. Hence, when a Charging Rule for a particular service is allowed for multiple bearers, the AF is not aware of the removal of individual bearers.

5.8.6 Session events

SBLP provides means to enforce bearer release upon certain AF session events (e.g. session hold or release).

The FBC architecture provides means to disable the service flows of the AF session upon AF session events (e.g. session hold or release). This is achieved by the AF providing new Rx input to the CRF which then removes the charging rules of the service flows of the AF session from the TPF. Hence, traffic of the service flow will be blocked in case there is no other applicable filter available in the TPF for this service data flow i.e. the CRF has not allowed this traffic to pass through the network.

3GPP TSG-SA2 Meeting #41
Montreal, Canada, 16th ñ 20th August, 2004

Tdoc ⌘ S2-042783

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **063** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

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

Title:	⌘	Clarification of pre-defined charging rules
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	The details of the usage of charging rules that are predefined in the TPF are currently not described. Especially the relation to traffic of a specific user is not specified.
Summary of change:	⌘	It is clarified that a predefined charging rule is either applicable for all users or dynamically activated per user.
Consequences if not approved:	⌘	Usage of pre-defined charging rules is unclear.

Clauses affected:	⌘	3.1, 5.3, 6.2.4			
Other specs affected:	⌘	**Y**	**N**		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

How to create CRs using this form:
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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.

Start of 1st modified section

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 21.905 [2] and in TS 32.225 [7] and the following apply:

Charging key: information used by the online and offline charging system for rating purposes.

Charging rule: a set of information including the service data flow filters, and the charging key, , for a single service data flow (further details can be found in 5.2).

Dynamic charging rule: Charging rule where some of the data within the charging rule (e.g. service data flow filter information) is assigned via real-time analysis, which may use dynamic application derived criteria.

Packet flow: a specific user data flow carried through the Traffic Plane Function. A packet flow can be an IP flow.

Predefined charging rule: Static charging rule which is defined in the Traffic Plane Function. A predefined charging rule is either applicable for all users or dynamically activated per user.

Service data flow: aggregate set of packet flows. In the case of GPRS, it shall be possible that a service data flow is more granular than a PDP context.

Service Data Flow Filter: a set of filter parameters used to identify one or more of the packet flows constituting a service data flow. At least the following means for the packet flow identification shall be supported: source and destination IP address+port, transport protocol, or application protocol.

Static charging rule: Charging rule where all of the data within the charging rule describing the service data flow is permanently configured throughout the duration of a userís data session. A static charging rule that is predefined may be activated dynamically.

End of 1st modified section

Start of 2nd modified section

5.3 Service data flow filters and counting

This section refers to the filtering that identifies the service data flows that need to be charged individually (e.g. at different rates). Basic example: look for packets of one service, e.g. to and from a server A.

- Separate filtering and counting can be applied for downlink and uplink.
- Different granularity for service data flow filters identifying the service data flow is possible e.g.
  - Filters based on the IP 5 tuple (source IP address, destination IP address, source port number, destination port number, protocol ID of the protocol above IP). Port numbers and protocol ID may be wildcarded. IP addresses may be wildcarded or masked by a prefix mask.
  - Special filters which look further into the packet, or require other complex operation (e.g. maintaining state) may be pre-defined in the TPF and invoked by the CRF using standardised means. Such filters may be used to support filtering with respect to a service data flow based on the transport and application protocols used above IP. This shall be possible for HTTP and WAP. This includes the ability to differentiate between TCP, Wireless-TCP according to WAP 2.0, WDP, etc, in addition to differentiation at the application level. Filtering for further application protocols and services may also be supported.

- In the case of GPRS, the traffic plane function supports simultaneous independent filtering on service data flows associated with ~~all, and~~ each individual active PDP context~~s~~; that is, primary and secondary PDP contexts, of one APN.

- In case of no applicable filters for a service data flow, the TPF shall discard the packets for this service data flow. To avoid the TPF automatically discarding packets due to no applicable charging rules, the operator may define generic charging rules (with wild-carded packet filters) to allow for default charging for the packets that donít match any other charging rule.

- The service data flow filters and counting are applied by the TPF (the GGSN in the case of GPRS).

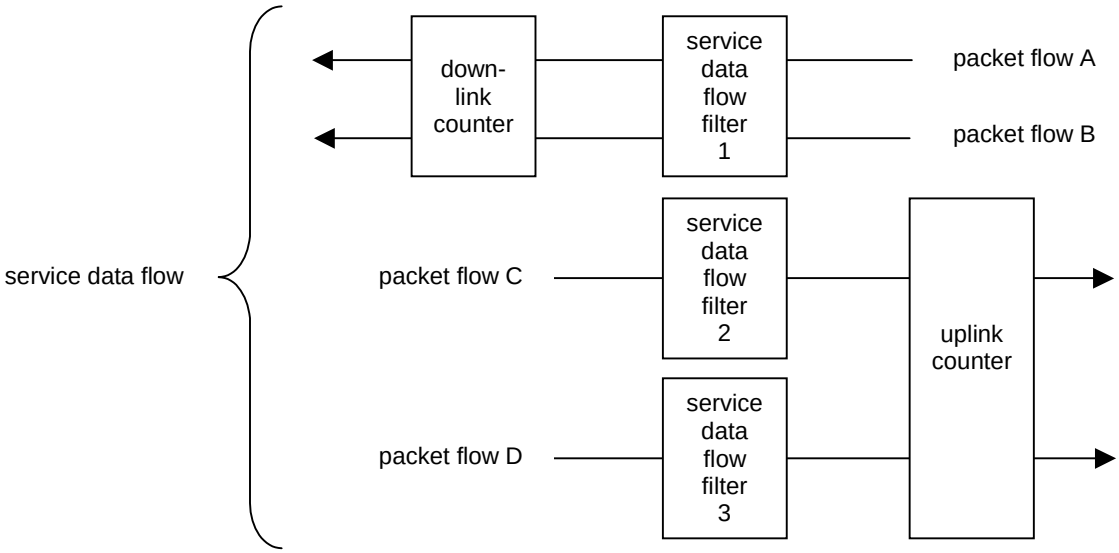

Figure 5.1 ñ Relationship of service data flow, packet flow and service data flow filter

End of 2nd modified section

Start of 3rd modified section

6.2.4 Traffic Plane Function

The Traffic Plane Function shall be capable of differentiating user data traffic belonging to different service data flows for the purpose of collecting offline charging data and performing online credit control.

The Traffic Plane Function shall support pre-defined charging rules, and pre-defined filters. See subclause 5.3 for further filtering and counting requirements.

In the case of online charging, the Traffic Plane Function shall not allow traffic unless network resource usage has been granted by the OCS.

For online charging, the Traffic Plane Function shall be capable of managing a pool of credit used for some or all of the service data flows of a user. The Traffic Plane Function shall also be capable of managing the credit of each individual service data flow of the user.

A TPF may be served by one or more CRF nodes. The appropriate CRF is contacted based on UE identity information.

Editorís note: The specific identity information used to identify the appropriate CRF is FFS.

For GPRS, it shall be possible to provide flow based charging functions for different service data flows even if they are carried in the same PDP Context. For GPRS, the traffic Plane Function is a logical function allocated to the GGSN.

Editorís Note: The effects of this co-location to the interfaces still needs to be studied e.g. Gy, Gz, Gi. Gi radius extensions for charging purposes are not precluded.

For GPRS, the TPF/GGSN shall be able to do separate counts per PDP context for a single service data flow if it is transferred on more than one PDP context.

Editorís note: How this can be achieved is FFS.

For each PDP context, the TPF shall accept information during bearer establishment and modification relating to:

- The user and terminal (e.g. MSISDN, IMEISV)
- Bearer characteristics (e.g. QoS negotiated, APN)
- Network related information (e.g. MCC and MNC)

The TPF may use this information in the OCS request/reporting or request for charging rules.

For each PDP context, there shall be a separate OCS request/reporting, so this allows the OCS and offline charging system to apply different rating depending on the PDP context.

The Traffic Plane Function shall identify packets that are charged according to service data flow based charging. The Traffic Plane Function shall report the data volume(s) charged according to service data flow based charging. In case of GPRS, the Traffic Plane Function shall report the service data flow based charging data for each charging rule on a per PDP context basis.

At initial bearer establishment the Traffic Plane Function shall request charging rules applicable for this bearer from the charging rules function. As part of the request, the Traffic Plane Function provides the relevant information to the charging rules function. The Traffic Plane Function shall use the charging rules received in the response from the charging rules function. In addition, the Traffic Plane Function shall use any applicable pre-defined static charging rules. Pre-defined charging rules may apply for all users or may be dynamically activated by the CRF for a specific bearer of a single user.

If the bearer is modified by changing the bearer characteristics, the TPF shall use the re-authorisation triggers in order to determine whether to require re-authorisation. The TPF shall use the event triggers to determine whether to request the charging rules for the new bearer characteristics from the charging rules function.

If the Traffic Plane Function receives an unsolicited update of the charging rules from the charging rules function, the new charging rules shall be used.

If another bearer is established by the same user (e.g. for GPRS a secondary PDP context), the same procedures shall be applied by the Traffic Plane Function as described for the initial bearer.

The Traffic Plane Function shall evaluate received packets against the service data flow filters in the order according to the precedence for the charging rules. When a packet is matched against a SDF filter, the packet matching process for that packet is complete, and the charging rule for that SDF filter shall be applied.

End of 3rd modified section

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CHANGE REQUEST

⌘ **23.125** **CR** **064** ⌘ **rev** **-** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Clarification on charging rules
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	11/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
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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:	⌘	There are some issues in section 5.2 in which the concept of charging rules is introduced that are incompletely described or difficult to understand.
Summary of change:	⌘	A number of clarifications are proposed for the charging rule identifier as well as for the overlap of charging rules and the precedence information.
Consequences if not approved:	⌘	The details of the charging rule concept are not clear. Especially the missing description of precedence information for multiple charging rules could lead to misbehaving implementations.

Clauses affected:	⌘	5.2

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

Other comments: ⌘

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Start of modified section

5.2 Charging rules

Charging rules contain information that allow for filtering of traffic to identify the packets belonging to a particular service data flow, and allow for defining how the service data flow is to be charged. The following apply to charging rules:

- The charging rules for bearer charging are defined by the operator.
- These charging rules are made available to the Traffic Plane function for both offline and online charging.
- Multiple charging rules are supported simultaneously per user.
- Filtering information within a charging rule is applied through filtering functionality at the Traffic Plane Function to identify the packets belonging to a particular service data flow.
- Charging rules with dynamically provisioned filtering information (i.e. made available to the Traffic Plane Function) are supported in order to cover IP service scenarios where the filtering information is dynamically negotiated (e.g. negotiated on the application level (e.g. IMS)).
- Pre-defined charging rules stored in the TPF are supported. The charging rule identifiers of the pre-defined charging rules ~~stored in the TPF~~ shall ~~have charging rule identifiers, which are~~be different from the charging rule identifiers allocated by the CRF.
- Elements of charging rules may be statically configured at the Traffic Plane Function, or dynamically provisioned.

Note-i: The mechanism to support use of elements statically pre-defined in the TPF (e.g. filter information) is for stage 3 development.

Note-ii: The stage 3 development may also evaluate providing an optimisation to support dynamic provisioning of an entire charging rule pre-defined in the TPF.

- Pre-defined filters that are part of the pre-defined charging rules may support extended capabilities, including enhanced capabilities to identify packets associated with application protocols.
- There may be overlap between the service data flow filter information of charging rules that are applicable. Overlap can occur between:
  - multiple pre-defined charging rules in the TPF;
  - multiple charging rules from the CRF;
  - charging rules pre-defined in the TPF and rules from the Service Data Flow Based Charging Rules Function, which can overlay the pre-defined rules in the TPF.

  The precedence identified with each charging rule shall resolve all overlap between the charging rules. When overlap occurs between a dynamically allocated charging rule and a pre-defined charging rule at the TPF, and they both share the same precedence, then the dynamically allocated charging rule shall be used.
- Charging rules contain information on:
  - How a particular service data flow is to be charged: online/offline;
  - In case of offline charging whether to record volume- or time-based charging information;
  - Charging key;
  - Service data flow filter(s);
  - Precedence~~.~~ (used at the TPF to determine the order in which charging rules shall be applied to a service data flow);

  - Charging rule identifier (used between CRF and TPF for referencing charging rules).

- Event triggers are associated with all charging rules for a user and IP network connection.
- The ~~identifier of the~~ charging rule identifiers allocated by the CRF shall be unique for a CRF/TPF instance.
- Once the charging rule is determined it is applied to the service data flow at the Traffic Plane Function and packets are counted and categorised per the rule set in the charging rule.
- Separate charging rules can be provided for downlink and uplink.
- Charging rules can be configured for both user initiated and network initiated flows.
- Charging rules can change and be overridden, e.g. for a previously established PDP context in the GPRS case, based on specific events (e.g. IM domain events or GPRS domain events, credit control events).
- Different charging rules can be applied for different users.
- The same charging rule can be applied for multiple users.
- Different charging rules can be applied based on the location of the user (e.g. based on identity of the roamed to network).
- Charging rule assignment can occur at bearer service establishment, modification and termination. For GPRS, charging rule assignment can occur at PDP context activation, modification and deactivation.
- For GPRS, the charging rules can be dependent on the APN used.

