Technical Specification Group Services and System Aspects
Meeting #24, Seoul, Korea 7-10 June 2004

TSGS#23(04)0314

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 #24.
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
S2-041454	Introduction of charging rule identifier	23.125	002r1	B	6.0.0	6	CH	S2 #39	3.1, 5.2, 6.3.1.3
S2-041664	Introdution of modify and add charging actions	23.125	003r2	B	6.0.0	6	CH	S2 #39	6.3.1.3, 7.2.1, 7.2.2, 7.2.3, 7.3
S2-041456	Add some use cases to the Flow Based Charging	23.125	004r1	B	6.0.0	6	CH	S2 #39	4.3.1
S2-041684	Time based charging tariffs	23.125	006r2	B	6.0.0	6	CH	S2 #39	A.2.1, new subclause A.2.9
S2-041685	FBC and IMS	23.125	008r2	B	6.0.0	6	CH	S2 #39	Annex B
S2-041279	RAT Type as possible re-authorisation trigger	23.125	009	F	6.0.0	6	CH	S2 #39	5.5
S2-041592	Ro reference removal	23.125	011r1	F	6.0.0	6	CH	S2 #39	2, 6.3.2
S2-041686	Bearer establishment, charging rules availability and credit control	23.125	012r2	F	6.0.0	6	CH	S2 #39	7.2
S2-041663	Traffic flow at TPF	23.125	013r2	C	6.0.0	6	CH	S2 #39	5.3, 6.2.4
S2-041662	Bearer modification triggers	23.125	014r2	C	6.0.0	6	CH	S2 #39	5.2, 5.4, 5.7 (new section), 6.2.4, 6.3.1.2, 7.2.2
S2-041457	Time and volume allocation in online charging	23.125	016r1	F	6.0.0	6	CH	S2 #39	4.3.1
S2-041289	General Corrections	23.125	018	F	6.0.0	6	CH	S2 #39	5.1, 5.2, 6.3.4.1, 7.2
S2-041290	Gx connection maintenance	23.125	019	F	6.0.0	6	CH	S2 #39	6.3.1.1
S2-041291	Rx connection maintenance	23.125	020	F	6.0.0	6	CH	S2 #39	6.3.4.2
S2-041661	FBC online charging	23.125	021r2	C	6.0.0	6	CH	S2 #39	4.2, 4.3.1, 5.4
S2-041610	Message flow for input to provision of charging rules in Ry interface	23.125	024r1	B	6.0.0	6	CH	S2 #39	7.1, New section 7.1a
S2-042245	Correction to the Termination Action	23.125	025r2	F	6.0.0	6	CH	S2 #40	5.6
S2-041953	Clarification to the charging rule	23.125	027r1	F	6.0.0	6	CH	S2 #40	5.2
S2-041954	Information to support charging rule selection	23.125	028r1	B	6.0.0	6	CH	S2 #40	6.2.5.
S2-042255	Re-authorization in case of charging rule change	23.125	033r1	C	6.0.0	6	CH	S2 #40	5.5, 7.3

S2-041947	Applying charging rules input from AF	23.125	035r1	F	6.0.0	6	CH	S2 #40	6.2.1.
S2-041948	Set of charging rules	23.125	036r1	C	6.0.0	6	CH	S2 #40	6.3.1.3
S2-042338	Policy functions provided by FBC	23.125	037r3	B	6.0.0	6	CH	S2 #40	Informative Annex D (new)
S2-042257	TPF in the GGSN for WLAN access	23.125	043r1	C	6.0.0	6	CH	S2 #40	2, Annex C
S2-042244	FBC and GAA	23.125	045r2	B	6.0.0	6	CH	S2 #40	2, 4.3.2
S2-042243	Limitations of FBC for IMS	23.125	046r2	B	6.0.0	6	CH	S2 #40	Annex B

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ShenZhen, China, April 19-23, 2004

Tdoc ⌘ S2-041454
combined S2-041268 and S2-041269

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **002** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Introduction of charging rule identifier
Source:	⌘	SA2 (Huawei, China Mobile)
Work item code:	⌘	CH
Date:	⌘	20/04/2004
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:	⌘	The current TS 23.125 for IP flow based charging states when the TPF receives the Provide Charging Rule from CRF, the TPF should support the following cases: - 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). However, there is no a charging rule identifier to identify each charging rule, in case the CRF requires the TPF to remove a charging rule, e.g. a charging rule previously sent to TPF by CRF, or a pre-defined charging rule stored in the TPF, the TPF will not implement it correctly.
Summary of change:	⌘	When the CRF provides a charging rule to TPF, an identifier to unique identify the charging rule should be allocated by the CRF for a relevant CRF/TPF instance, and the CRF send the identifier to the TPF as an element of the charging rule in the provision charging rule message. The pre-defined charging rules in the TPF also have identifier.
Consequences if not approved:	⌘	The charging rule can not be removed separately by the TPF.

Clauses affected:	⌘	3.1, 5.2, 6.3.1.3
Other specs	⌘	Y ☐ N ☒ Other core specifications ⌘

affected:		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.

<< First changed clause >>

3.1 Definitions

Charging rule: a set of information ~~comprising~~ including the service data flow filters, and the charging key~~, and the associated charging actions~~, for a single service data flow (further details can be found in ~~4.3~~5.2).

<< Next 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~~filters~~ 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.

- 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 or groups of users.
- Different charging rules can be applied based on the location of the user (e.g. based on identity of the roamed to network).
- For GPRS, charging rule assignment can occur at PDP context establishment and modification.
- For GPRS, the charging rules can be dependent on the APN used.

<< 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~~Provision of Charging Rules shall include~~s~~ 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 action indications (install and/or remove), and the associated charging rules. ~~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.

<< End of changed clause >>

3GPP TSG SA WG2 Meeting #39
ShenZhen, China, April 19-23, 2004

Tdoc ⌘ S2-041664
Revised S2-041270, S2-041461

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CHANGE REQUEST

⌘ **23.125** **CR** **003** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Introduction of modify charging actions
Source:	⌘	SA2 (Huawei, China Mobile)
Work item code:	⌘	CH
Date:	⌘	09/04/2004
Category:	⌘	**B**
Release:	⌘	Rel-6

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
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R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)

Reason for change:	⌘	The TS 23.125 so far describes three kinds of actions: install, remove, install and remove. However, in case only a few data of the previously installed charging rule need to be changed, e.g. only charging key needs to be changed, the action "modify" may be more suitable.
Summary of change:	⌘	The "modify" action is added to the Provision Charging Rule message and the related message flows are also changed.
Consequences if not approved:	⌘	According to the current mechanism, when the charging rule is changed, the CRF should ask the TPF to remove the old charging rule and install a new one, in case the new charging rule is more similar to the old one, this mechanism is not efficiency.

Clauses affected:	⌘	6.3.1.3, 7.2.1, 7.2.2, 7.2.3, 7.3

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

Other comments:	⌘	

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<< First 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~~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 to be removed in the TPF;~~
  - ~~charging rules are to be installed and removed in the TPF;~~
- 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.

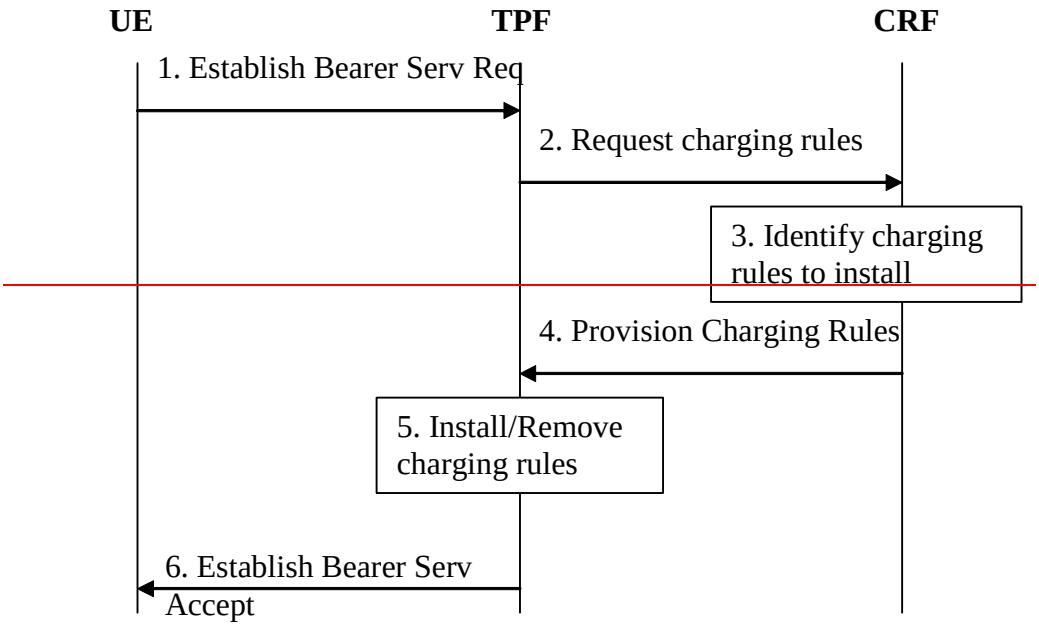
The charging rule provision includes information about the instance it relates to (i.e. identifier for the relevant CRF/TPF instance), charging mechanism (online/offline), volume- or time-based charging indication, charging key, service data flow filter(s), and precedence.