End of modified section

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CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **065** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Traffic plane function behavior
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	The description of the TPF behavior needs to be clarified and aligned with the latest changes in the specification.
Summary of change:	⌘	The TPF behavior during a bearer modification is clarified by defining the checking against the event triggers before the checking against re-authorization triggers. Finally, the TPF capabililty of discarding in case of no applicable charging rule is described.
Consequences if not approved:	⌘	The section on the TPF behavior would be incomplete and not aligned with other parts of the specification.

Clauses affected:	⌘	6.2.4

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

Other comments:	⌘	

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Start of 1st modified section

6.2.4 Traffic Plane Function

The Traffic Plane Function shall be capable of differentiating user data traffic belonging to different service data flows for the purpose of collecting offline charging data and performing online credit control.

The Traffic Plane Function shall support pre-defined charging rules, and pre-defined filters. See subclause 5.3 for further filtering and counting requirements.

In the case of online charging, the Traffic Plane Function shall not allow traffic unless network resource usage has been granted by the OCS.

For online charging, the Traffic Plane Function shall be capable of managing a pool of credit used for some or all of the service data flows of a user. The Traffic Plane Function shall also be capable of managing the credit of each individual service data flow of the user.

A TPF may be served by one or more CRF nodes. The appropriate CRF is contacted based on UE identity information.

Editorís note: The specific identity information used to identify the appropriate CRF is FFS.

For GPRS, it shall be possible to provide flow based charging functions for different service data flows even if they are carried in the same PDP Context. For GPRS, the traffic Plane Function is a logical function allocated to the GGSN.

Editorís Note: The effects of this co-location to the interfaces still needs to be studied e.g. Gy, Gz, Gi. Gi radius extensions for charging purposes are not precluded.

For GPRS, the TPF/GGSN shall be able to do separate counts per PDP context for a single service data flow if it is transferred on more than one PDP context.

Editorís note: How this can be achieved is FFS.

For each PDP context, the TPF shall accept information during bearer establishment and modification relating to:

- The user and terminal (e.g. MSISDN, IMEISV)
- Bearer characteristics (e.g. QoS negotiated, APN)
- Network related information (e.g. MCC and MNC)

The TPF may use this information in the OCS request/reporting or request for charging rules.

For each PDP context, there shall be a separate OCS request/CCF reporting, so this allows the OCS and offline charging system to apply different rating depending on the PDP context.

The Traffic Plane Function shall identify packets that are charged according to service data flow based charging. The Traffic Plane Function shall report the data volume(s) charged according to service data flow based charging. In case of GPRS, the Traffic Plane Function shall report the service data flow based charging data for each charging rule on a per PDP context basis.

At initial bearer establishment the Traffic Plane Function shall request charging rules applicable for this bearer from the charging rules function. As part of the request, the Traffic Plane Function provides the relevant information to the charging rules function. The Traffic Plane Function shall use the charging rules received in the response from the charging rules function. In addition, the Traffic Plane Function shall use any applicable pre-defined static charging rules. Pre-defined charging rules may apply for all users or may be activated by the CRF.

If the bearer is modified by changing the bearer characteristics, the TPF shall first use the event triggers to determine whether to request the charging rules for the new bearer characteristics from the charging rules function. Afterwards, the TPF shall use the re-authorisation triggers in order to determine whether to require re-authorisation for the charging rules that were either unaffected or modified. ~~The TPF shall use the event triggers to determine whether to request the charging rules for the new bearer characteristics from the charging rules function.~~

If the Traffic Plane Function receives an unsolicited update of the charging rules from the charging rules function, the new charging rules shall be used.

If another bearer is established by the same user (e.g. for GPRS a secondary PDP context), the same procedures shall be applied by the Traffic Plane Function as described for the initial bearer.

The Traffic Plane Function shall evaluate received packets against the service data flow filters in the order according to the precedence for the charging rules. When a packet is matched against a SDF filter, the packet matching process for that packet is complete, and the charging rule for that SDF filter shall be applied. If there is no match against any SDF filter the packet shall be discarded.

End of 1st modified section

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Montreal, Canada, 16th ñ 20th August, 2004

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CHANGE REQUEST

⌘ **23.125** **CR** **066** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Termination action
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	20/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
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Use one of the following releases:
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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 aspects of the termination actions description need to be clarified.
Summary of change:	⌘	A termination action for allowing packets to pass through is added. It is clarified that there is only one default behaviour to be configured at the TPF affecting all service data flows without a specific termination action. It is also clarified that the OCS provides the termination action on a charging rule basis and that the OCS may overwrite any previously provided termination action. Finally, a note is added describing the lifetime of a termination action and the possibility of triggering a bearer removal is expressed as an editorís note since the concrete details are not yet defined.
Consequences if not approved:	⌘	The description of termination actions will be incomplete and may not provide the required functionality for the OCS.

Clauses affected:	⌘	5.6
Other specs affected:	⌘	Y N ☐ X Other core specifications ☐ X Test specifications ☐ X O&M Specifications
	⌘	
Other comments:	⌘	

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Start of 1st modified section

5.6 Termination Action

The Termination Action applies only in case of online charging. The termination action indicates the action, which the Traffic Plane Function should perform when the credit for the service data flow has expired.

The defined termination actions include:

- Allowing the packets corresponding to a terminated service data flow to pass through;
- Dropping the packets corresponding to a terminated service data flow as they pass through the Traffic Plane Function;
- Indicating to the TPF that the default termination behaviour shall be used;
- The re-directing of packets corresponding to a terminated service data flow to an application server (e.g., defined in the termination action).

Note: such a re-direction may cause an application protocol specific asynchronous close event and application protocol specific procedures may be required in the UE and/or Application Function in order to recover, e.g., as specified in RFC 2616 for HTTP.

The ~~D~~default termination behaviour for all terminated service data flows without a specific Termination Action shall be pre-configured in the TPF according to operatorís policy. For instance, ~~a~~ the default behaviour may consist of allowing packets of ~~the corresponding~~any terminated service data flow to pass through the TPF.

The OCS may provide ~~the~~ a Termination Action over the Gy interface. Any previously provided Termination Action may be overwritten by the OCS.

Note: A Termination Action remains valid and shall be applied by the TPF until the corresponding charging rule is removed or the user and IP network connection is removed (for GPRS when the last PDP context is removed).

In case the OCS intends to provide Termination Action, it shall send it to the TPF before the credit for the service data flow is exhausted; otherwise pre-configured default termination behaviour will be performed.

The Termination Action may trigger other procedures, e.g. the deactivation of a PDP context or the termination of a WLAN session.

End of 1st modified section

3GPP TSG-SA2 Meeting #41
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Tdoc ⌘ S2-042545

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **067** ⌘ **rev** **-** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Re-authorization triggers
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	11/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	The description of the re-authorization triggers is distributed over two sections. Although it is stated that the TPF has re-authorization trigger information, it in not clear how this is achieved.
Summary of change:	⌘	It is clarified that the OCS defines the re-authorization triggers for each charging rule. Details on the re-authorization triggers are moved from section 5.5 to 5.7.
Consequences if not approved:	⌘	It is not clear how the TPF receives the re-authorization triggers.

Clauses affected:	⌘	5.5, 5.7
Other specs affected:	⌘	Y / N ☐ / X Other core specifications ☐ / X Test specifications ☐ / X O&M Specifications
	⌘	
Other comments:	⌘	A small clarification is added in section 5.5 with regard to credit pooling.

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.

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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.

Start of 1st modified section

5.5 Credit management

In case of online charging, it shall be possible for the OCS to apply re-authorisation of credit in case of particular events as described in section 5.7~~e.g. credit authorisation lifetime expiry, idle timeout, charging rule is changed, GPRS events such as SGSN change, QoS changes, RAT type change~~.

In case of online charging, credit can be pooled for multiple (one or more) charging rules applied at the Traffic Plane Function. A pool of credit applying to a single charging rule is equivalent to an individual credit limit for that charging rule. Multiple pools of credit shall be allowed per user.

Rating decisions shall be strictly controlled by the OCS for each service. The OCS shall also control the credit pooling decision for charging rules. The OCS shall either provide a new pool of credit, together with a new credit limit, or a reference to a pool of credit that already exists at the TPF.

The grouping of charging rules into pools in this way shall not restrict the ability of the OCS to do credit authorisation and provide termination action individually for each charging rule of the pool.

Note: ëcreditî as used here does not imply actual monetary credit, but an abstract measure of resources available to the user. The relationship between this abstract measure, actual money, and actual network resources or data transfer, is controlled by the OCS.

It shall be possible for the OCS to group service data flows charged at different rates or in different units (e.g. time/volume) into the same pool.

Editorís note: Any impact of this requirement in relation to operation of the Gy needs to be investigated.

End of 1st modified section

Start of 2nd modified section

5.7 Re-authorisation and Event Triggers

Re-authorisation applies to online charging. For each charging rule, the TPF ~~has~~ receives re-authorisation trigger information from the OCS which determines when the TPF should perform a re-authorisation. The re-authorisation trigger detection will cause the TPF to request re-authorisation of the credit in the OCS. It shall be possible for the OCS to apply re-authorisation of credit in case of particular events, e.g. credit authorisation lifetime expiry, idle timeout, charging rule is changed, GPRS events such as SGSN change, QoS changes, RAT type change.

Event triggers apply to both offline and online charging. The event triggers are provided by the CRF to the TPF using Provision Charging Rule procedure. Event triggers are associated with all charging rules for a user and an IP network connection. Event triggers determine when the TPF shall signal to the CRF that a bearer has been modified or a specific event has been detected.

Event triggers include GPRS events such as SGSN change, QoS change, RAT type change, TFT change.

Event triggers apply after initial bearer establishment.

Bearer modifications which do not match an event trigger shall cause no action at the TPF.

End of 2nd modified section

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Tdoc ⌘ S2-042778

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CHANGE REQUEST

⌘ **23.125** **CR** **068** ⌘ **rev** **1** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Gx reference point functions
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

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

Reason for change:	⌘	The section containing the description of the Gx functions needs to be updated according to the latest version of the specification.
Summary of change:	⌘	Details on charging rules are moved to section 5.3. The TPF request for charging rules is also issued at bearer removal. However, there are no other event triggers that are unrelated to a bearer event. Therefore this trigger is deleted. Finally, some small modifications are proposed for the provision of charging rules section to improve the understanding.
Consequences if not approved:	⌘	The Gx function section does not comply with other parts of the specification.

Clauses affected:	⌘	5.3, 6.3.1.2, 6.3.1.3

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

⌘

Other comments: ⌘

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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.

Start of 1st modified section

5.3 Service data flow filters and counting

This section refers to the filtering that identifies the service data flows that need to be charged individually (e.g. at different rates). Basic example: look for packets of one service, e.g. to and from a server A.

- Separate filtering and counting can be applied for downlink and uplink. The service data flow filters are specified separately for the uplink and downlink direction.

Note: A charging rule may provide information for a service data flow for one direction, or for both directions.

- Different granularity for service data flow filters identifying the service data flow is possible e.g.
  - Filters based on the IP 5 tuple (source IP address, destination IP address, source port number, destination port number, protocol ID of the protocol above IP). Port numbers and protocol ID may be wildcarded. IP addresses may be wildcarded or masked by a prefix mask.
  - Special filters which look further into the packet, or require other complex operation (e.g. maintaining state) may be pre-defined in the TPF and invoked by the CRF using standardised means. Such filters may be used to support filtering with respect to a service data flow based on the transport and application protocols used above IP. This shall be possible for HTTP and WAP. This includes the ability to differentiate between TCP, Wireless-TCP according to WAP 2.0, WDP, etc, in addition to differentiation at the application level. Filtering for further application protocols and services may also be supported.
- In the case of GPRS, the traffic plane function supports simultaneous independent filtering on service data flows associated with all, and each individual active PDP contexts; that is, primary and secondary PDP contexts, of one APN.
- In case of no applicable filters for a service data flow, the TPF shall discard the packets for this service data flow. To avoid the TPF automatically discarding packets due to no applicable charging rules, the operator may define generic charging rules (with wild-carded packet filters) to allow for default charging for the packets that donít match any other charging rule.
- The service data flow filters and counting are applied by the TPF (the GGSN in the case of GPRS).

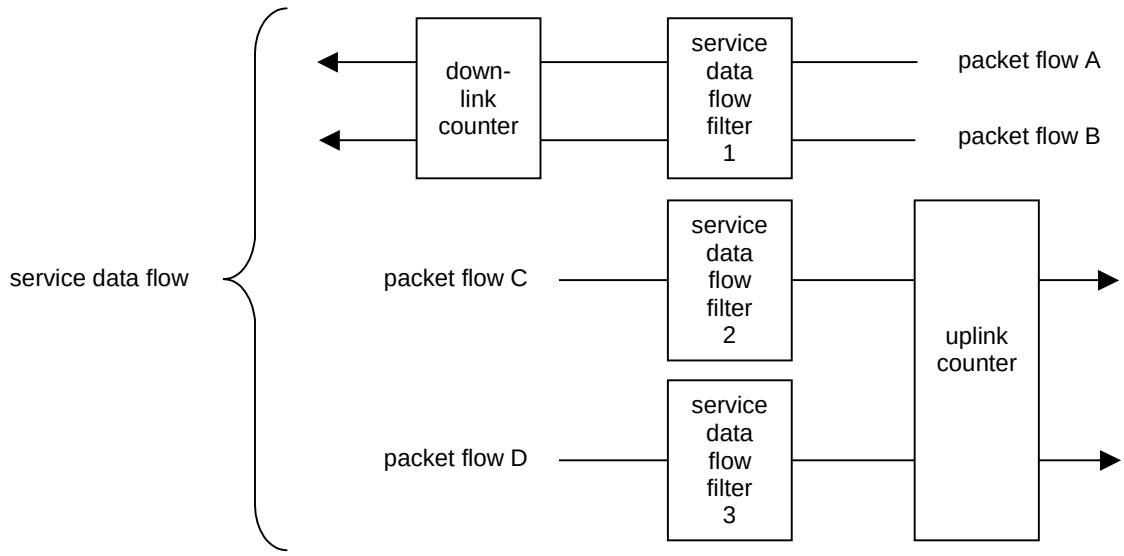

Figure 5.1 ñ Relationship of service data flow, packet flow and service data flow filter

End of 1st modified section

Start of 2nd modified section

6.3.1 Gx reference point

The Gx reference point enables the use of service data flow based charging rules such as counting number of packets belonging to a rate category in the IP-Connectivity Network. This functionality is required for both offline and online charging.

Note: The reuse of existing protocols over the Gi reference point for Gx shall be evaluated in stage 3.

The Gx reference point supports the following functions:

1. Initialisation and maintenance of connection
2. Request for Charging Rules (from TPF to CRF)
3. Provision of Charging Rules (from CRF to TPF)
4. Indication of Bearer Service Termination (from TPF to CRF)

6.3.1.1 Initialisation and Maintenance of Connection

A single connection shall be established between each interworking CRF and TPF pair. The connection can be direct, or established via a relay/proxy node. A connection may be redirected to an alternate CRF.

At a failover, commands which have not been successfully received shall be queued to an alternate CRF.

Only CRFs responsible for the same UE identity information may be selected as alternate CRF.

The detail specification of the connection establishment and maintenance is for specification in stage 3.

6.3.1.2 Request for Charging Rules (from TPF to CRF)

The TPF requests the charging rules to be applied:

- At ~~a~~ bearer service establishment (PDP context establishment for GPRS) or,
- At bearer service modification (PDP context modification for GPRS) if the Event trigger is met, or
- At bearer service termination (PDP context deactivation for GPRS).
- ~~When the specific event of the Event trigger is detected.~~

The request must identify whether it is an initial request (primary context establishment for GPRS), or a subsequent request (i.e. for GPRS, a secondary PDP context establishment, or a PDP context modification). For an initial request for GPRS, the request shall include APN, PDP address information, and at least one of IMSI or MSISDN. Other relevant network and terminal information should also be included.

Editorís Note: Where the relevant network and terminal information is defined is FFS (either in this TS or 32.xyz).

An identifier is required to allow the specific instance in the TPF/CRF to be identified for subsequent data exchange. The identifier for the communication must be provided.

The request must provide further information used for the charging rule selection. The request shall include an identifier for the bearer, the QoS information, and flow identifier information allocated to the bearer. For GPRS, this information would include the traffic class, and the TFT.

~~Where the charging rule selection data for a bearer is modified, the TPF sends the request to the CRF indicating it is for a bearer modification, and providing the modified data.~~

6.3.1.3 Provision of Charging Rules (from CRF to TPF)

The CRF identifies the charging rules that are applicable to the TPF. The CRF then sends the charging rule information to the TPF.

The charging rule information represents the set of charging rules to be installed by the TPF, which can be one or a combination of the following:

- charging rule(s),
- identifier(s) for pre-defined charging rule(s),
- a single identifier for a set of pre-defined charging rules.

The provisioning may be a response to a Request for Charging Rules, or it may be unsolicited.

Provision of Charging Rule shall support cases where charging rules are to be installed, removed or modified in the TPF as well as cases where charging rules are neither installed nor removed nor modified in the TPF (only relevant in the response to a request for charging rules).

~~The provisioning may be a response to a Request for Charging Rules, or it may be unsolicited.~~

The Provision of Charging Rules shall include information about the instance it relates to (i.e. identifier for the relevant CRF/TPF instance), in addition, the Provision of Charging Rules may include charging rules~~action indications (install and/or remove)~~, and the associated ~~charging rules~~ action indications (install, modify, remove).

~~The service data flow filters are specified separately for the uplink and downlink direction.~~

~~Note: A charging rule may provide information for service data flows for one direction, or for both directions.~~

6.3.1.4 Indication of Bearer Termination (from TPF to CRF)

The TPF indicates to the CRF that a bearer is terminated.

The bearer termination indication includes information to identify the instance it relates to (i.e. an identifier for the relevant CRF/TPF instance), and an indication of the bearer being removed (the PDP context in the case of GPRS). The termination also indicates if this is the last bearer for that TPF/CRF instance.

End of 2nd modified section

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Montreal, Canada, 16th ñ 20th August, 2004

Tdoc ⌘ S2-042786

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **069** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Clarifications in message flows
Source:	⌘	SA2 (Siemens, Huawei, China Mobile)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	Some aspects are currently not shown in the message flows. Especially the different interactions with the OCS that are possible should be included.
Summary of change:	⌘	The message flows are extended by descriptions about the TPF actions regarding installing pre-defined charging rules, credit request and credit return. Details on the event and re-authorization triggers are also added.
Consequences if not approved:	⌘	The message flows are incomplete and the relation between the actions on the different interfaces is not reflected correctly.

Clauses affected:	⌘	7.1, 7.1a, 7.2.1, 7.2.3, 7.3
Other specs affected:	⌘	Y / N ☐ / **X** Other core specifications ☐ / **X** Test specifications ☐ / **X** O&M Specifications
	⌘	
Other comments:	⌘	The comment in front of the title of section 7.1a was deleted.

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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.

Start of 1st modified section

7.1 AF input to provision of charging rules

The AF may provide the CRF with application/service data flow charging information. This information is used by the CRF to determine and complete the appropriate charging rules to send to the TPF. It is an AF decision when to send this information and the CRF takes the AF input into account from the point that it receives the AF information. The AF input may trigger an unsolicited provision of charging rules by the CRF as described in 7.3.

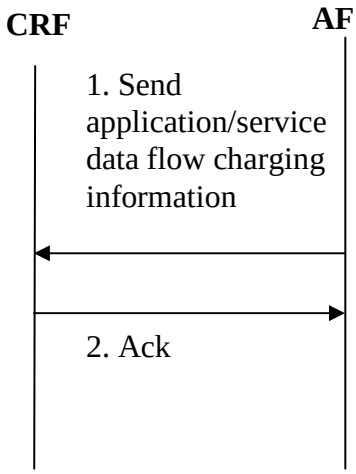

Figure 7.0a: AF input to provision of charging rules

1. The AF sends application/service data flow charging information
2. The CRF acknowledges the AF input.

~~7.1a OCS input to provision of charging rules~~

7.1a OCS input to provision of charging rules

The OCS may provide the CRF with OCS related charging information. It is an OCS decision when to send this information and the CRF takes the OCS input into account from the point that it receives the OCS information. The OCS input may trigger an unsolicited provision of charging rules by the CRF as described in 7.3.

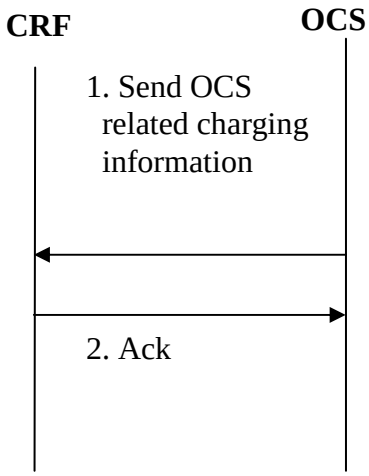

Figure 7.0b: OCS input to provision of charging rules

1. The OCS sends OCS related charging information
2. The CRF acknowledges the OCS input.

End of 1st modified section

Start of 2nd modified section

7.2.1 Bearer Service Establishment

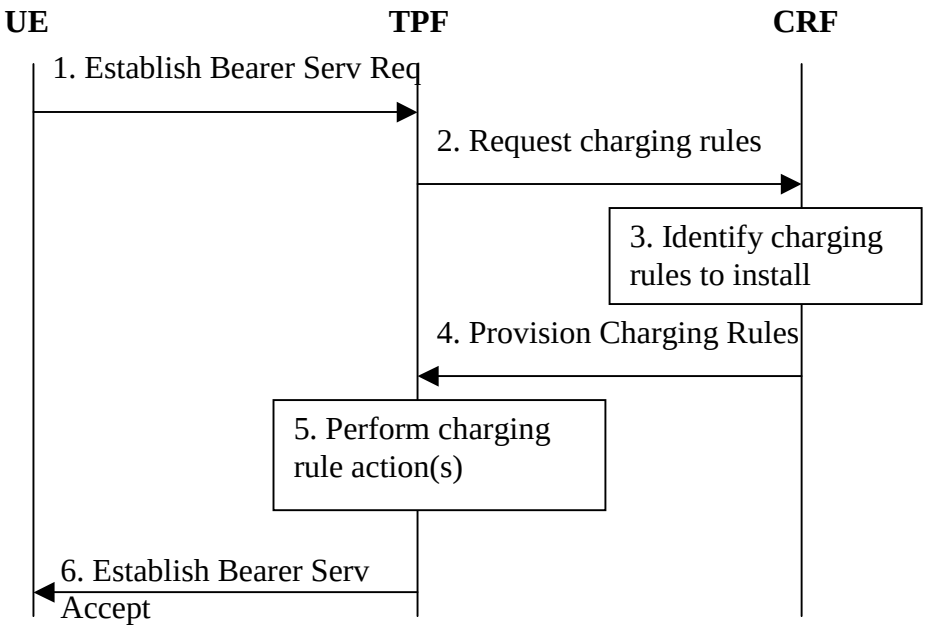

Figure 7.1: Bearer Service Establishment in case of offline charging

1 The TPF receives a request to establish a bearer service. For GPRS, this is the GGSN that receives a Create PDP context request for a primary or secondary PDP context.

2 The TPF requests the applicable charging rules, and provides relevant input information for the charging rule selection.

3 The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the TPF). Charging rules may need to be installed~~, and/or removed, and/or modified~~. In addition, the CRF also determines which event triggers shall be monitored by the TPF.

4 The CRF provides the charging rules and associated event triggers (if available) to the TPF. This message is flagged as the response to the TPF request.

5 The TPF performs charging rule actions as indicated, i.e. installing charging rules. During establishment of the initial bearer service the TPF also installs any pre-defined charging rules.

6 The TPF continues with the bearer service establishment procedure.

The TPF shall wait for the charging rules installation before accepting the Bearer establishment as shown in figure 7.1.

In case of online charging, in order to allow for Bearer establishment control upon credit check, the TPF shall wait for the credit control information before accepting the Bearer establishment as shown in figure 7.2.

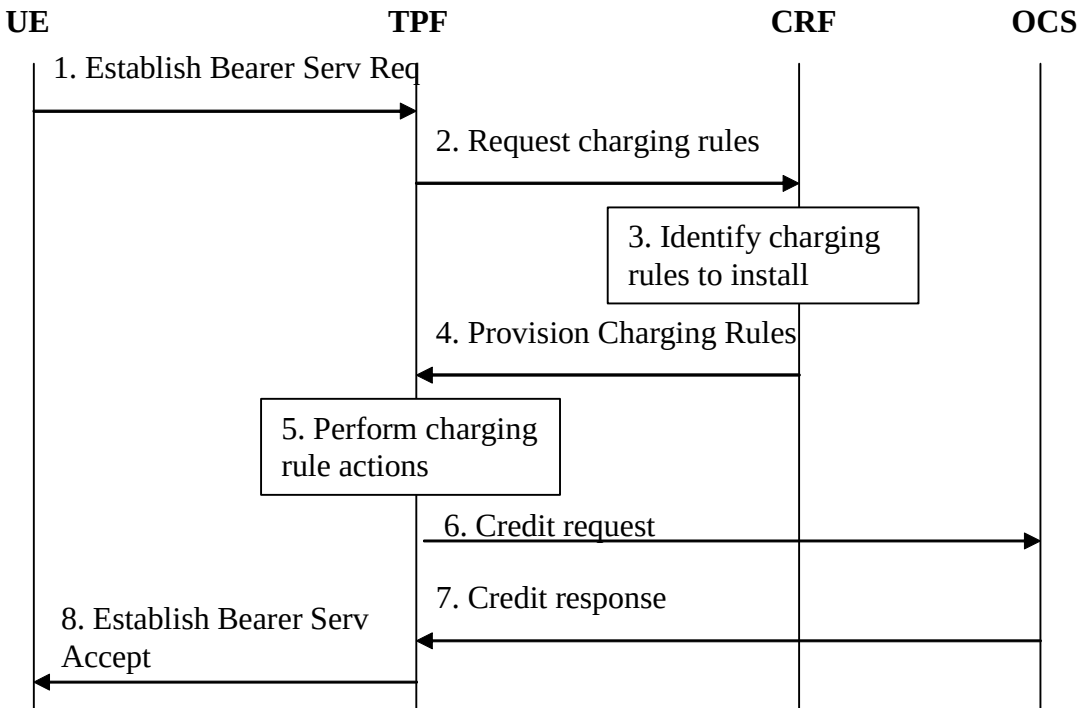

Figure 7.2: Bearer Service Establishment in case of online charging

1. The TPF receives a request to establish a bearer service. For GPRS, this is the GGSN that receives a Create PDP context request for a primary or secondary PDP context.