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 >>

7.2.1 Bearer Service Establishment



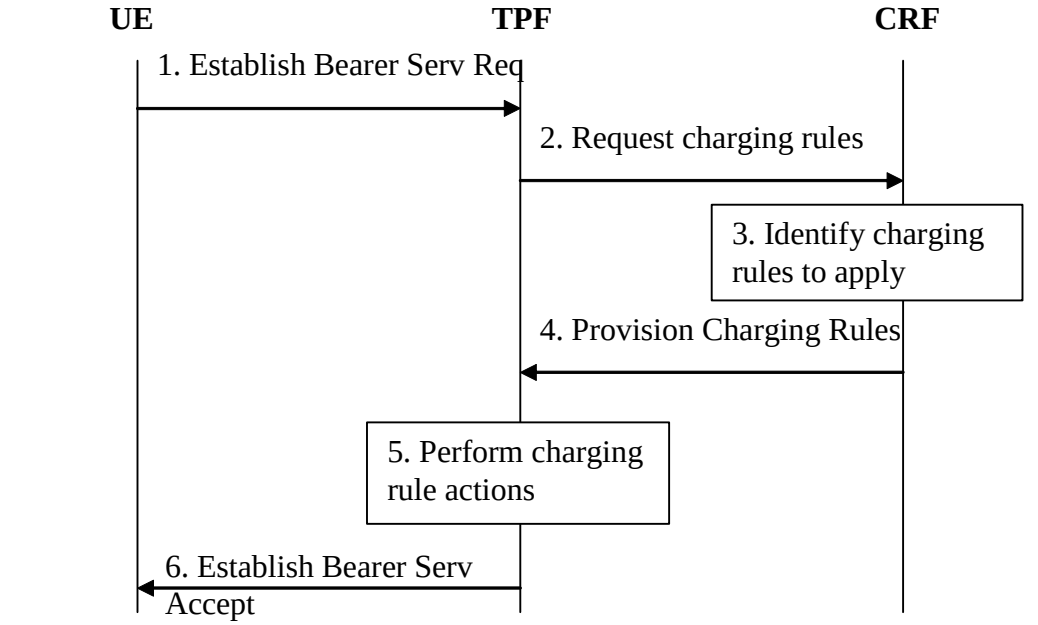


Figure 7.1: Bearer Service Establishment

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 ~~added~~installed, and/or removed, and/or modified.

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

5 The TPF ~~installs/removes the charging rules~~performs charging rule actions as indicated.

6 The TPF continues with the bearer service establishment procedure.

Editor's Note: It is FFS whether the bearer service establishment procedure can proceed in parallel with the charging rules request.

<< Next changed clause >>

7.2.2 Bearer Service Modification

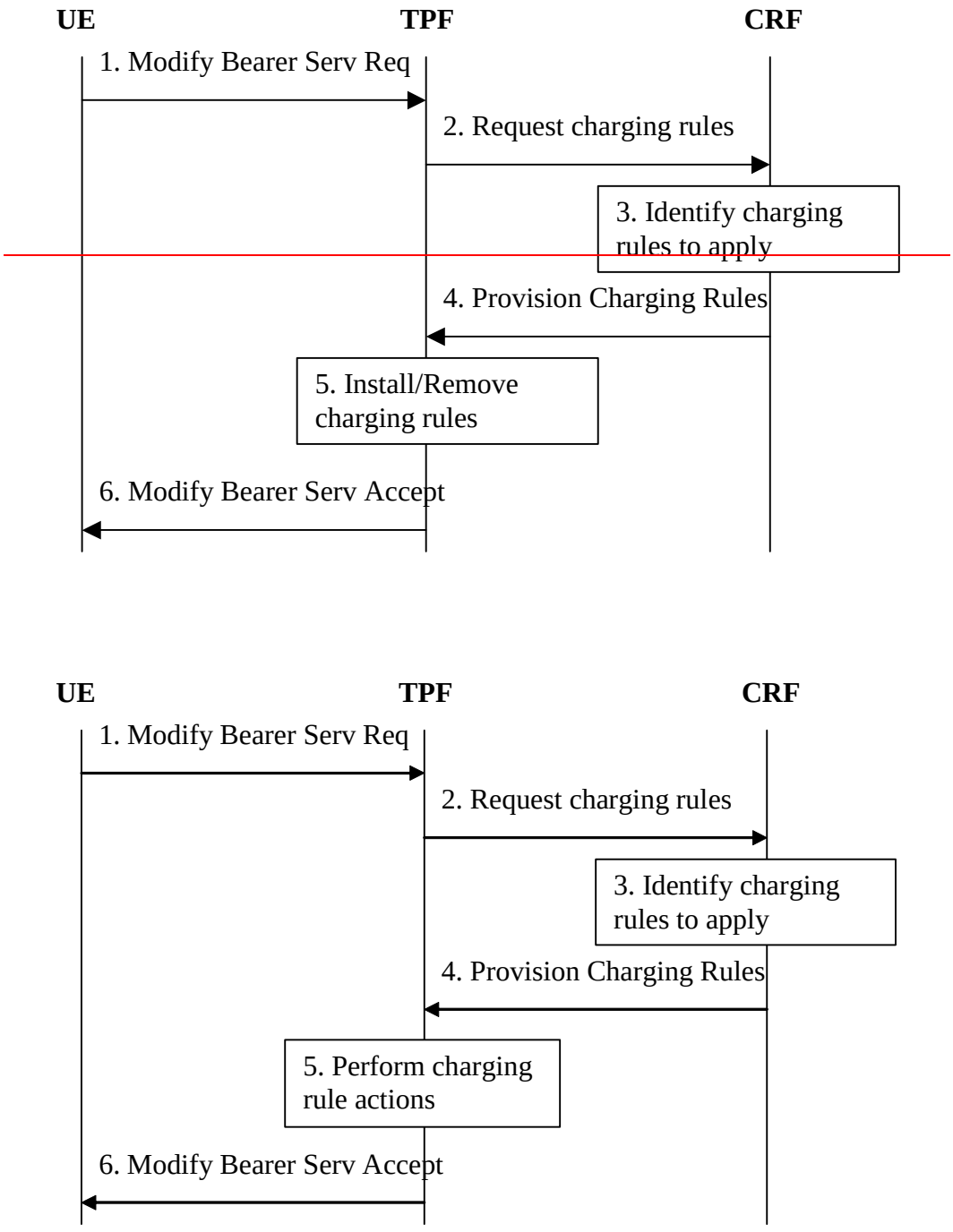


Figure 7.2: Bearer Service Modification

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 ~~added~~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 ~~installs/removes the charging rules~~ performs charging rule actions as indicated.

6 The TPF continues with the bearer service modification procedure.

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

Editor's Note: It is FFS whether the bearer service modification procedure can proceed in parallel with the charging rules request.

<< Next changed clause >>

7.2.3 Bearer Service Termination

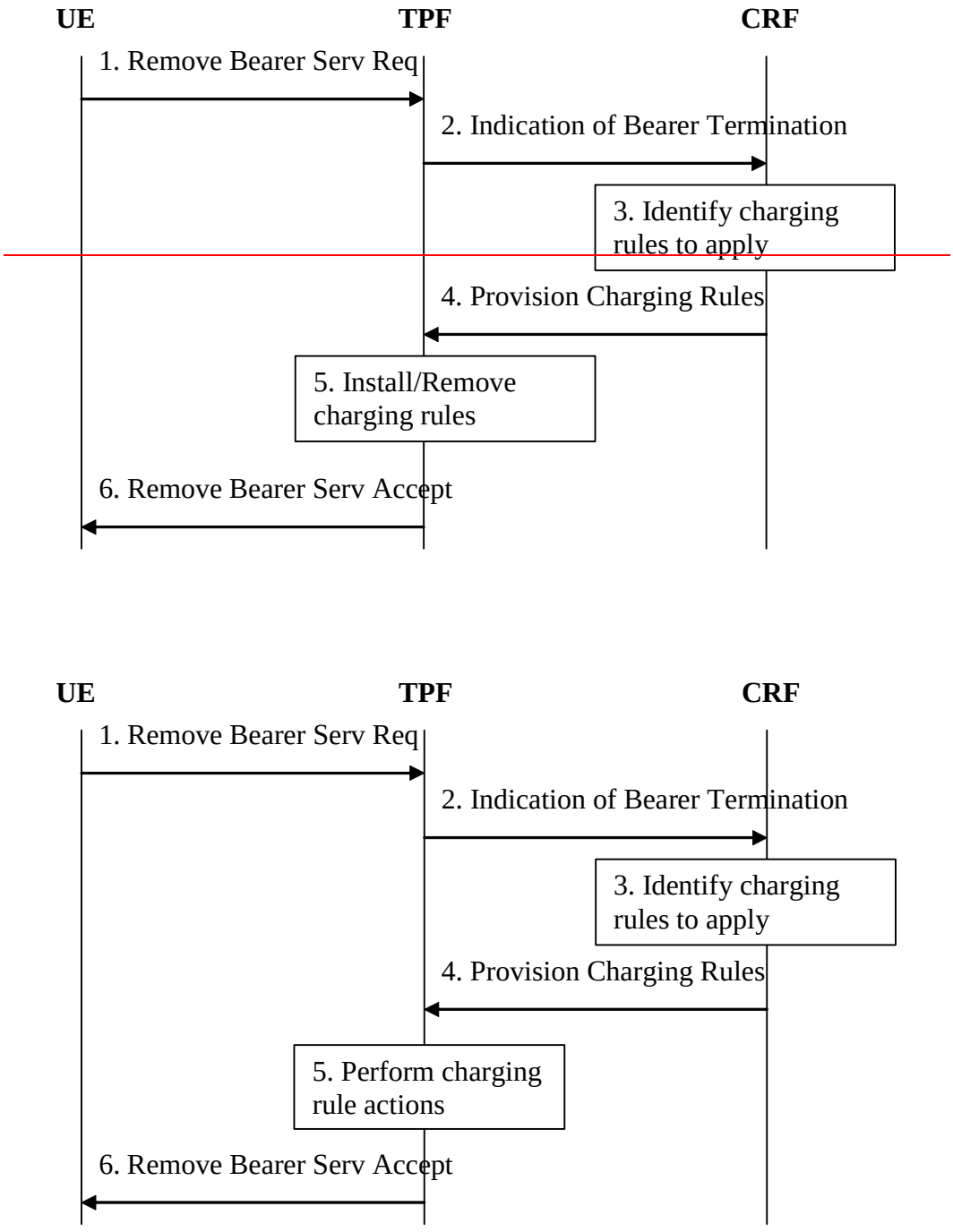


Figure 7.3: Bearer Service Termination

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 ~~added~~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 ~~installs/removes the charging rules~~ performs charging rule actions as indicated.