2. The TPF requests the applicable charging rules, and provides relevant input information for the charging rule decision.

3. The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the TPF). Charging rules may need to be installed~~, and/or removed, and/or modified~~. In addition, the CRF also determines which event triggers shall be monitored by the TPF.

4. The CRF provides the charging rules and associated event triggers (if available) to the TPF. This message is flagged as the response to the TPF request.

5. The TPF performs charging rule actions as indicated, i.e. installing charging rules. During establishment of the initial bearer service the TPF also installs any pre-defined charging rules.

6. The TPF requests credit ~~availability to~~ for any established charging rule (either already established or newly installed) from the OCS, and provides relevant input information for the OCS decision. The TPF returns the remaining credit of any removed charging rule.

7. The OCS provides the credit information to the TPF and may provide re-authorisation triggers for each of the credits.

8. If credit is available at least for one charging rule, the TPF accepts the bearer service establishment. If no credit is available, the TPF rejects the bearer service establishment.

Note: Further details of the credit control mechanism are expected to be specified by Stage 3.

End of 2nd modified section

Start of 3rd modified section

7.2.3 Bearer Service Termination

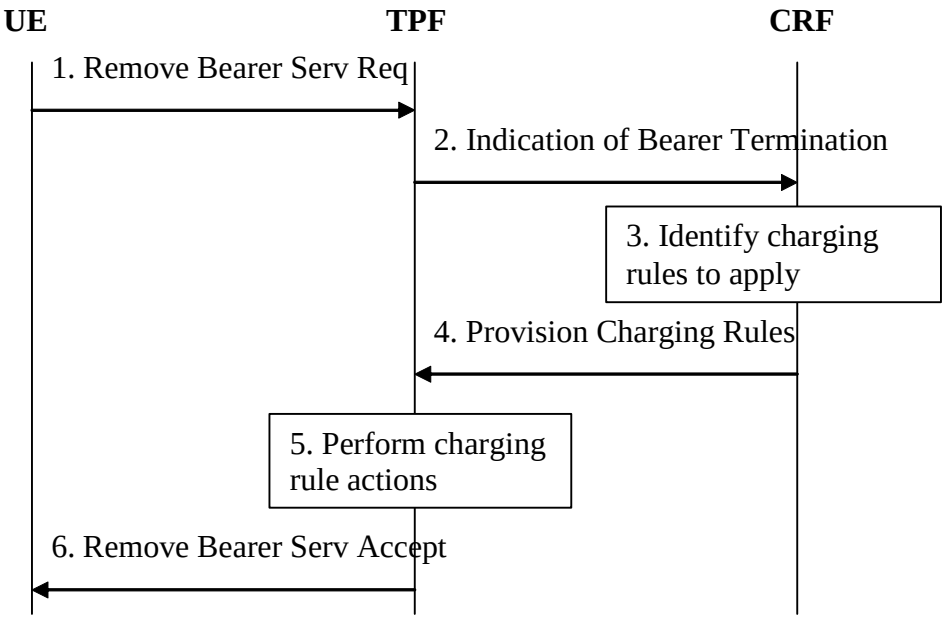

Figure 7.3: Bearer Service Termination in case of offline charging

1 The TPF receives a request to remove a bearer service. For GPRS, this is the GGSN that receives a delete PDP context request.

2 The TPF indicates that a bearer (for GPRS, a PDP context) is being removed and provides relevant input information for the charging rule selection.

3 The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the TPF). Charging rules may need to be ~~installed, and/or~~ removed~~, and/or modified~~.

4 The CRF provides the charging rule information to the TPF. This message is flagged as the response to the TPF request.

5 The TPF performs charging rule actions as indicated, i.e. removing charging rules.

6 The TPF continues with the bearer service removal procedure.

Note: In the case of GPRS, the bearer service termination procedure may also be initiated by other nodes such as the SGSN.

The bearer service termination procedure can proceed in parallel with the indication of bearer termination.

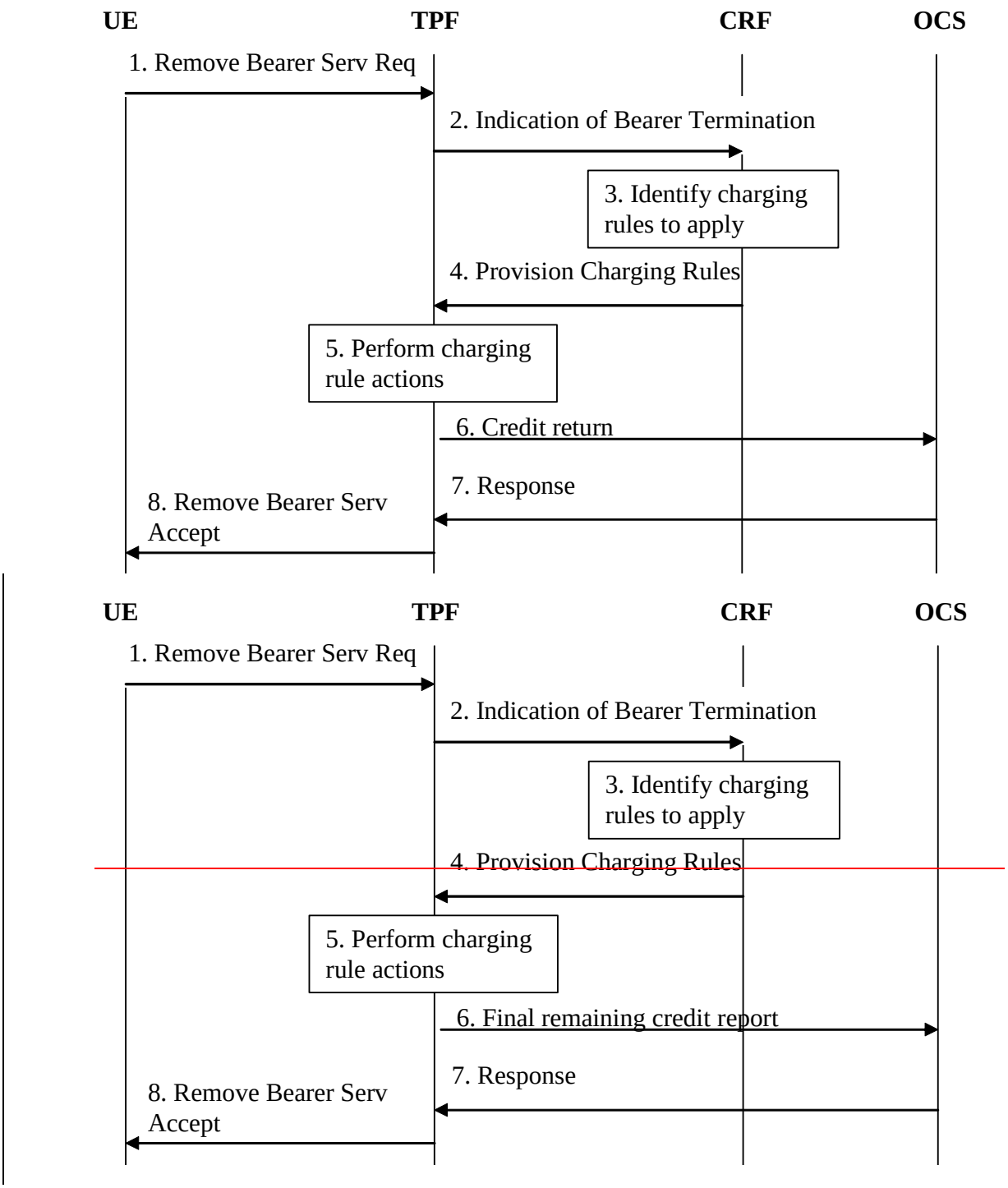

Figure 7.3a: Bearer Service Termination in case of online charging

1. The TPF receives a request to remove a bearer service. For GPRS, this is the GGSN that receives a delete PDP context request.

2. The TPF indicates that a bearer (for GPRS, a PDP context) is being removed and provides relevant input information for the charging rule decision.

3. The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the TPF) Charging rules may need to be installed, and/or removed, and/or modified.

4. The CRF provides the charging rule information to the TPF. This message is flagged as the response to the TPF request.

5. The TPF performs charging rule actions as indicated, i.e. removing charging rules.
6. The TPF ~~reports the final~~ returns the remaining credit ~~usage~~ to the OCS for each charging rule that is removed.
7. The OCS acknowledges the report to the TPF.
8. The TPF continues with the bearer service removal procedure.

The bearer service termination procedure can proceed in parallel with the final usage reporting.

Note: Further details of the credit control mechanism are expected to be specified by Stage 3.

End of 3rd modified section

Start of 4th modified section

7.3 Provision of Charging Rules triggered by other event to the CRF

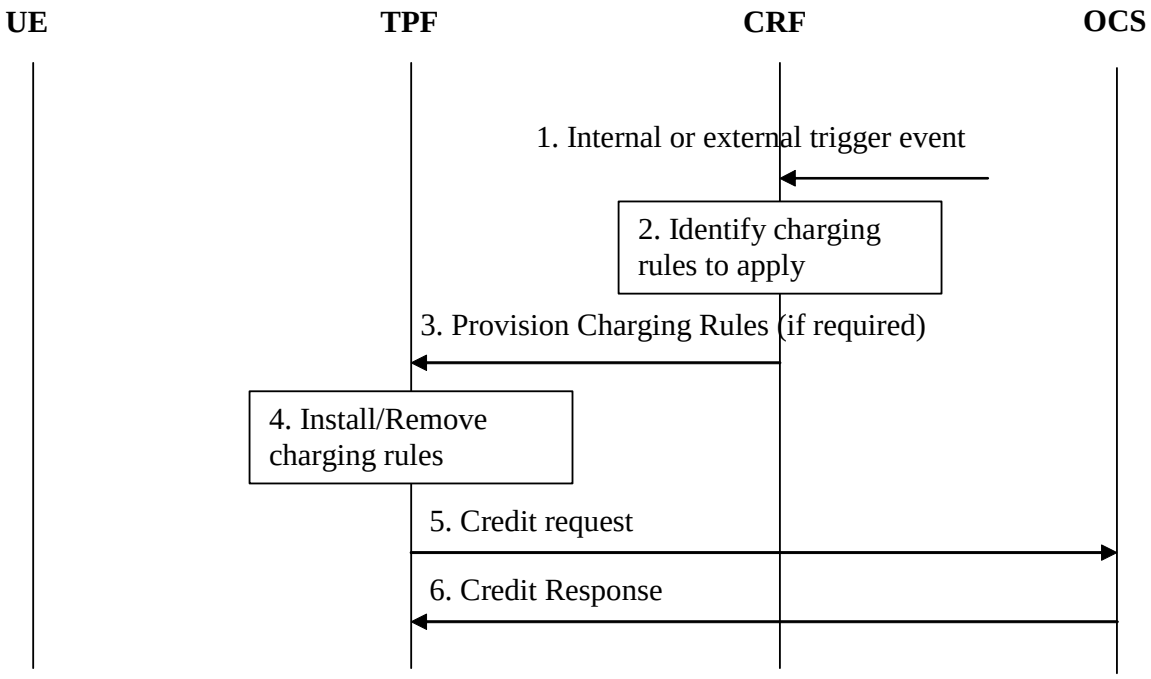

Figure 7.4: Provision of Charging Rules due to external or internal Trigger Event

1 The CRF receives a trigger event, with relevant information related to the event. One example event is an AF interaction as described in 7.1.

2 The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the trigger). Charging rules may need to be installed, and/or removed, and/or modified.

3 If required, the CRF provisions the charging rules to the TPF.

4 The TPF performs charging rule actions as indicated, i.e. installing, modifying or removing charging rules.

5 In case of online charging, the TPF requests credit for any newly installed charging rule from ~~interacts with~~ the OCS~~.~~, and provides relevant input information for the OCS decision. The TPF returns the remaining credit of any removed charging rule.

6 In case of online charging, ~~T~~the OCS ~~answers~~ provides the credit information to the TPF and may provide re-authorisation triggers for each of the credits.

End of 4th modified section

3GPP TSG-SA2 Meeting #41
Montreal, Canada, 16th ñ 20th August, 2004

Tdoc ⌘ S2-042785

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CHANGE REQUEST

⌘ **23.125** **CR** **070** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Bearer service modification in case of online charging
Source:	⌘	SA2 (Siemens, Huawei, China Mobile)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	The current version of the bearer modification message flows shows separate flows for the charging rule request and the re-authorization request. However, in case of online charging both requests occur and it is important to show their sequence and relationship.
Summary of change:	⌘	A new message flow for bearer modification in case of online charging is proposed combining the charging rule and re-authorization request.
Consequences if not approved:	⌘	The sequence and the relationship between the two actions that may occur during bearer modification is not clear. Especially, the need to re-authorize a charging rule that was just installed and for which credit was just granted.
Clauses affected:	⌘	7.2.2.2, 7.2.2.3, 7.2.2.4

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

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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.

Start of 1st modified section

7.2.2 Bearer Service Modification

7.2.2.1 General

According to the Event triggers and Re-authorisation triggers, Bearer Service Modification may trigger the TPF to signal the CRF that a bearer has been modified and/or trigger the TPF to request re-authorisation (for online).

7.2.2.2 ~~Triggered signalling of b~~Bearer Service ~~m~~Modification in case of offline charging

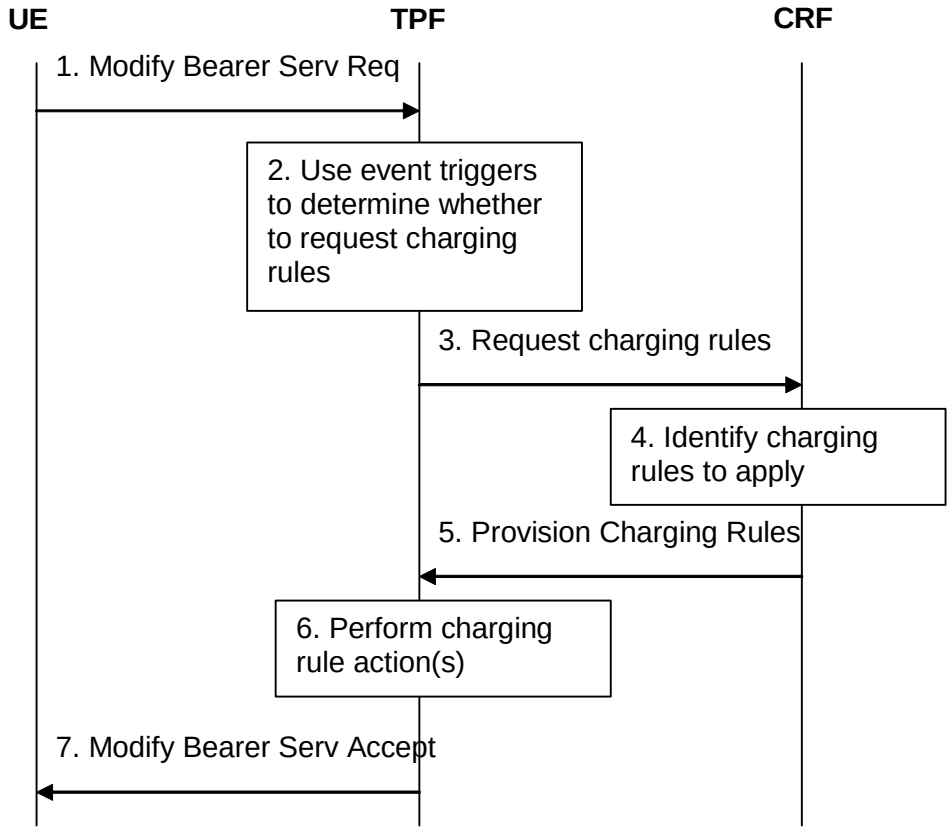


Figure 7.2a: Bearer Service Modification triggered Charging Rule Request

1. The TPF receives a request to modify a bearer service. For GPRS, the GGSN receives an Update PDP context request.
2. The TPF uses the event triggers in order to determine whether a request for charging rules is required
3. The TPF requests the applicable charging rules indicating a bearer modification, and provides relevant input information for the charging rule selection.
4. The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the TPF). Charging rules may need to be installed, and/or removed, and/or modified.
5. The CRF provides the charging rule information to the TPF. This message is flagged as the response to the TPF request.

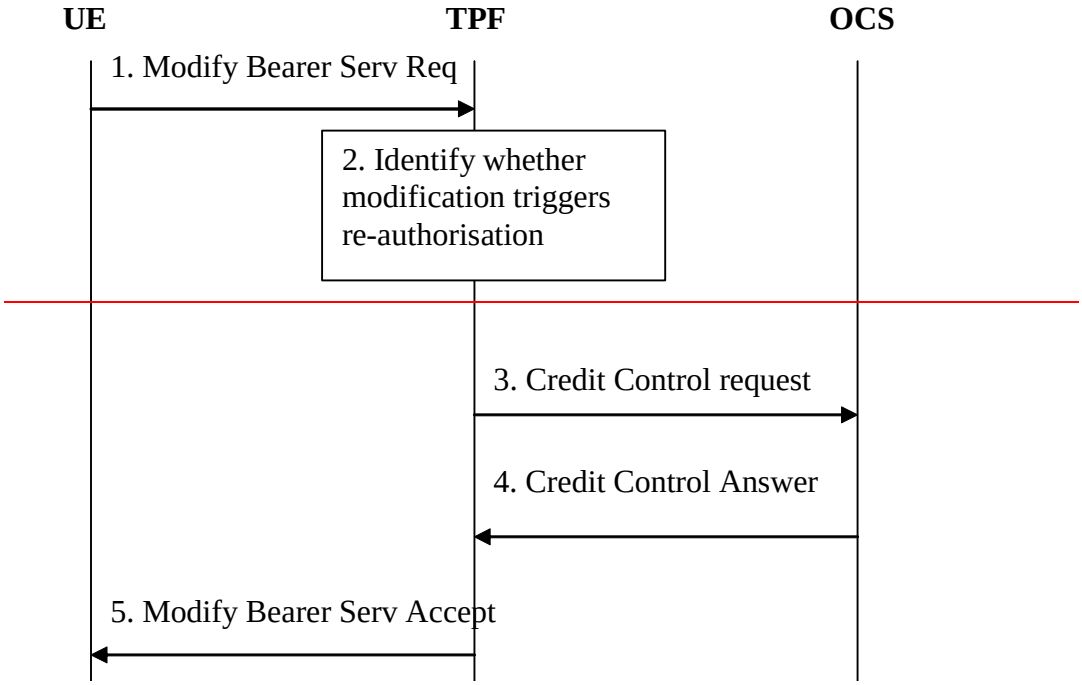
6. The TPF performs charging rule actions as indicated, i.e. installing, modifying or removing charging rules.

7. The TPF continues with the bearer service modification procedure.

Note-i: In the case of GPRS, the modification of the bearer service may also be initiated by other nodes such as the SGSN.

Note-ii: The TPF shall wait for the charging rules installation before accepting the Bearer modification, as shown in figure 7.1.

7.2.2.3 ~~Triggered Re-authorisation (online charging)~~Void



~~Figure 7.2b: Bearer Service Modification triggered re-authorisation~~

~~1 The TPF receives a request to modify a bearer service. For GPRS, the GGSN receives an Update PDP context request.~~

~~2 The TPF identifies whether the modification matches the re-authorisation trigger(s).~~

~~3 The re-authorisation trigger will cause the TPF to return the unused credit(s) for the charging rule(s) and request re-authorisation of the charging rule(s) in the OCS.~~

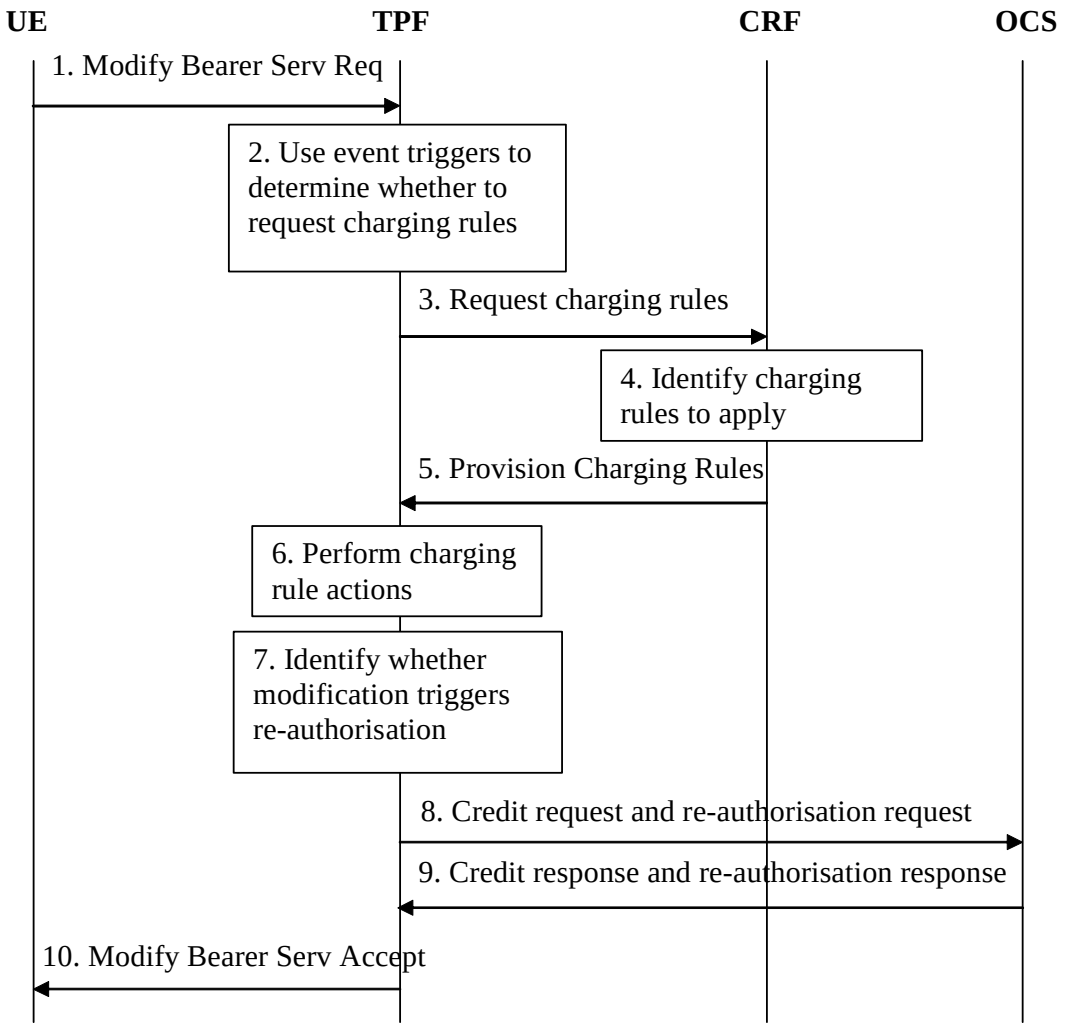
~~4 The OCS re-authorizes the appropriate charging rules.~~

~~5 The TPF continues with the bearer service modification procedure. The TPF accepts the bearer service modification only if credit is available at least for one charging rule.~~

~~If re-authorisation is required, the TPF shall wait for the credit control information before deciding whether to accept or not the Bearer modification.~~

~~Editorís note: It is FFS what happens if no credit is granted.~~

7.2.2.4 Bearer Service Modification in case of online charging



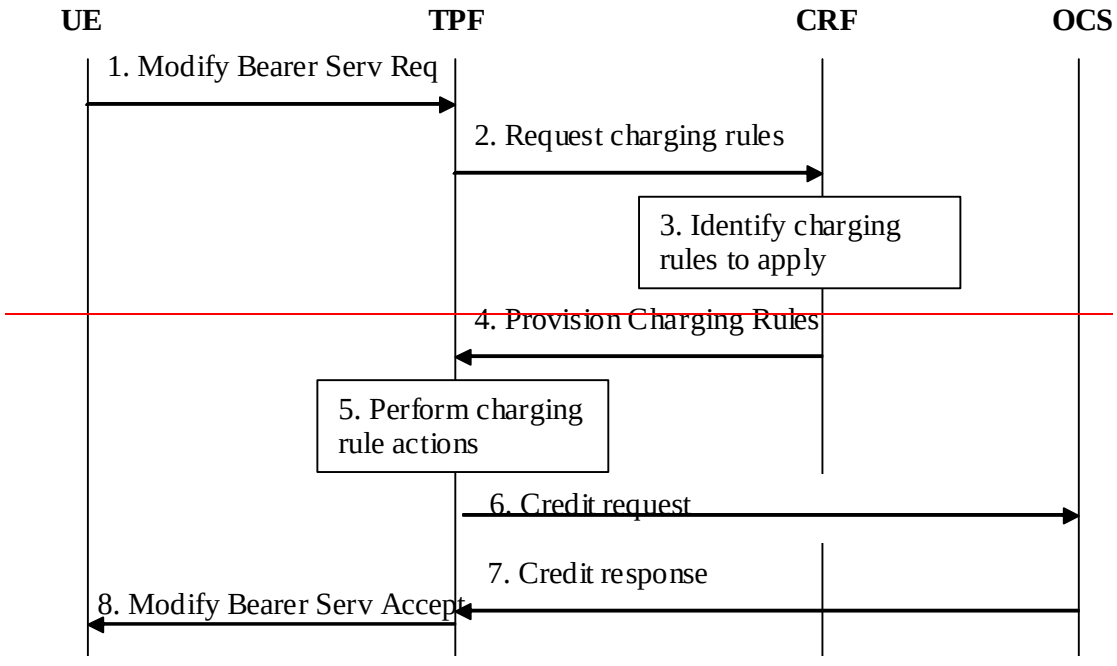


Figure 7.2c: Bearer Service Modification in case of online charging

1. The TPF receives a request to modify a bearer service. For GPRS, the GGSN receives an Update PDP context request.

2. The TPF uses the event triggers in order to determine whether a request for charging rules is required.

3. The TPF requests the applicable charging rules indicating a bearer modification, and provides relevant input information for the charging rule ~~decision~~selection.