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.

Editor's Note: It is FFS whether the bearer service termination procedure can proceed in parallel with the indication of bearer termination.

<< Next changed clause >>

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

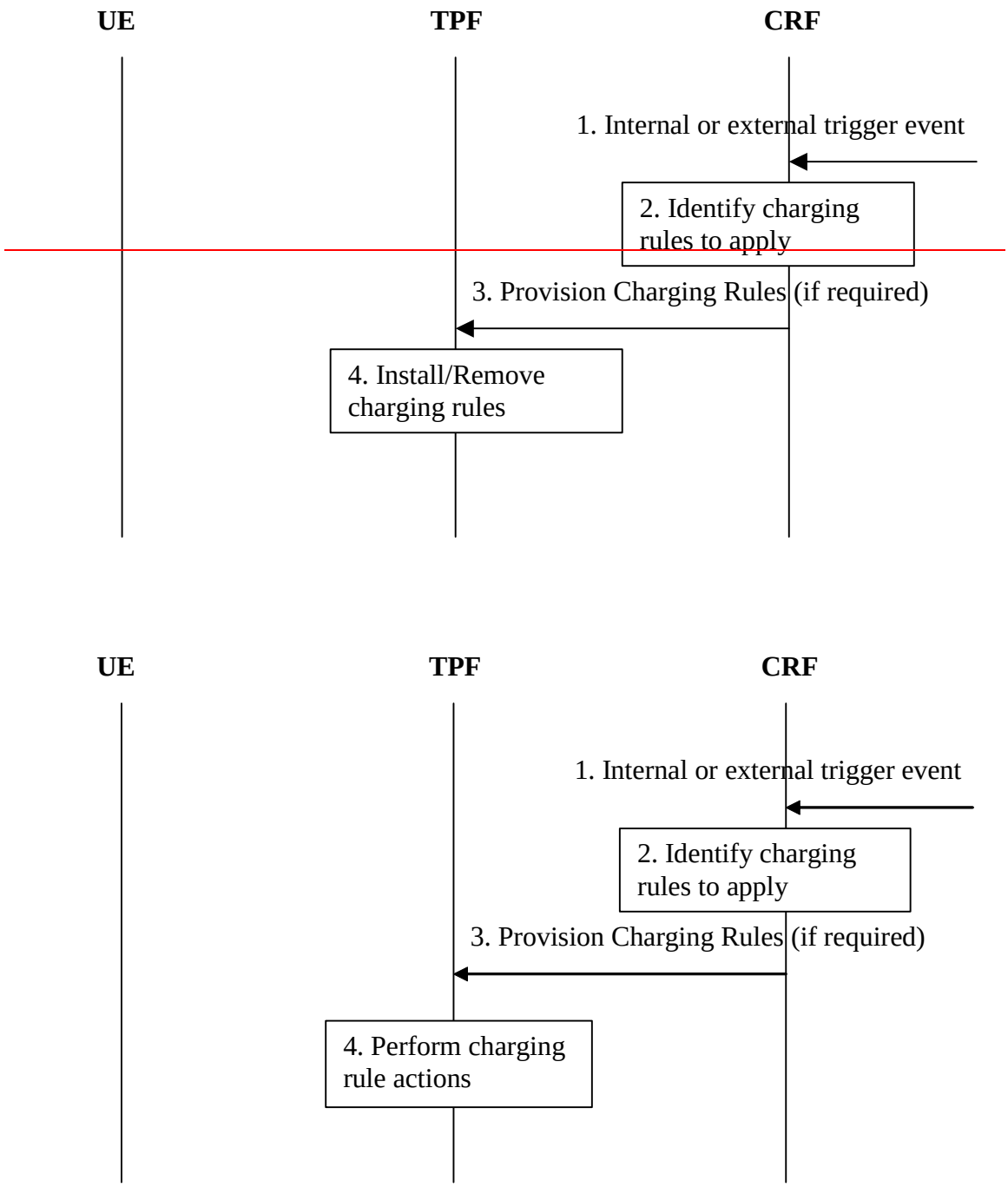


Figure 7.4: Provision of Charging Rules due to external or internal Trigger Event

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 ~~added/removed~~ 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 ~~added~~installed, and/or removed, and/or modified.

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

4 The TPF ~~installs/removes the charging rules~~ performs charging rule actions as indicated.

<< End of changed clause >>

3GPP TSG-SA WG2 Meeting #39
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Tdoc ⌘ S2-041456
Revised S2-041271

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **004** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Add some use cases to the Flow Based Charging
Source:	⌘	SA2 (Huawei, China Mobile)
Work item code:	⌘	CH
Date:	⌘	20/04/2004
Category:	⌘	**B**
Release:	⌘	REL-6

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F *(correction)*
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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:	⌘	In the current TS 23.125 it states that the charging rate or charging model applied to a service data flow may be changed as a result of events in the service or as a result of events identified by the OCS. Considering the need in the market, the operator may also apply a new charging rule based on the event idetified by the TPF. Besides the bearer establishment and modification, the usage information related to the bearer is also required, e.g. the amount of time or volume the user has consumed on the bearer. Therefore some new use cases is added in the Flow Based Charging.
Summary of change:	⌘	Add the description in the clause 4.3.1 to clarify that the charging rate or charging model can also be changed as a result of having used the service data flow for a certain amount of time or volume.
Consequences if not approved:	⌘	Some implementations based on the Flow Based Charging will not be reflected in the specification.

Clauses affected:	⌘	4.3.1

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

⌘

Other comments: ⌘

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<< The first modification >>

4.3 Charging models

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.

Editor's 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).

In the case of online charging, and where information is available to enable service data flow packets to be associated with a specific PDP context, it shall be possible to perform rating and allocate credit depending on the characteristics of the 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).

3GPP TSG SA WG2 meeting #39
Shenzhen, China, 19th – 23rd April 2004

Tdoc ⌘S2-041684

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **006** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Time based charging tariffs
Source:	⌘	SA2 (Nokia)
Work item code:	⌘	CH
Date:	⌘	19/04/2004
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 states as a general charging model requirement: "It shall be possible also to apply special rates based on the time of day". The time of the day may be defined at where the service is provided or at where the user is located. In the current GPRS architecture the TPF is located within the GGSN. If the user is located in another time zone than the GGSN (for example while roaming or within HPLMN that expands over several time zones), and the operator wants the tariff to be based on the time of the day as the user measures it, the requirement can not be fulfilled since the user's location's time is not known by the GGSN.
Summary of change:	⌘	A new information element is added to be passed between the SGSN and the GGSN to allow the GGSN to be aware of the local time where the user is located.
Consequences if not approved:	⌘	

Clauses affected:	⌘	A.2.1, new subclause A.2.9

Other specs Affected:	⌘	Y	N		⌘
		X		Other core specifications	TS 29.060
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:

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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 amended section

A.2.1 S-CDR information missing from G-CDR

The following fields are present in the S-CDR but absent from the G-CDR

- Served IMEI;
- MS Network Capability;
- LAC/RAC/CI at "record opening";
- Access Point Name Operator Identifier;
- System Type;
- CAMEL information;
- RNC unsent data volume;
- Time zone of the user's location.

These parameters are analysed further in the following subsections.

Next amended section

A.2.9 Time zone of the user's location

Tariffs for different service flows may be time dependent, i.e. a tariff is different based on the time of the day, week or year (for example off-peak tariff for weekends, special holidays and/or night-times, on-peak tariff at day-time). Currently the time is reported at where the usage is measured. However the tariff may depend on the time at where the user is located. The time at the user's location may be different than the time at the GGSN due different time zones and daylight saving time settings. Each SGSN should know the area and the corresponding time zone the user is within, and indicate that to the GGSN. Otherwise tariffs based on the time at user's location may not be used.

Hence it is recommended to add "User Location Time Zone" as a parameter to the following GTP messages:

- Create PDP Context Request;
- Update PDP Context Request in case of a SRNC relocation.

This parameter should indicate the offset from the GMT and the Daylight Saving Time period at the user's location. The GGSN adds it to the charging information (either to CDRs or to online credit requests).

NOTE 1: It should be noted that a SGSN may cover an area expanding over several time-zones. This adds complexity when user moves from a time-zone to another during an open PDP context.

NOTE 2: A solution applying user's location based on SGSN address, MNC, MCC or LAC/RAC/CI may not be elegant since it requires to keep information of each location a home users may roam.

3GPP TSG-SA2 Meeting #39
Shenzhen, China, 19-23 April 2004

Tdoc ⌘S2-041685

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **008** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	FBC and IMS
Source:	⌘	SA2 (Nortel Networks)
Work item code:	⌘	CH
Date:	⌘	19/04/2004
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:	⌘	IMS usage of FBC missing
Summary of change:	⌘	Add how IMS can re-use the principles described in the TS.
Consequences if not approved:	⌘	Unclear how IMS can take advantage of new FBC capabilities introduced in rel6

Clauses affected:	⌘	Annex B

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

Other comments:	⌘	

How to create CRs using this form:
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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.
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Annex B (informative):

IMS and Flow based Charging

Flow Based Charging offers other ways that IMS service may be charged. Considering this, we need to study the usage of Flow Based Charging in relation to IMS.