~~3~~4. The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the TPF) Charging rules may need to be installed, and/or removed, and/or modified.

~~4~~5. The CRF provides the charging rule information to the TPF. This message is flagged as the response to the TPF request.

~~5~~6. The TPF performs charging rule actions as indicated, i.e. installing, modifying or removing charging rules.

~~6~~7. The TPF identifies whether the bearer modification matches the re-authorisation trigger(s) of any charging rule that has neither been installed nor removed in step 6.

8. The TPF interacts with the OCS if the set of charging rules has changed or if the bearer modification matches re-authorisation trigger(s) of any charging rule in the step 7. The TPF requests credit for any newly installed charging rule, and provides relevant input information for the OCS decision. The TPF returns the remaining credit of any removed charging rule. The TPF returns the unused credit(s) for any charging rule(s) applicable for re-authorisation and requests re-authorisation of their credits.

~~7~~9. The OCS answers to the TPF providing credits.

~~8~~10. If credit is available at least for one charging rule, the TPF accepts the bearer modification.

Note: In the case of GPRS, the modification of the bearer service may also be initiated by other nodes such as the SGSN.

Editorís note: Further details of the credit control mechanism are expected to be specified by Stage 3.

End of 1st modified section

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Montreal, Canada, 16th ñ 20th August, 2004

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CHANGE REQUEST

⌘ **23.125** **CR** **071** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Policy functions of FBC ñ update of Annex D
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	20/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
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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:	⌘	Annex D contains only a rough description about the possibilities to provide policy control functionality with FBC. This CR proposes an update of the description according to the recent discussions and tries to identify the set of FBC-based policy control functionality that will be specified within Release 6.
Summary of change:	⌘	The description of the different functionalities is updated by highlighting the functions that are included in Release 6. Furthermore, a number of problems and difficulties for the remaining functions are added refering also to the required modifications or enhancements of FBC. The table is aligned by separating the FBC-based policy control functionality onto this and the next release.
Consequences if not approved:	⌘	Annex D would not reflect the current status of the discussion. It would not be clear which policy control functionality can be provided by FBC in this release.

Clauses affected:	⌘	Annex D

Other specs affected: ⌘

Y	N	
	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.

Annex D (informative): Policy functions provided by FBC architecture

D.1 General

This Annex studies the possibilities and solutions for evolving FBC towards supporting policy control functions similar but not equivalent to what is provided by SBLP and Go. However, policy requirements in the context of FBC need to be clarified and could establish different needs than those of SBLP and Go. SBLP focuses on the control of bearer resources based on a binding mechanism that binds one or more service to a bearer. FBC evolution towards supporting policy control functions is mainly aiming for the policy control of the service itself.

Once the architecture and functionalities described in this Annex become stable, parts of the content are intended to be moved to the main body of this document. ~~It is expected that s~~Some parts ~~will~~ have been included in the body upon this release of the specifications, other parts may be included in the next release.

D.2 General architectural considerations

Considering the FBC development described in this specification, as well as the definition of new services e.g. IMS based services, which were not available in Release 5, it has been recognized that there is a need to introduce flexibility in the handling of the different services. It will be studied whether a CRF responsible for Charging Rules and Policy control ~~filters~~ may be considered. This could facilitate the possibility to minimize the number of nodes to maintain as well as for Stage 3 defined interfaces i.e. from a Stage 3 point of view interfaces may be re-used.

Media flows for an AF (e.g. IMS) can be divided into two categories:

- Peer-to-peer where the AF (e.g. P-CSCF) may provide information to the CRF for Charging Rule selection;
- Client/Server media flows where the AF (e.g. AS) sends input to the CRF for Charging Rule selection. The handling of the Charging Rule procedures as defined in Annex B is to be performed dynamically.

The handling of Charging Rules and the procedures related to selecting charging rules is specified in this technical specification. Below, the procedures for possible handling of policy control within the FBC framework are described.

It shall be possible to have multiple flows over the same PDP context.

It shall be possible to support generic IP flow policies.

The CRF shall take the responsibility for all applications, which means that conflicts between policies are alleviated facilitating easier and faster provisioning of services. The CRF shall be responsible for the precedences of the policies. An AS may provide information to the CRF whether the subscriber is allowed to access the service or not as an input to the decision function for filter definition.

The evolved FBC architecture including not only charging rules but also policy control shall implement policies for both IMS and non-IMS services, as SBLP has also been generalized in Rel6 to support both IMS and non-IMS services.

The CRF not only provides dynamic filters but also references to pre-configured filters.

The following subclauses provide a list and corresponding analysis of policy functions considered to be provided by the FBC architecture.

D.2.1 Charging correlation

The FBC architecture provides an alternative bearer charging mechanism. The charging key passed to the OCS/CCF is the only input to the rating logic (along with any AF/CSCF input about type of sessions, start/stop time of session etc. that may have come from Ro/Rf).

FBC provides the capability for charging correlation through the usage of Application Function Record information. In case of IMS the Application Function Record information should include the ICID and the flow ID(s).

Since the charging systems may need to be upgraded in ~~rel6~~this release to support FBC, we could use the FBC model and logic based on the charging key, instead of adding any correlation identifier (ICID) to Gx/Gy.

This function is part of this release.

D.2.2 Gating

This refers to the ability to block or allow traffic to flow. This ~~is already~~ can be achieved by the TPF in the FBC architecture which discards the packets for the service data flow in case of no applicable filters for this service data flow. However, it is only possible to implicitely block a specific service data flow, i.e. in case there are no other charging rules matching the service data flow for any bearer.

For peer-to-peer traffic, special rates may apply. The gate could therefore be either closed for this traffic before the applicable filters are available, or the gate could be opened with a more generic charging rule which doesnít allow for this special rate to apply yet.

The AF (e.g. P-CSCF) could wait until answer to give Rx input to the CRF which then sends this information down to the TPF, allowing for the filters for this peer-to-peer traffic to form a new charging rule. This allows waiting until the final SDP and the actual answer to allow the special rate to apply (and possibly the traffic to flow if no other filters were applicable before). As soon as the rules are sent down to the TPF then they are active at the TPF.

Compared to Gq/Go gating functionality the FBC ability of blocking traffic provides for further flexibility in combining the charging and policy models, because Go/Gq do not provide for a model where different rates can be applied in combination with different gating rules. However, FBC is ~~not~~ able to prevent the usage of a specific PDP context as Gq/Go gating functionality does as long as there is no other matching charging rule established for this PDP context.

The functionality for allowing and implicite blocking of service data flows is part of this release.

Editorís note: It is FFS if and how the explicite blocking (i.e. blocking of a specific service data flow that also matches a generic charging rule) can be provided by FBC.

D.2.3 QoS control

This refers to the ability to ~~provide~~ authorize different QoS for different applications (even peer-to-peer session) and to the ability to control the bandwidth usage once the traffic has been allowed to flow.

Requirements need to be identified for QoS control in the context of FBC, which could be different needs than those of SBLP and Go. FBC provides means to control what bearer a service flow is allowed to be carried on. This implicitly allows the CRF to control the QoS parameters of the bearer a service flow is allowed to use. A charging rule may only apply to one or more particular bearer(s) (to a particular PDP Context in case of GPRS). Hence, the QoS the service flow is allowed to use is restricted to the QoS of a particular bearer(s).

To evolve the FBC architecture towards complete QoS control for the service data flow as well as the bearer enhancements and extensions are probably required. The binding concept could be replaced by TFT interpretation to some extent but for the uplink similar information would be required. The control of the bitrate of a PDP context is only possible in case the charging rules apply only to a particular bearer. Otherwise one does not know on which bearer and at which time the service data flows occur.

The functionality for limiting the maximum QoS class of a service data flow is part of this release.

Editorís note: It is FFS how complete QoS control can be provided by FBC.

D.2.4 Bearer events

Indication of bearer events could allow for communication between the GGSN and the AF (P-CSCF in IMS).

In case a charging rule for an AF service flow applies only to a particular bearer, it is possible for the CRF to inform the AF about events related to that bearer. However, this bearer event indication functionality of FBC only works if there is no matching charging rule installed for any other bearer.

In case a charging rule for an AF service flow applies to more than one bearer of a UE IP address or more than one matching charging rule is applied, it is only possible for the CRF to inform the AF in case of the removal of all these bearers of a UE IP address (i.e. the AF is not aware of the removal of individual bearers). Because due to the missing

binding concept it is difficult to predict if a service data flow would use another PDP context instead once the previously used PDP context was deleted. Therefore, it may not be necessary or even wrong to inform the AF. Furthermore, the knowledge which service data flows are currently active may need to be extended to the CRF because an AF is only interested in such information if the corresponding service data flow is currently active.

The functionality for informing the CRF about the removal the last bearer for a specific IP address and APN is part of this release. Based on the applied charging rules, the CRF may also be able to inform the AF about events related to a particular bearer.

Editorís note: ~~It is FFS how the bearer events can be correlated to the charging rules as well as to the related AF because currently, charging rules apply to all PDP contexts of a user (APN and IP address)If indication of bearer events, as already provided over Gx, can be provided over Rx, then this allows any AF involved to get this indication so it can take any appropriate actions (e.g. record time of radio loss, trigger session release).~~ There is a need to confirm whether this functionality is required in the case that the service data flow used for the AF session can be found on multiple bearers.

D.2.5 Session events

This ~~is used when~~refers to the ability to react on AF session modification or AF session ~~signalling~~ release~~s the AF session~~, e.g. upon IMS session release. This can be provided by the Rx input which allows the AF to tell the CRF that e.g. no charging rule exists for a traffic flow any more, meaning the traffic will no longer be allowed at the TPF. The same applies if, over the Gy reference point, the OCS indicates ~~that~~ to abort the session (Abort Session Request in Diameter Credit Control).

While the FBC architecture supports an update of charging rules in the TPF due to a session modification, it is only to some extent possible to enforce a bearer modification or removal. It is possible to disable the service data flow belonging to the AF session as long as there are no other matching charging rules. However the actual bearer release or modification cannot be enforced in general.

The functionality for updating the charging rules in the TPF due to a session modification is part of this release.

Editorís note: It is FFS if and when the TPF could release the entire bearer (e.g. GGSN PDP context deletion).