The following needs to be studied:

1. Flow Based Charging needs to provide a solution to the issues solved by Rel5 IMS correlation, considering issues such as backwards compatibility.

2. It needs to be clarified whether having multiple filters provided to the GGSN (over Go and Gx) is an issue (and if it is, it needs to be resolved).

3. How charging rules can be applied to the SIP signalling used for IMS session control

B.1 IMS SIP signalling

This section studies how flow based charging can be applied to the IMS signalling used for IMS session control.

It is to be noted though that the SIP signalling itself could carry different type of information that may be charged differently (e.g. SIP Session Invites, IMS messaging, etc.).

Possible ways to charge SIP ~~at the bearer level~~ with Flow Based Charging could consist of:

- Applying pre-configured static rules in the TPF;
- ~~Requesting~~ Obtaining charging rules from the CRF;
- Updating charging for the IMS signalling charging rules based on specific triggers (e.g. time of day, modification of the session parameters, etc.) for a given user.

Note: the usage of the signalling indication needs to be further studied with respect to Flow Based Charging.

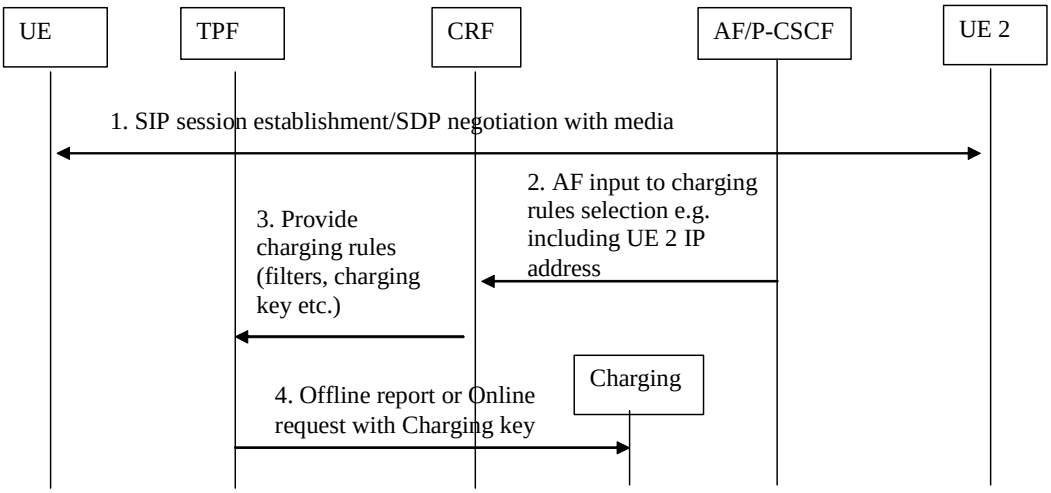
Since IMS SIP signalling may be compressed and encrypted, the TPF needs to be able to filter signalling based on other means than SIP application protocol identification. Therefore filters defined for IMS SIP signalling need to be based on IP 5-tuple. This also allows to charge SIP packets destined to the P-CSCF differently from other non IMS SIP packets.

B.2 IMS media

This section studies how flow based charging can be applied to the media associated with IMS sessions.

IMS media flows can be of two categories:

A. Peer-to-peer IMS media flows. Filters for these flows may need to be dynamically defined as the session control occurs for that particular peer-to-peer session. The details of the filters (e.g. destination address) may need to be dynamically provided to the TPF via the CRF (Rx and Gx interfaces).



1. IMS SIP session establishment occurs between UE1 and UE2, via a P-CSCF

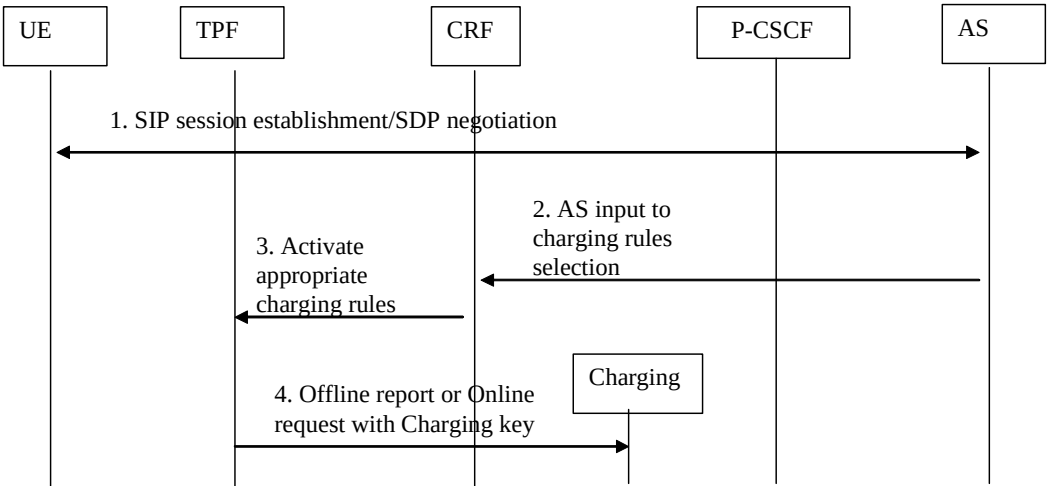
2. The P-CSCF sends Rx input to the CRF for charging rules selection. This may include high level information such as identifying the IMS application. In the case of peer-to-peer, the information may include the IP address of the destination UE in order for the applicable filters to be applied by the CRF and TPF.

3. The CRF uses the input from the P-CSCF to complete the appropriate charging rules. The CRF provides the TPF with an appropriate charging key.

4. The charging key is used as an input to the rating logic in the offline or online charging system.

Note that session based messaging falls into this category, but immediate messaging doesn't (see IMS SIP signalling section).

B. Client/Server IMS media flows. Filters for these flows need to be identified dynamically when the session control is established to the server, but can reference well known IP 5-tuple for the client/server services used.



1. IMS SIP session establishment occurs between UE1 and AS, via a P-CSCF

2. The AS sends Rx input to the CRF for charging rules selection. This may include high level information such as identifying the IMS application.

3. The CRF uses the input from the AS to activate the appropriate charging rules. The CRF provides the TPF with an appropriate charging key.

4. The charging key is used as an input to the rating logic in the offline or online charging system.

The following issues are FFS:

- AF input to the CRF in Step 2 above must include some identifier for the UE, so that the correct TPF can be identified.
- The CRF must determine which of the user's PDP Context(s) the new charging rule needs to be applied to. This could be based on analysis of the Traffic Flow Templates against the IP flow definitions in the new charging rule. Then the OCS may enforce that the IMS charging keys are only used on bearers with the right QoS by only providing quotas at the 'IMS rates' if the QoS matches that which is authorised for that special IMS charging key.

B.3 FBC with IMS compared to rel5 IMS charging correlation

The principles followed in B.1 and B.2 is that the charging key input to the rating logic allows the Offline or Online Charging System to determine the appropriate rate for the IMS session.

In rel5 where a correlation mechanism is used, the Offline or Online Charging System determines the GPRS and IMS charging records that are related in order to apply special handling. One example of special handling is to zero rate the GPRS volume, and use time based charging for the IMS session. Logic for determination of IMS-specific charging policies is contained within the Offline or Online Charging System.

In rel6 with FBC, special handling of IMS traffic can be achieved by activating the appropriate charging rules. For example, filters for IMS media/GPRS data from UE1 to UE2 can be associated in the charging rule with a charging key that is zero rated. Alternatively, special charging keys can be defined for 'IMS voice media' etc. In this case, a large part of the logic which determines IMS-specific charging policies is required to determine the Charging Key to be selected. This logic needs to be executed within the Application Function or Charging Rules function.

Additionally, the Offline and Online Charging systems in rel6, which support the FBC architecture, need to be enhanced to support the concept of charging key and thus use a different charging logic from that user in rel5 with charging correlation.

B.4~~2~~ 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 TS.

These two functions are independent and thus can be provided separately.

3GPP TSG-SA2 Meeting #39
Shenzhen, China, 19-23 April 2004

Tdoc ⌘S2-041279

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **009** ⌘ **rev** **-** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	RAT Type as possible re-authorisation trigger
Source:	⌘	SA2 (Nortel Networks)
Work item code:	⌘	CH
Date:	⌘	19/04/2004
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:	⌘	RAT Type has now been added to the GTP signalling from the SGSN to the GGSN. Thus it is possible that when the GGSN is informed of a change of the access technology, it asks for a re-authorisation.
Summary of change:	⌘	Add “RAT type change” as a possible trigger for re-authorisation.
Consequences if not approved:	⌘	Flexible credit management dependent upon Access Technology is not covered.

Clauses affected:	⌘	5.5

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.

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, 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 creditlimit, 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: 'credit' 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).

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

3GPP TSG-SA2 Meeting #39
Shenzhen, China, 19-23 April 2004

Tdoc ⌘S2-041592

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **011** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Ro reference removal
Source:	⌘	SA2 (Nortel Networks)
Work item code:	⌘	CH
Date:	⌘	19/04/2004
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:	⌘	23.125 contains a reference to Ro under Gy reference point. This attempts to reflect that we expect Gy to use Diameter Credit Control. However Ro was defined for IMS only whereas Flow Based charging applies to many services.
Summary of change:	⌘	Remove reference to Ro and instead include reference to Diameter Credit control.
Consequences if not approved:	⌘	Incorrect implication that FBC credit control is IMS only.