D.3 Summary and comparison

Go/Gq procedure	**Provides for**	**FBC equivalent in this release**	**FBC equivalent not in this release**
Authorize QoS Resources, AF session establishment	QoS control, charging correlation	Transfer of charging correlation information Or relies on charging key for rating instead of charging correlation QoS control is limited to maximum QoS class for a service data flow (in case no other matching charging rule is in place)	~~Instead of charging correlation, relies on charging key for rating~~ Complete QoS control for service data flow and the bearer is FFS
Authorize QoS Resources, bearer establishment	QoS control, charging correlation	Transfer of charging correlation information Or relies on charging key for rating instead of charging correlation QoS control is limited to maximum QoS class for a service data flow (in case no other matching charging rule is in place)	~~Instead of charging correlation, relies on charging key for rating~~ Complete QoS control for service data flow and the bearer is FFS

Enable Media procedure	Gating (open)	Provide charging rules over Gx for the traffic flow Provide credit over Gy for the traffic flow Service data flow can be enabled and usage of bearer controlled (in case no other matching charging rule is in place)	~~Provide charging rules over Gx for the traffic flow~~ ~~Provide credit over Gy for the traffic flow~~ Control of bearer usage in case of existing other matching charging rules is FFS
Disable Media procedure	Gating (close)	Provide no charging rule over Gx for the traffic flow Provide no credit over Gy for the traffic flow Service data flow can be disabled and usage of bearer controlled (in case no other matching charging rule is in place)	~~Provide no charging rule over Gx for the traffic flow~~ ~~Provide no credit over Gy for the traffic flow~~ Control of bearer usage and explicite disabling in case of existing other matching charging rules is FFS
Revoke Authorization for GPRS and IP Resources	Session events	AF input to provision of charging rules over Rx followed by Provision of Charging Rules triggered by other event to the CRF, Or OCS Abort Session Request	~~AF input to provision of charging rules over Rx followed by Provision of Charging Rules triggered by other event to the CRF,~~ ~~Or OCS Abort Session Request~~ Complete QoS control for service data flow and the bearer is FFS
Indication of PDP Context Release	Bearer events	Bearer service termination over Gx and Gy Rx in case a charging rule applies only to this bearer and no other matching charging rules are used on any other bearer	~~Bearer service termination over Gx and Gy~~ Rx in the general case is FFS
Authorization of PDP Context Modification	QoS control	Bearer service modification over Gx Rx in case a charging rule applies only to this bearer and no other matching charging rules are used on any other bearer	~~Bearer service modification over Gx~~ Complete QoS control for service data flow and the bearer is FFS Rx in the general case is FFS
Indication of PDP Context Modification	Bearer events	Bearer service modification over Gx Rx in case a charging rule applies only to this bearer and no other matching charging rules are used on any other bearer	~~Bearer service modification over Gx~~ Rx in the general case is FFS

Update Authorization procedure	QoS control	AF input to provision of charging rules over Rx followed by Provision of Charging Rules triggered by other event to the TPF, Or OCS initiated re-authorisation	~~AF input to provision of charging rules over Rx followed by Provision of Charging Rules triggered by other event to the CRF over Gx,~~ ~~Or OCS initiated re-authorisation~~ Complete QoS control for service data flow and the bearer is FFS

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⌘ **23.125** **CR** **072** ⌘ **rev** **1** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	Removal of superfluous FFS notes
Source:	⌘	SA2 (Ericsson)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**D**
Release:	⌘	Rel-6

Use one of the following categories:
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R96 (Release 1996)
R97 (Release 1997)
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R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	The 23.125 contains a number of Editorís notes, indicating FFS items. Many of these have lost their relevance and are to be removed.
Summary of change:	⌘	Editorís note removed: - Section 5.1 indicated planned content of the section. - Section 5.5 indicated normal stage 3 work. - Section 6.1 indicated planned content of the section. - Section 6.2.4 indicated that a requirement needs to be fulfilled. - Section 6.2.5 indicated that additional changes might occur. To be handled by CR procedure. - Section 6.3.1.2 indicated a need for deciding upon which TS to define ìrelevant network and terminal informationî. A CR may introduce specific requirements in this TS. Redundant sentence removed. - Section 7 indicated planned content of the section. - Section 7.2.2.4 indicated that stage 3 work is required.
Consequences if not approved:	⌘	Redundant editors notes remain in the TS

Clauses affected:	⌘	5.1, 5.5, 6.1, 6.2.4, 6.2.5, 6.3.1.2, 7, 7.2.2.4

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

Other comments: ⌘

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****** First modified section ******

5.1 Overview

~~Editor's note: This clause is planned to contain the relevant descriptions of the overall function for the flow based charging.~~

The following functions are provided by the network for service data flow based charging. This applies to both online and offline charging unless otherwise specified:

- Identification of the service data flows that need to be charged individually (e.g. at different rates);
- Provision and control of charging rules on service data flow level;
- Reporting of service data flow level byte counts (for volume based charging) and service data flow durations (for time based charging);
- Event indication according to on-line charging procedures (e.g. sending AAA Accounting Stop) and, optionally, following this particular event, taking appropriate actions on service data flow(s) according to the termination action.
- Event indication and event monitoring by the TPF and following this particular event, taking the appropriate on-line charging actions.

****** Second modified section ******

5.5 Credit management

In case of online charging, it shall be possible for the OCS to apply re-authorisation of credit in case of particular events e.g. credit authorisation lifetime expiry, idle timeout, charging rule is changed, GPRS events such as SGSN change, QoS changes, RAT type change.

In case of online charging, credit can be pooled for multiple (one or more) charging rules applied at the Traffic Plane Function. A pool of credit applying to a single charging rule is equivalent to an individual credit limit for that charging rule. Multiple pools of credit shall be allowed per user.

Rating decisions shall be strictly controlled by the OCS for each service. The OCS shall also control the credit pooling decision for charging rules. The OCS shall either provide a new pool of credit, together with a new credit limit, or a reference to a pool of credit that already exists at the TPF.

The grouping of charging rules into pools in this way shall not restrict the ability of the OCS to do credit authorisation and provide termination action individually for each charging rule of the pool.

Note: ëcreditî as used here does not imply actual monetary credit, but an abstract measure of resources available to the user. The relationship between this abstract measure, actual money, and actual network resources or data transfer, is controlled by the OCS.

It shall be possible for the OCS to group flows charged at different rates or in different units (e.g. time/volume).

~~Editorís note: Any impact of this requirement in relation to operation of the Gy needs to be investigated.~~

****** Third modified section ******

6.1 Architecture

~~Editor's note: This clause is planned to contain the relevant part of the architecture impacted by IP flow level based charging.~~

****** Fourth modified section ******

6.2.4 Traffic Plane Function

The Traffic Plane Function shall be capable of differentiating user data traffic belonging to different service data flows for the purpose of collecting offline charging data and performing online credit control.

The Traffic Plane Function shall support pre-defined charging rules, and pre-defined filters. See subclause 5.3 for further filtering and counting requirements.

In the case of online charging, the Traffic Plane Function shall not allow traffic unless network resource usage has been granted by the OCS.

For online charging, the Traffic Plane Function shall be capable of managing a pool of credit used for some or all of the service data flows of a user. The Traffic Plane Function shall also be capable of managing the credit of each individual service data flow of the user.

A TPF may be served by one or more CRF nodes. The appropriate CRF is contacted based on UE identity information.

Editorís note: The specific identity information used to identify the appropriate CRF is FFS.

For GPRS, it shall be possible to provide flow based charging functions for different service data flows even if they are carried in the same PDP Context. For GPRS, the traffic Plane Function is a logical function allocated to the GGSN.

Editorís Note: The effects of this co-location to the interfaces still needs to be studied e.g. Gy, Gz, Gi. Gi radius extensions for charging purposes are not precluded.

For GPRS, the TPF/GGSN shall be able to do separate counts per PDP context for a single service data flow if it is transferred on more than one PDP context.

~~Editorís note: How this can be achieved is FFS.~~

For each PDP context, the TPF shall accept information during bearer establishment and modification relating to:

- The user and terminal (e.g. MSISDN, IMEISV)
- Bearer characteristics (e.g. QoS negotiated, APN)
- Network related information (e.g. MCC and MNC)

The TPF may use this information in the OCS request/reporting or request for charging rules.

For each PDP context, there shall be a separate OCS request/reporting, so this allows the OCS and offline charging system to apply different rating depending on the PDP context.

The Traffic Plane Function shall identify packets that are charged according to service data flow based charging. The Traffic Plane Function shall report the data volume(s) charged according to service data flow based charging. In case of GPRS, the Traffic Plane Function shall report the service data flow based charging data for each charging rule on a per PDP context basis.

At initial bearer establishment the Traffic Plane Function shall request charging rules applicable for this bearer from the charging rules function. As part of the request, the Traffic Plane Function provides the relevant information to the charging rules function. The Traffic Plane Function shall use the charging rules received in the response from the

charging rules function. In addition, the Traffic Plane Function shall use any applicable pre-defined static charging rules. Pre-defined charging rules may apply for all users or may be activated by the CRF.

If the bearer is modified by changing the bearer characteristics, the TPF shall use the re-authorisation triggers in order to determine whether to require re-authorisation. The TPF shall use the event triggers to determine whether to request the charging rules for the new bearer characteristics from the charging rules function.

If the Traffic Plane Function receives an unsolicited update of the charging rules from the charging rules function, the new charging rules shall be used.

If another bearer is established by the same user (e.g. for GPRS a secondary PDP context), the same procedures shall be applied by the Traffic Plane Function as described for the initial bearer.

The Traffic Plane Function shall evaluate received packets against the service data flow filters in the order according to the precedence for the charging rules. When a packet is matched against a SDF filter, the packet matching process for that packet is complete, and the charging rule for that SDF filter shall be applied.

6.2.5 Application Function

The Application Function provides information to the service data flow based charging rules function, which can then be used for selecting the appropriate charging rule, and also used for configuring some of the parameters for the charging rule. The operator configures the charging rules in the service data flow based charging rules function, and decides what data from the application function shall be used in the charging rule selection algorithm.

An AF may communicate with multiple CRFs. The AF contacts the appropriate CRF for a user at any time based on UE identity information.

Editorís note: The specific identity information used to identify the appropriate CRF is FFS.

The Application Function shall provide information to allow the service data flow to be identified. The Application Function shall also provide some other information that may be used in the charging rule selection process.

The information provided by the application function is as follows:

- Information to identify the service data flow: refer to subclause 5.3.
  The application function may use wildcards to identify an aggregate set of IP flows.
- Information to support charging rule selection:
  - Application identifier;
  - Application event identifier;
  - Type of Stream (e.g. audio, video) (optional);
  - Data rate of stream (optional);
  - User information (such as user identity).

~~Editorís Note: Additional information is FFS.~~

The ì Application Identifierî is an identifier associated with each service that an AF provides for an operator (e.g. a packet streaming service application function would have one application identifier for the service).

The ì Application event identifierî is an identifier within an Application identifier. It is used to notify the Service Data Flow Based Charging Rules Function of such a change within a service session that affects the charging rules, e.g. triggers the generation of a new charging rule.

****** Fifth modified section ******

6.3.1.2 Request for Charging Rules (from TPF to CRF)

The TPF requests the charging rules to be applied:

- At a bearer establishment (PDP context establishment for GPRS) or,
- At bearer modification (PDP context modification for GPRS) if the Event trigger is met, or
- When the specific event of the Event trigger is detected.

The request must identify whether it is an initial request (primary context establishment for GPRS), or a subsequent request (i.e. for GPRS, a secondary PDP context establishment, or a PDP context modification). For an initial request for GPRS, the request shall include APN, PDP address information, and at least one of IMSI or MSISDN. ~~Other relevant network and terminal information should also be included.~~

~~Editorís Note: Where the relevant network and terminal information is defined is FFS (either in this TS or 32.xyz).~~

An identifier is required to allow the specific instance in the TPF/CRF to be identified for subsequent data exchange. The identifier for the communication must be provided.

The request must provide further information used for the charging rule selection. The request shall include an identifier for the bearer, the QoS information, and flow identifier information allocated to the bearer. For GPRS, this information would include the traffic class, and the TFT.

Where the charging rule selection data for a bearer is modified, the TPF sends the request to the CRF indicating it is for a bearer modification, and providing the modified data.

****** Sixth modified section ******

7 Message Flows

~~Editor's note: This clause is planned to contain the description of new and modified information flows.~~

****** Seventh modified section ******

7.2.2.4 Bearer Service Modification in case of online charging

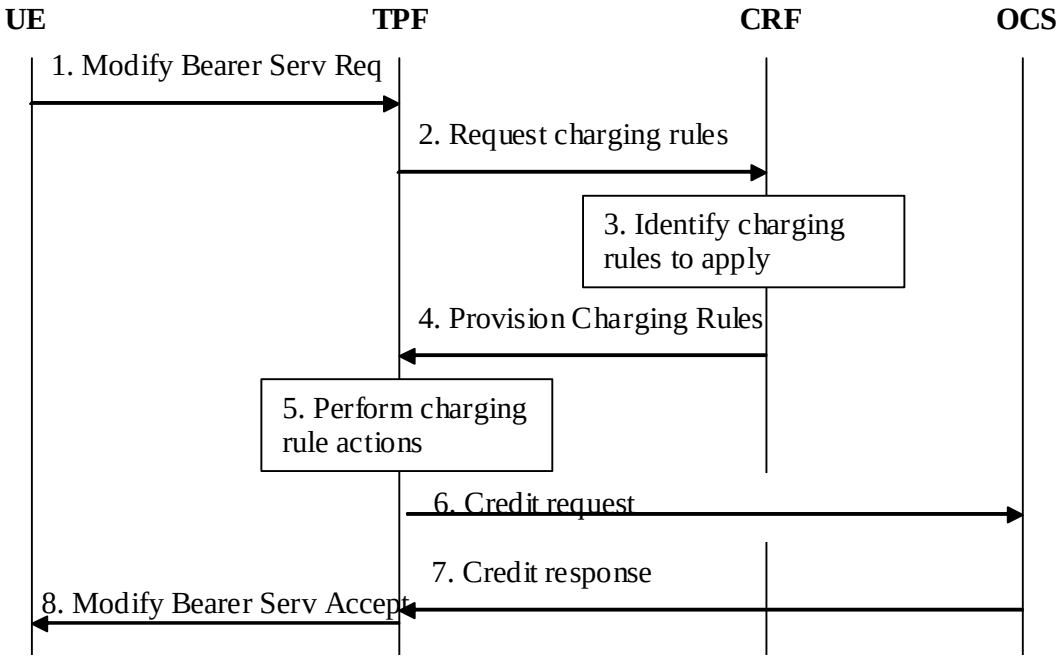

Figure 7.2c: Bearer Service Modification in case of online charging

1. The TPF receives a request to modify a bearer service. For GPRS, the GGSN receives an Update PDP context request.
2. The TPF requests the applicable charging rules, and provides relevant input information for the charging rule decision.
3. The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the TPF) Charging rules may need to be installed, and/or removed, and/or modified.
4. The CRF provides the charging rule information to the TPF. This message is flagged as the response to the TPF request.
5. The TPF performs charging rule actions as indicated.
6. The TPF interacts with the OCS if the set of charging rules has changed.
7. The OCS answers to the TPF.
8. If credit is available at least for one charging rule, the TPF accepts the bearer modification.

Note: In the case of GPRS, the modification of the bearer service may also be initiated by other nodes such as the SGSN.

~~Editorís note: Further details of the credit control mechanism are expected to be specified by Stage 3.~~

****** End of Document ******

3GPP TSG-SA2 Meeting #41
Montreal, Canada, 16-20 August 2004

Tdoc ⌘S2-042913

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **074** ⌘ **rev** **2** ⌘ Current version: **6.1.0** ⌘

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

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

Title:	⌘	FBC Control
Source:	⌘	SA2 (Ericsson)
Work item code:	⌘	CH
Date:	⌘	19/08/04
Category:	⌘	**C**
Release:	⌘	Rel-6

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

Use one of the following releases:

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

Reason for change:	⌘	There is a need to control which IP flows are allowed over a certain bearer based on the QoS parameters, such as Traffic Class, of that bearer. In 23.125, the basic elements are already in place to support this functionality. • the CRF gets all bearer QoS parameters, including Traffic Class, from the TPF at bearer initiation • the CRF can provision Charging Rules (based on e.g. QoS parameters) so that they are applicable for the initiated bearer • the TPF shall discard packets if no Charging Rule is applicable So, to support the desired functionality, we need to add the clarification that for a bearer, the TPF shall only apply the Charging Rules that are activated/associated with this bearer. Not even wild-carded, ìdefaultî Charging Rules that are defined for all users are applied, unless explicitely activated.
Summary of change:	⌘	For a bearer (e.g. in GPRS, a secondary PDP Context), the TPF shall only apply the Charging Rules that are activated/associated with this bearer. In some cases the UE may activate e.g. two streaming bearers and the CRF may given the operator policy decide to apply the same charging rule to both these bearers since there is no TFT concept for the uplink case.
Consequences if not approved:	⌘	The understanding of Charging Rules applicable for a bearer and when to discard packets if no Charging Rule is applicable is incomplete.

Clauses affected:	⌘	6.2.4

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.

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 ********

6.2.4 Traffic Plane Function

The Traffic Plane Function shall be capable of differentiating user data traffic belonging to different service data flows for the purpose of collecting offline charging data and performing online credit control.

The Traffic Plane Function shall support pre-defined charging rules, and pre-defined filters. See subclause 5.3 for further filtering and counting requirements.

In the case of online charging, the Traffic Plane Function shall not allow traffic unless network resource usage has been granted by the OCS.

For online charging, the Traffic Plane Function shall be capable of managing a pool of credit used for some or all of the service data flows of a user. The Traffic Plane Function shall also be capable of managing the credit of each individual service data flow of the user.

A TPF may be served by one or more CRF nodes. The appropriate CRF is contacted based on UE identity information.

Editorís note: The specific identity information used to identify the appropriate CRF is FFS.

For GPRS, it shall be possible to provide flow based charging functions for different service data flows even if they are carried in the same PDP Context. For GPRS, the traffic Plane Function is a logical function allocated to the GGSN.

Editorís Note: The effects of this co-location to the interfaces still needs to be studied e.g. Gy, Gz, Gi. Gi radius extensions for charging purposes are not precluded.

For GPRS, the TPF/GGSN shall be able to do separate counts per PDP context for a single service data flow if it is transferred on more than one PDP context.

Editorís note: How this can be achieved is FFS.

For each PDP context, the TPF shall accept information during bearer establishment and modification relating to:

- The user and terminal (e.g. MSISDN, IMEISV)
- Bearer characteristics (e.g. QoS negotiated, APN)
- Network related information (e.g. MCC and MNC)

The TPF may use this information in the OCS request/reporting or request for charging rules.

For each PDP context, there shall be a separate OCS request/reporting, so this allows the OCS and offline charging system to apply different rating depending on the PDP context.

The Traffic Plane Function shall identify packets that are charged according to service data flow based charging. The Traffic Plane Function shall report the data volume(s) charged according to service data flow based charging. In case of GPRS, the Traffic Plane Function shall report the service data flow based charging data for each charging rule on a per PDP context basis.

At initial bearer establishment the Traffic Plane Function shall request charging rules applicable for this bearer from the charging rules function. As part of the request, the Traffic Plane Function provides the relevant information to the charging rules function. The Traffic Plane Function shall use the charging rules received in the response from the charging rules function. In addition, the Traffic Plane Function shall use any applicable pre-defined static charging rules. Pre-defined charging rules may apply for all users or may be activated by the CRF.

If the bearer is modified by changing the bearer characteristics, the TPF shall use the re-authorisation triggers in order to determine whether to require re-authorisation. The TPF shall use the event triggers to determine whether to request the charging rules for the new bearer characteristics from the charging rules function.

If the Traffic Plane Function receives an unsolicited update of the charging rules from the charging rules function, the new charging rules shall be used.

If another bearer is established by the same user (e.g. for GPRS a secondary PDP context), the same procedures shall be applied by the Traffic Plane Function as described for the initial bearer. For a bearer (e.g. in GPRS, a secondary PDP context), the TPF shall only apply the charging rules that are activated/associated with this bearer. Hence a charging

rule is installed, modified and removed on a per PDP context basis. If multiple PDP contexts are active for a UE the CRF may decide that a charging rule is to be activated/associated with more than one PDP context.

The Traffic Plane Function shall evaluate received packets against the service data flow filters in the order according to the precedence for the charging rules. When a packet is matched against a SDF filter, the packet matching process for that packet is complete, and the charging rule for that SDF filter shall be applied.

****** END OF CHANGE *******

3GPP TSG-SA2 Meeting #41
Montreal, Canada, 16th ñ 20th August, 2004

Tdoc ⌘ S2-042782

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **075** ⌘ **rev** **1** ⌘ Current version: **6.1.0** ⌘

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

Title:	⌘	TPF performing no charging
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	17/08/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

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

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

Reason for change:	⌘	There are some places in the specification where it is mentioned that FBC may be used to zero rate traffic.
Summary of change:	⌘	The possibility of no charging is added to the charging models supported by FBC and also to the parameters of a charging rule. It is proposed to add no charging as alternative to online and offline charging. In case a service data flow is indicated with no charging there is no need for the TPF to support interaction with the online or offline charging infrastructure. Furthermore, it is clarified that also the combination of volume- and time-based offline charging is possible.
Consequences if not approved:	⌘	The concept of zero rating cannot be supported efficiently. The TPF would communicate with the charging infrastructure although this may be not required by an operator.

Clauses affected:	⌘	4.3.1, 5.2

Other specs affected: ⌘	Y	N		⌘
		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.

Start of 1st modified section

4.3.1 General

When developing the charging solutions, the following charging models should be considered, even though the full solution to support the models may not be within the scope of this TS.

Shared revenue services shall be supported. In this case settlement for all parties shall be supported, including the third parties that may have been involved providing the services.

The charging solution shall allow various charging models such as:

- Volume based charging;
- Time based charging~~,~~;
- Volume and time based charging;
- No charging.

Editorís note: Additional charging models that are event and service based require further investigation.

It shall be possible to apply different rates when a user is identified to be roaming from when the user is in the home network.

It shall be possible to restrict special rates to a specific service, e.g. allow the user to download a certain volume of data from one service for free, but this allowed volume is not transferable to other services. It shall be possible also to apply special rates based on the time of day.

It shall be possible to enforce per-service usage limits for a service data flow using online charging on a per user basis (may apply to pre-paid and postpaid users).

It shall be possible for online charging systems to check the amount of data used over some time period. The online charging systems can provide both volume credit and time indication.

In the case of online charging, it shall be possible to perform rating and allocate credit depending on the characteristics of the bearer resources allocated initially (in the GPRS case, the QoS of the PDP context).

The flow based bearer level charging can support dynamic selection of charging to apply. A number of different inputs can be used in the decision to identify the specific charging to apply. For example, a service data flow may be charged with different rates depending on what QoS is applicable. The charging rate may thus be modified when a bearer is created or removed, to change the QoS provided for a service data flow.

The charging rate or charging model applicable to a service data flow may also be changed as a result of events in the service (e.g. insertion of a paid advertisement within a user requested media stream). The charging model applicable to a service data flow may also change as a result of events identified by the OCS (e.g. after having spent a certain amount, the user gets to use some services for free). The charging rate or charging model applicable to a service data flow may also be changed as a result of having used the service data flow for a certain amount of time and/or volume.

In the case of online charging, it shall be possible to apply an online charging action upon TPF events (e.g. re-authorization upon QoS change).

It shall be possible to indicate to the TPF that interactions with the charging systems are not required for a charging rule, i.e. to perform neither accounting nor credit control for this service data flow.

End of 1st modified section

Start of 2nd modified section

5.2 Charging rules

Charging rules contain information that allow for filtering of traffic to identify the packets belonging to a particular service data flow, and allow for defining how the service data flow is to be charged. The following apply to charging rules:

- The charging rules for bearer charging are defined by the operator.
- These charging rules are made available to the Traffic Plane function for both offline and online charging.
- Multiple charging rules are supported simultaneously per user.
- Filtering information within a charging rule is applied through filtering functionality at the Traffic Plane Function to identify the packets belonging to a particular service data flow.
- Charging rules with dynamically provisioned filtering information (i.e. made available to the Traffic Plane Function) are supported in order to cover IP service scenarios where the filtering information is dynamically negotiated (e.g. negotiated on the application level (e.g. IMS)).
- Pre-defined charging rules are supported. The pre-defined charging rules stored in the TPF shall have charging rule identifiers, which are different from the charging rule identifiers allocated by the CRF.
- Elements of charging rules may be statically configured at the Traffic Plane Function, or dynamically provisioned.

Note-i: The mechanism to support use of elements statically pre-defined in the TPF (e.g. filter information) is for stage 3 development.

Note-ii: The stage 3 development may also evaluate providing an optimisation to support dynamic provisioning of an entire charging rule pre-defined in the TPF.

- Pre-defined filters that are part of the pre-defined charging rules may support extended capabilities, including enhanced capabilities to identify packets associated with application protocols.
- There may be overlap between the charging rules that are applicable. Overlap can occur between:
  - multiple pre-defined charging rules in the TPF;
  - charging rules pre-defined in the TPF and rules from the Service Data Flow Based Charging Rules Function, which can overlay the pre-defined rules in the TPF.

  The precedence identified with each charging rule shall resolve all overlap between the charging rules. When overlap occurs between a dynamically allocated charging rule and a pre-defined charging rule at the TPF, and they both share the same precedence, then the dynamically allocated charging rule shall be used.
- Charging rules contain information on:
  - How a particular service data flow is to be charged: online~~/~~, offline or neither;
  - In case of offline charging whether to record volume- or time-based charging information or both;
  - Charging key;
  - Service data flow filter(s);
  - Precedence.
  - Charging rule identifier.
- Event triggers are associated with all charging rules for a user and IP network connection.
- The identifier of the charging rule allocated by the CRF shall be unique for a CRF/TPF instance.

- Once the charging rule is determined it is applied to the service data flow at the Traffic Plane Function and packets are counted and categorised per the rule set in the charging rule.
- Separate charging rules can be provided for downlink and uplink.
- Charging rules can be configured for both user initiated and network initiated flows.
- Charging rules can change and be overridden, e.g. for a previously established PDP context in the GPRS case, based on specific events (e.g. IM domain events or GPRS domain events, credit control events).
- Different charging rules can be applied for different users.
- The same charging rule can be applied for multiple users.
- Different charging rules can be applied based on the location of the user (e.g. based on identity of the roamed to network).
- Charging rule assignment can occur at bearer service establishment, modification and termination. For GPRS, charging rule assignment can occur at PDP context activation, modification and deactivation.
- For GPRS, the charging rules can be dependent on the APN used.

End of 2nd modified section