Clauses affected:	⌘	2, 6.3.2

	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.

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: “Telecommunication management; Charging management; Charging data description for the IP Multimedia Subsystem (IMS)”.

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

[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.

NEXT CHANGE

6.3.2 Gy reference point

The Gy reference point allows credit control for service data flow based online charging. The functionalities required across the Gy reference point use existing functionalities and mechanisms ~~specified for the release 5 Ro interface~~ for example based on [9].

~~The Ro interfaceis specified for release 5 in TS 32.200 [3] and TS 32.225 [7].~~

3GPP TSG-SA2 Meeting #39
Shenzhen, China, 19-23 April 2004

Tdoc ⌘S2-041686

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **012** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Bearer establishment, charging rules availability and credit control
Source:	⌘	SA2 (Nortel Networks)
Work item code:	⌘	CH
Date:	⌘	19/04/2004
Category:	⌘	**F**
Release:	⌘	Rel-6

Use one of the following categories:
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R99 *(Release 1999)*
Rel-4 *(Release 4)*
Rel-5 *(Release 5)*
Rel-6 *(Release 6)*

Reason for change:	⌘	Currently 23.125 says that it is FFS whether the PDP context/Bearer establishment can proceed at the GGSN/TPF before charging rules have been received from the CRF. It is proposed to resolve the FFS note by not proceeding the bearer establishment before Gx (and Gy in case of online) input. Flows are added to show the online case where the operator can control bearer establishment depending on credit availability. This avoids e.g. roaming users to establish PDP contexts (and thus roaming charges to home operators) in cases where the user was not authorised or had no credit anyway. For bearer modification, if there is a trigger at the TPF that decides that new CRF input is required then it seems reasonable to wait for the CRF input before accepting the modification, as currently shown. OCS involvement upon bearer modification will depend on any re-authorisation/re-recording triggers – this is discussed in another contribution which proposes in line with this that in case of online charging, if re-authorisation/re-recording is required, the TPF shall wait for the credit control information before accepting the Bearer modification. For bearer termination there seems to be no reason to control the bearer removal depending on CRF or OCS input and thus it is proposed to allow parallel processing.
Summary of change:	⌘	For bearer establishment Gx (with user information) check needs to be done first before accepting bearer establishment. Further for online charging, the next step of credit availability is needed before accepting bearer establishment at the TPF. For bearer modification, Gx info also needs to be available before accepting the bearer modification. For bearer termination, parallel processing is allowed.
Consequences if not approved:	⌘	FFS remains. No ability for operator to control bearer establishment and modification depending on authorisation and credit availability.

Clauses affected:	⌘	7.2

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		
Other comments:	⌘	The text below assumes that CR#3 [S2-041461rev1 under e-mail approval after SA2#39] is approved, i.e. updates to step 3 and 5 of the text added under figures 7.2, 7.4 and 7.6 have been made to align with CR#3, as well as updates to box 5 in those figures.				

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7.2 Bearer events

7.2.1 Bearer Service Establishment

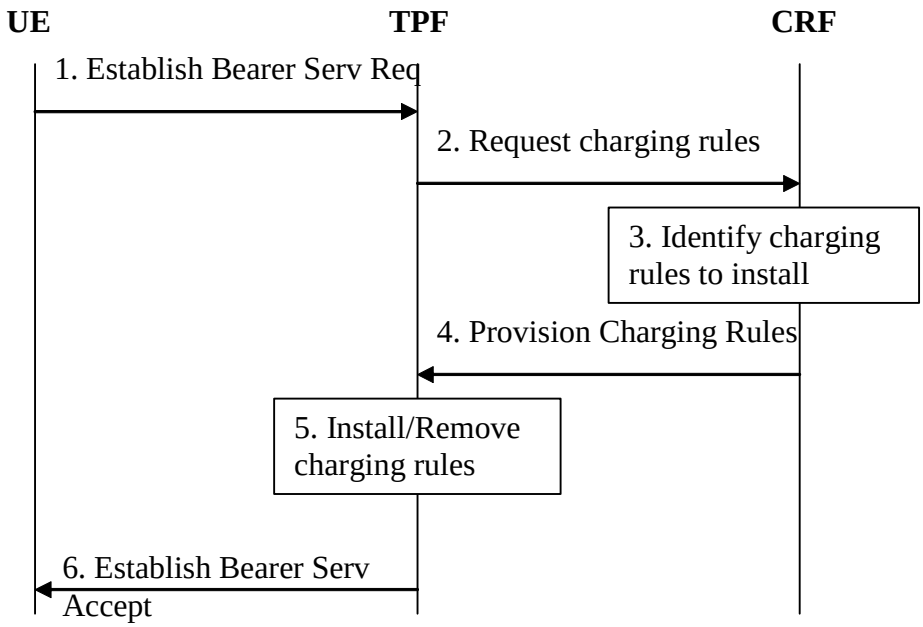


Figure 7.1: Bearer Service Establishment in case of offline charging

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 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 added, and/or removed.
4. The CRF provides the charging rules to the TPF. This message is flagged as the response to the TPF request.
5. The TPF installs/removes the charging rules as indicated.
6. The TPF continues with the bearer service establishment procedure.

~~Editor's Note: It is FFS whether the bearer service establishment procedure can proceed in parallel with the charging rules request.~~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.

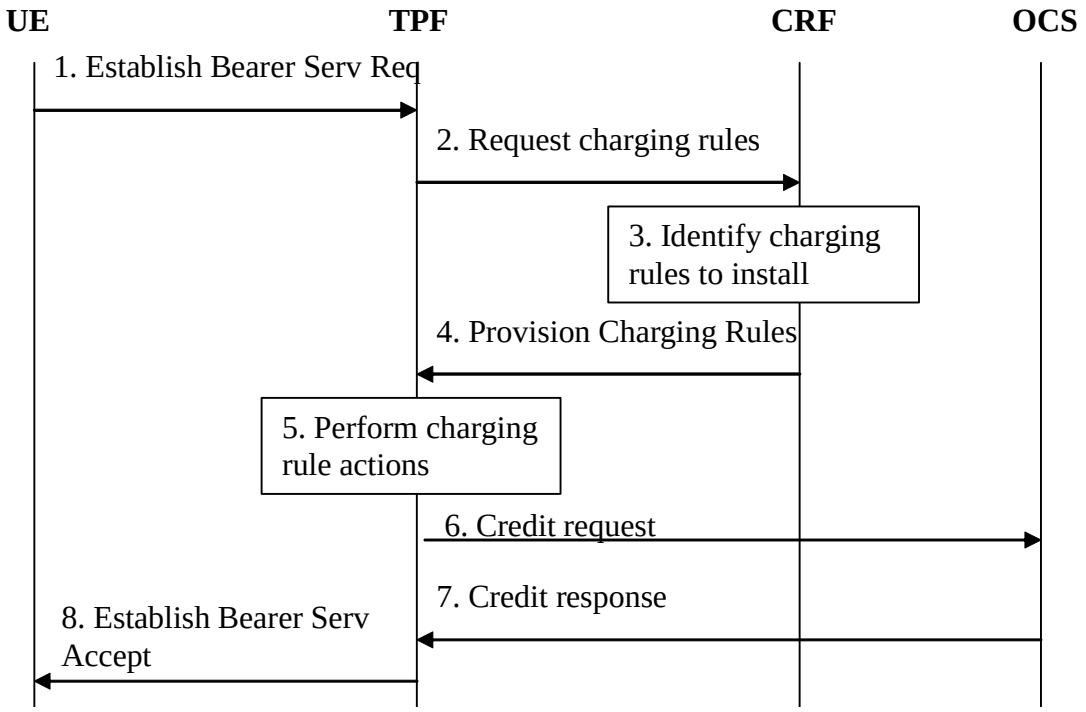


Figure 7.2: Bearer Service Establishment in case of online charging

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.

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

5. The TPF performs charging rule actions as indicated.

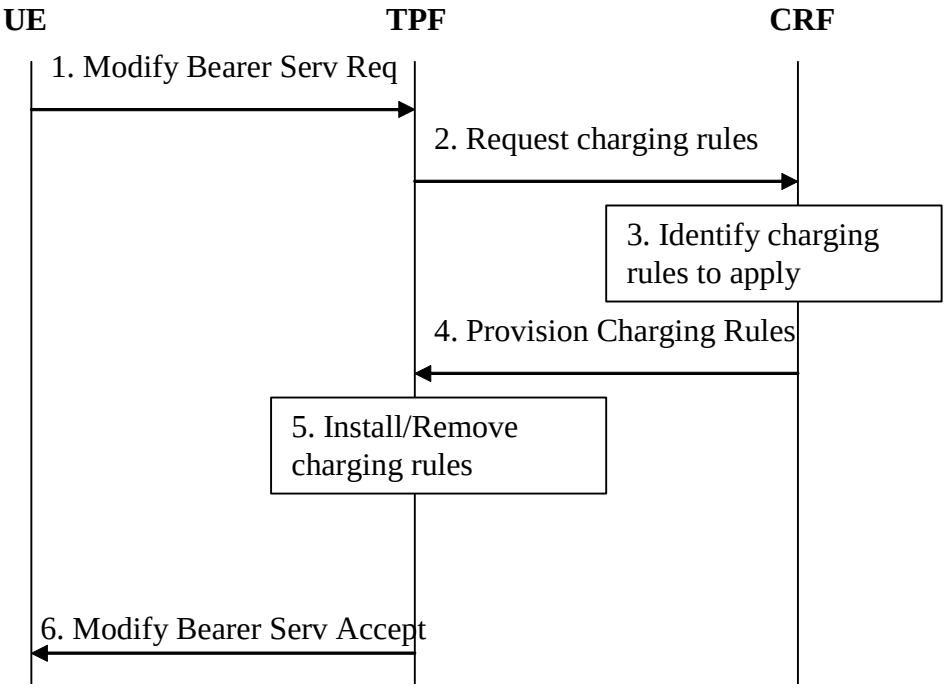
6. The TPF requests credit availability to the OCS, and provides relevant input information for the OCS decision.

7. The OCS provides the credit information to the TPF.

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.

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

7.2.2 Bearer Service Modification



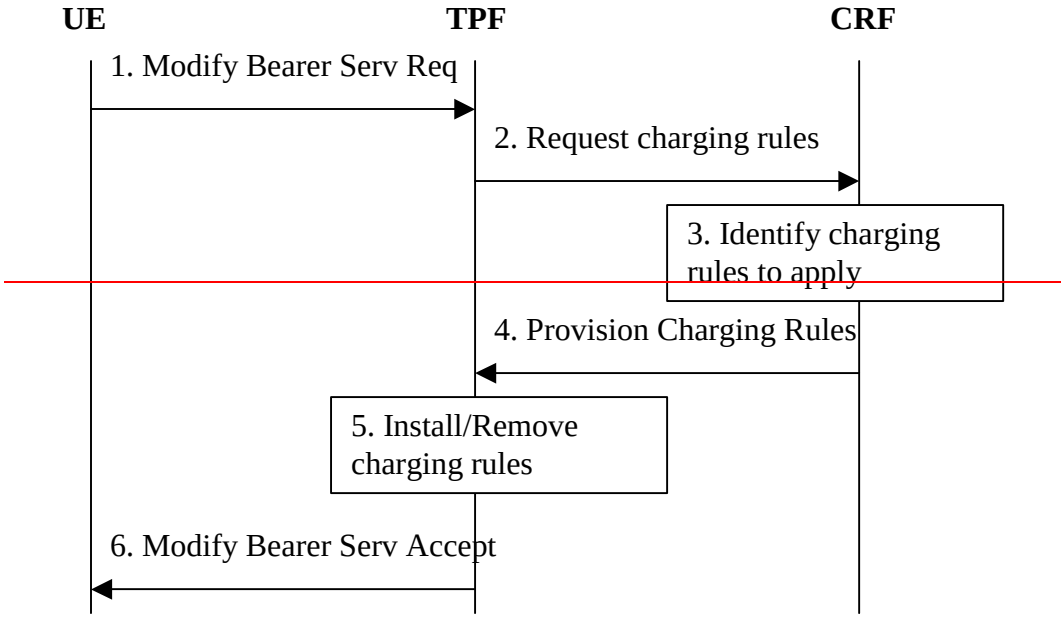


Figure 7.~~2~~3: Bearer Service Modification in case of offline charging

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 added, and/or removed.

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 installs/removes the charging rules as indicated.

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

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

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

~~Note: It is FFS whether the bearer service modification procedure can proceed in parallel with the charging rules request.~~

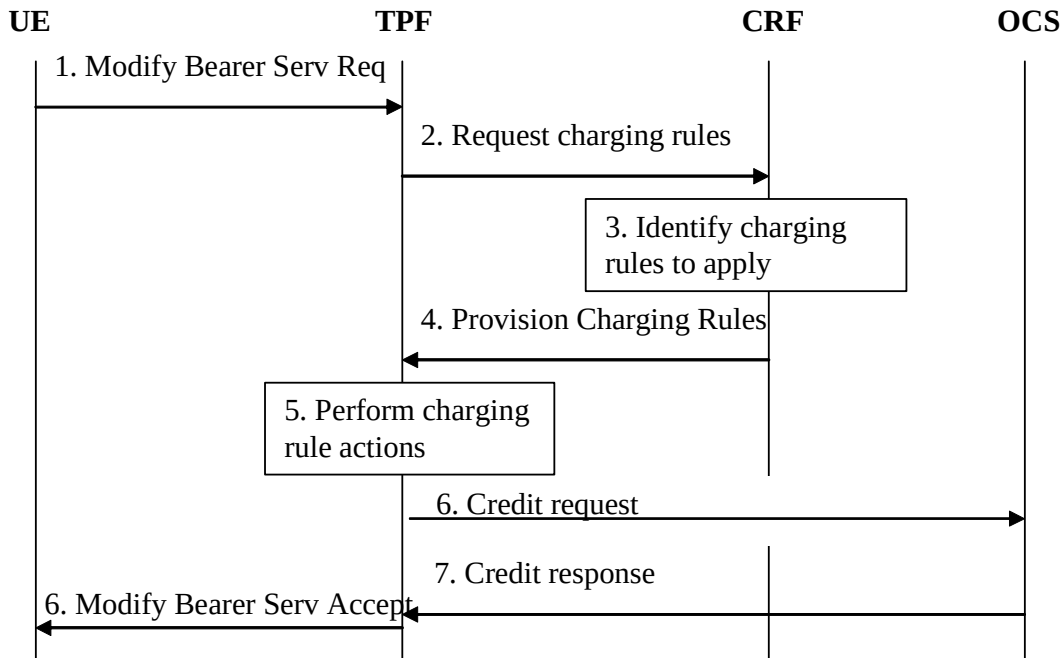


Figure 7.4: Bearer Service Modification in case of online charging

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.

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

7.2.3 Bearer Service Termination

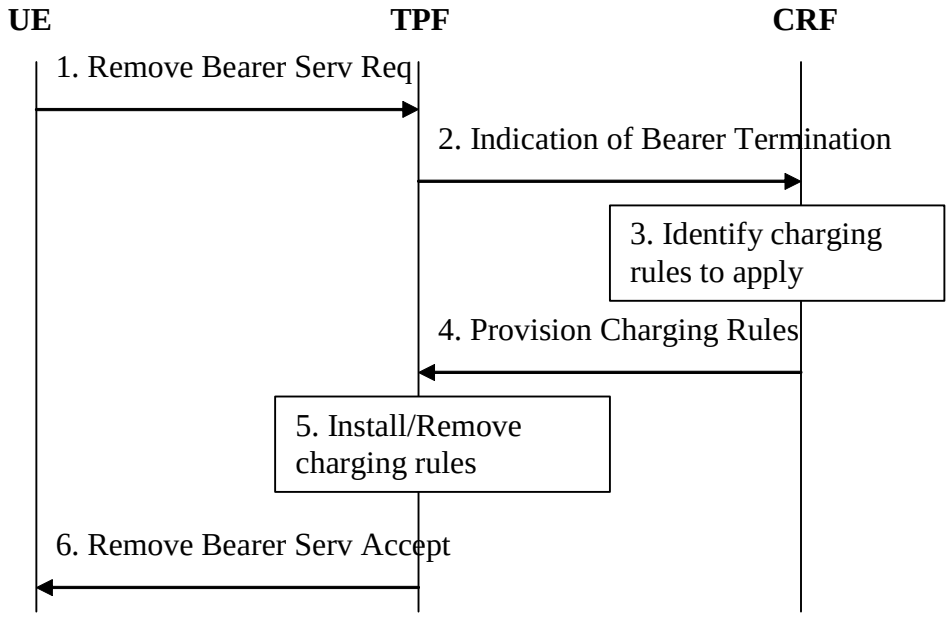


Figure 7.5~~3~~: Bearer Service Termination in case of offline charging

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 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 added, and/or removed.
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 installs/removes the charging rules as indicated.
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.

~~Editor's Note: It is FFS whether the~~ The bearer service termination procedure can proceed in parallel with the indication of bearer termination.

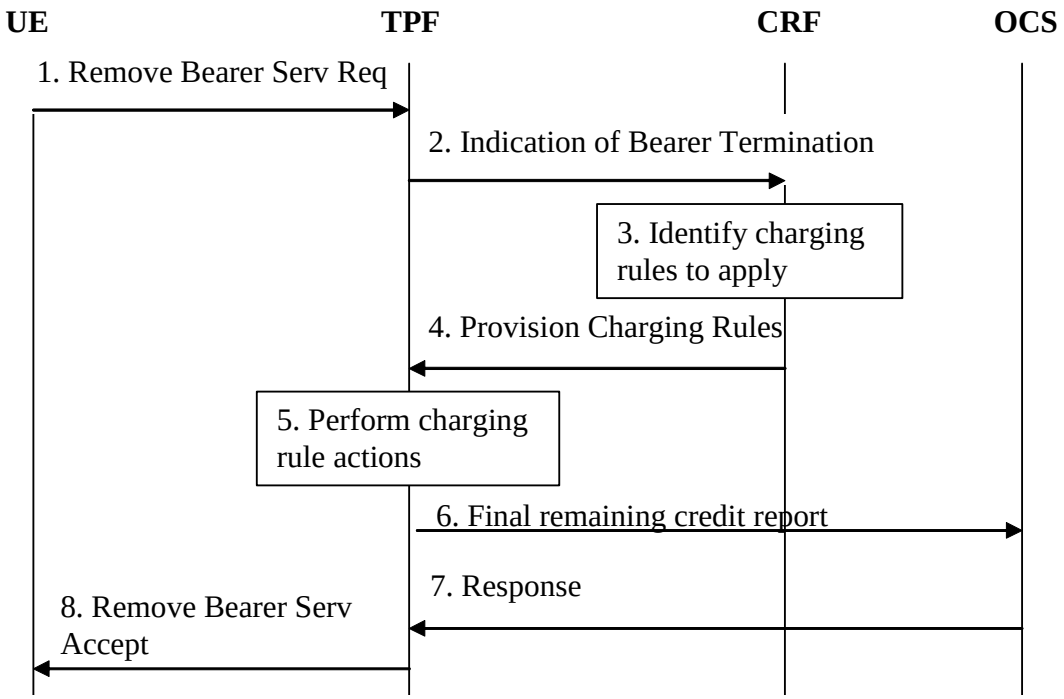


Figure 7.6: Bearer Service Termination in case of online charging

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.

6. The TPF reports the final remaining credit usage to the OCS for each charging rule.

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.

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

3GPP TSG-SA2 Meeting #39
Shenzhen, China, 19-23 April 2004

Tdoc ⌘S2-041663

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **013** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Traffic flow at TPF
Source:	⌘	SA2 (Nortel Networks, Ericsson)
Work item code:	⌘	CH
Date:	⌘	19/04/2004
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:	⌘	The TPF gets charging rules from the CRF. Specific and more generic rules may be provided. If no rules is available for a particular flow, then the traffic should not be allowed. Further the TPF gets credit from the OCS, and if no credit is granted, then the TPF should not allow traffic.
Summary of change:	⌘	TPF does not allow traffic to flow if it does not match any charging rule. In case of online, it does not allow traffic if no quota has been given by the OCS.
Consequences if not approved:	⌘	Traffic that is not charged may be allowed to flow at the TPF.

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

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

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

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

5.3 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 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 don't match any other charging rule. ~~an operator configurable default charging should be applied. The default charging may use accounting information provided by FBC, or may use accounting information provided by other charging mechanisms available for the IP Connectivity Access Network (e.g. existing GPRS charging mechanisms)~~.
- The service data flow filters and counting are applied by the TPF (the GGSN in the case of GPRS).

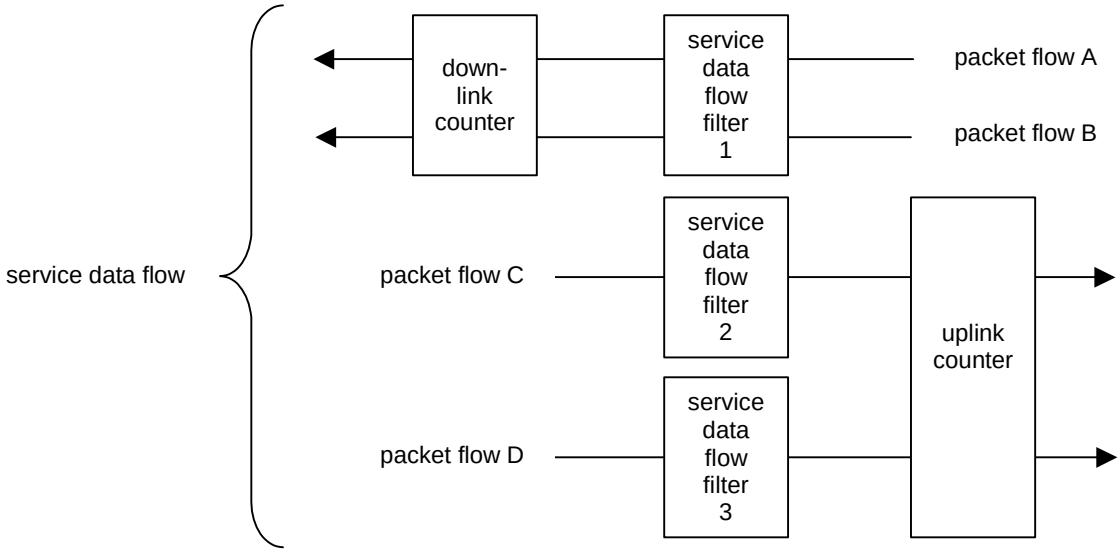


Figure 5.1 – Relationship of service data flow, packet flow and service data flow filter

NEXT CHANGE

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.

Editor's 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.

Editor's 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.

Editor's 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 relevant for the selection of the charging rules, the Traffic Plane Function shall request 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.

3GPP TSG-SA WG2 Meeting #39
Shenzhen, China, 19th – 23rd April 2004.

Tdoc ⌘S2-041662

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **014** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Bearer modification triggers
Source:	⌘	SA2 (Nortel Networks)
Work item code:	⌘	CH
Date:	⌘	19/04/2004
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:	⌘	This contribution introduces new functionality in the TPF which identifies whether charging rules need to be simply re-rated or whether the TPF needs to contact the CRF in order to install new charging rules. The requirement for a bearer modified change in a charging rule is not at all clear, whereas the requirement for a bearer modified change in rating is obvious. We define rating and modification information in a charging rule which defines for the online case the situations where the TPF can simply perform an interaction with the charging systems of an existing service data flow and the cases where charging rule modification is required (and by inference, the cases where no action is required). This allows for optimization of the TPF-OCS interface since only existing charging sessions are modified. Also this allows optimization of the TPF-CRF interface since now it is explicitly defined when a bearer modification requires a new charging rule to be installed.
Summary of change:	⌘	Introduces new functionality in the TPF which identifies whether charging rules need to be simply re-rated or whether the TPF needs to contact the CRF in order to install new charging rules.
Consequences if not approved:	⌘	Requests for charging rules would be made by TPF when not necessary. Cases for re-authorisation not fully specified.

Clauses affected:	⌘	5.2, 5.4, 5.7 (new section), 6.2.4, 6.3.1.2, 7.2.2

		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

********** 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.
- 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 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;
- Event triggers are associated with all charging rules for a user and IP network connection.

- 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 or groups of users.
- Different charging rules can be applied based on the location of the user (e.g. based on identity of the roamed to network).
- For GPRS, charging rule assignment can occur at PDP context establishment and modification.
- For GPRS, the charging rules can be dependent on the APN used.

********** Second Change**********

5.4 Reporting

This refers to the differentiated charging information being reported to the charging functions. Basic example: those 20 packets were in rating category A, include this in your global charging information.

- The Traffic Plane function shall report bearer charging information for online charging;
- The Traffic Plane function shall report bearer charging information for offline charging;
- Charging information is reported based on the application of the bearer charging rules in the TPF (service data flow related charging information), and in the case of GPRS, as specified in [3] (per PDP context);
- The Traffic Plane function shall report triggered Events of an existing charging rule for both offline and on-line charging;
- The Traffic Plane function shall report triggered re-authorisation of existing charging rules for on-line charging;
- It shall be possible to report charging information showing usage for each user for each charging rule, e.g. a report may contain multiple containers, each container associated with a charging key;
- It shall be possible to associate per PDP context charging information with the corresponding service data flow based charging information. It shall be possible to derive or account the data volumes per PDP context for traffic not accounted via any applicable charging rule.
  For example, in the case of GPRS, output of FBC data per charging rule on a per PDP context basis would allow non-FBC charged data volumes to be determined, and existing GPRS charging mechanisms to be applied.

Editor's Note: How online GPRS charging can be supported for packets not accounted by FBC is FFS.

********** Third Change**********

5.7 Re-authorisation and Event Triggers

Re-authorisation applies to online charging. For each charging rule, the TPF has re-authorisation trigger information 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.

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.

********** Fourth Change**********

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.

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.

Editor's 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.

Editor's 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.

Editor's 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 ~~relevant for the selection of the charging rules, the Traffic Plane Function shall 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.

********** Fifth Change**********

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 ~~establishment/~~modification for GPRS) if the Event trigger is met, or
- When the specific event of the Event trigger is detected~~, the TPF requests the charging rules to be applied~~.

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.

Editor's 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.

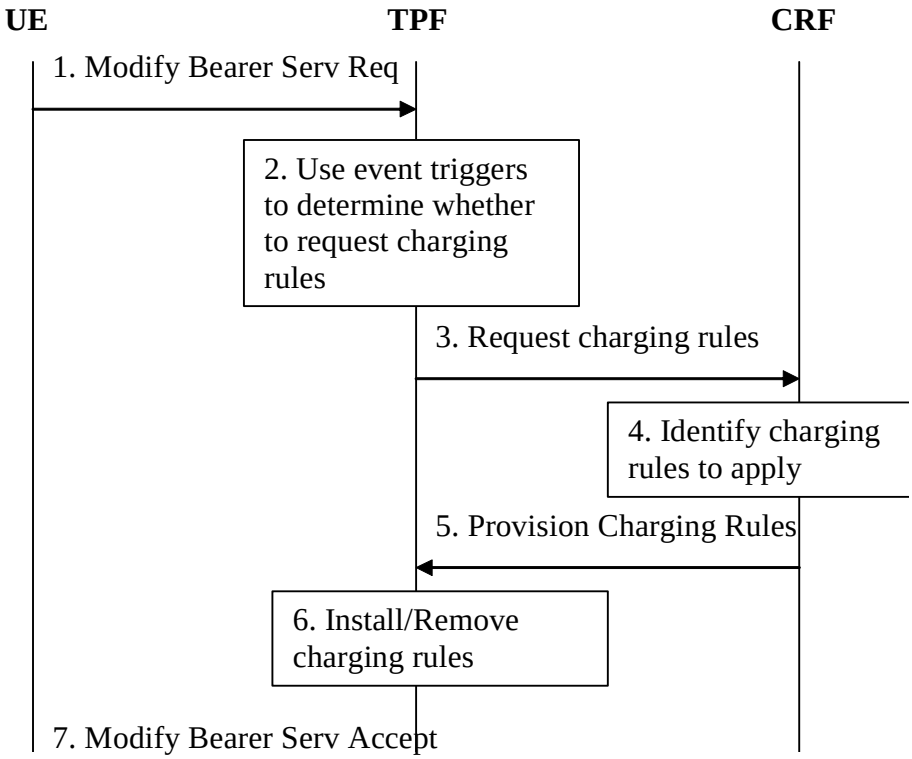
********** Sixth Change**********

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 bearer modification



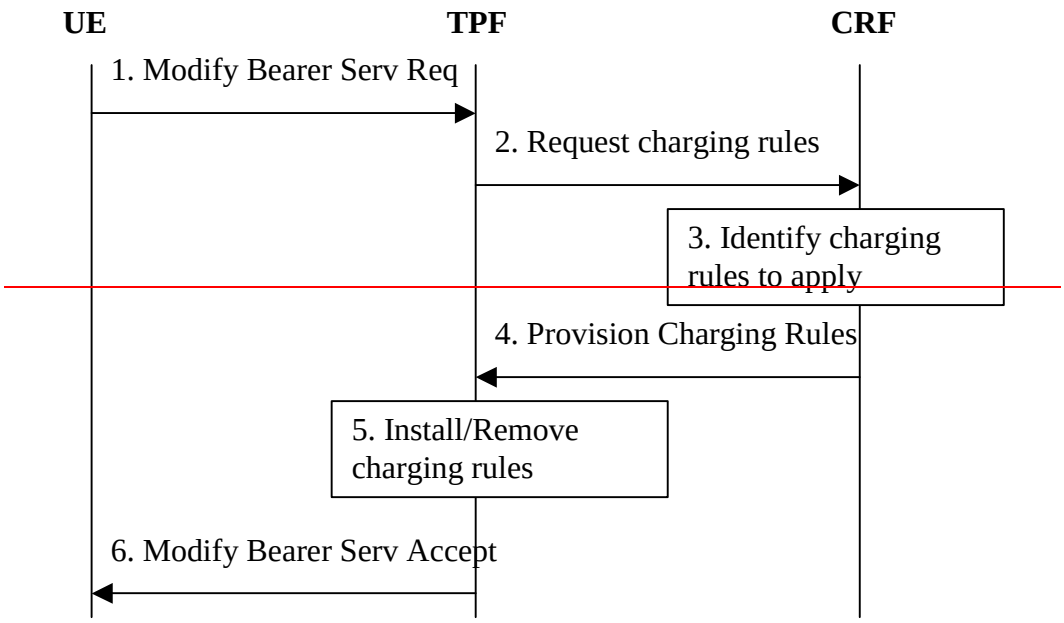


Figure 7.2a: Bearer Service Modification triggered Charging Rule Request

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

~~2~~3 The TPF requests the applicable charging rules, and provides relevant input information for the charging rule decision.

~~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 added, and/or removed.

~~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 installs/removes the charging rules as indicated.

~~6~~7 The TPF continues with the bearer service modification procedure.

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

Editor's Note: It is FFS whether the bearer service modification procedure can proceed in parallel with the charging rules request.

7.2.2.3 Triggered Re-authorisation

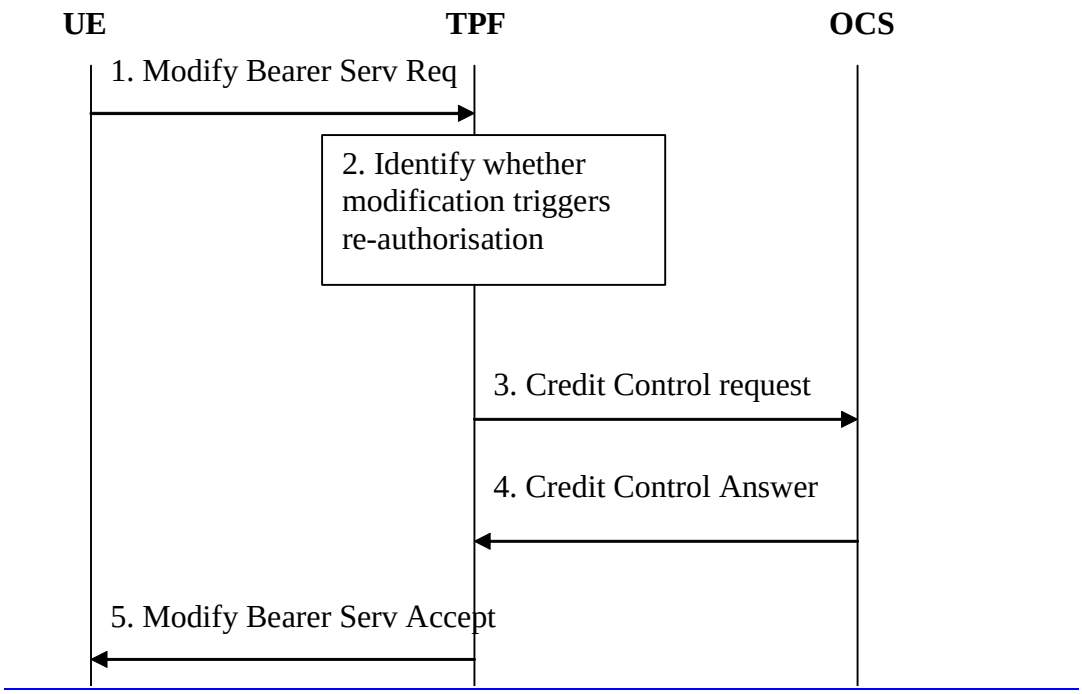


Figure 7.2b: Bearer Service Modification triggered re-authorisation

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

2 For online charging, the TPF identifies whether the modification matches the re-authorisation trigger(s).

3 For online charging 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 For online charging, the OCS re-authorizes the appropriate charging rules.

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

In case of online charging, if re-authorisation is required, the TPF shall wait for the credit control information before deciding whether to accept or not the Bearer modification.

Editor's note: It is FFS what happens if no credit is granted.

********** End of Change**********

3GPP TSG-SA2 Meeting #39
Shenzhen, China, 19-23 April 2004

Tdoc ⌘S2-041457

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **016** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Time and volume allocation in online charging
Source:	⌘	SA2 (Nortel Networks)
Work item code:	⌘	CH
Date:	⌘	19/04/2004
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:	⌘	Currently the TS mentions that time based charging or volume based charging can be supported. We propose to clarify that both volume and time can be used. In case of online, this allows for the OCS a kind of control of how the resources are used.
Summary of change:	⌘	Add volume and time based charging. Add that the OCS can choose to allocate volume and time credit depending on how it wants to control the resource usage.
Consequences if not approved:	⌘	Some charging models missing in the TS.

Clauses affected:	⌘	4.3.1

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.

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.

Editor's 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, and where information is available to enable service data flow packets to be associated with a specific PDP context, it shall be possible to perform rating and allocate credit depending on the characteristics of the 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).

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).

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Shenzhen, China, 19th – 23rd April, 2004

Tdoc ⌘ S2-041289

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **018** ⌘ **rev** **-** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	General corrections
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	14/04/2004
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 text in several sections of 23.125 is not aligned with regard to time based charging, charging rules assignment and some terminology.
Summary of change:	⌘	A number of corrections are proposed that align and update different sections of the specification.
Consequences if not approved:	⌘	The specification would be inconsistent and could be misunderstood.

Clauses affected:	⌘	5.1, 5.2, 6.3.4.1, 7.2			
		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.

Start of 1st 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.

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.
- 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 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.
- 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 or groups of 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 ~~establishment~~activation, ~~and~~ modification and deactivation.
- For GPRS, the charging rules can be dependent on the APN used.

End of 2nd modified section

Start of 3rd modified section

6.3.4.1 General

The Rx reference point enables transport of information (e.g. dynamic media stream information) from the application function to the charging rules function. An example of such information would be filter information to identify the ~~packet~~ service data flow.

End of 3rd modified section

Start of 4th modified section

7.2 Bearer events

7.2.1 Bearer Service Establishment

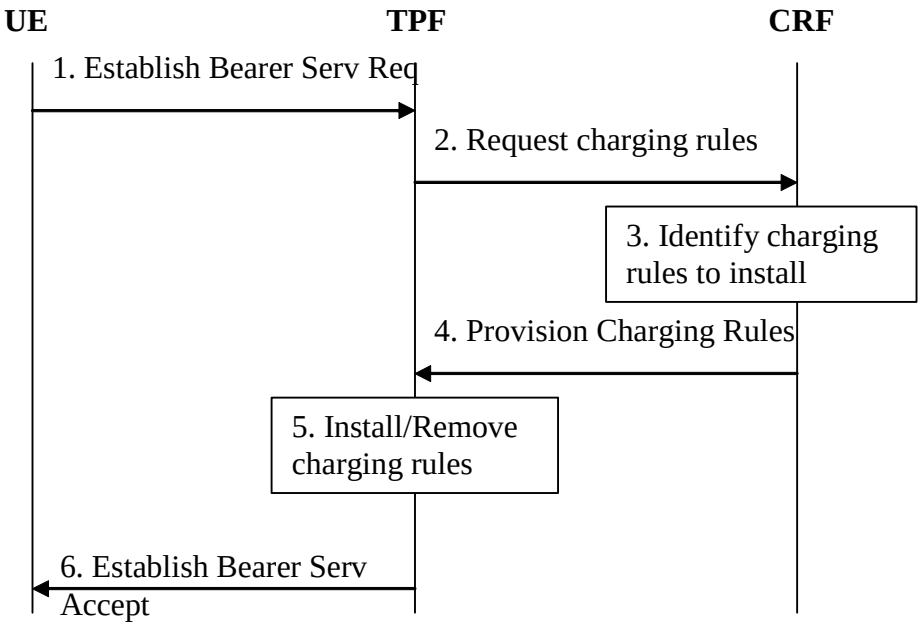

Figure 7.1: Bearer Service Establishment

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~~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 added, and/or removed.

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

5 The TPF installs/removes the charging rules as indicated.

6 The TPF continues with the bearer service establishment procedure.

Editor's Note: It is FFS whether the bearer service establishment procedure can proceed in parallel with the charging rules request.

7.2.2 Bearer Service Modification

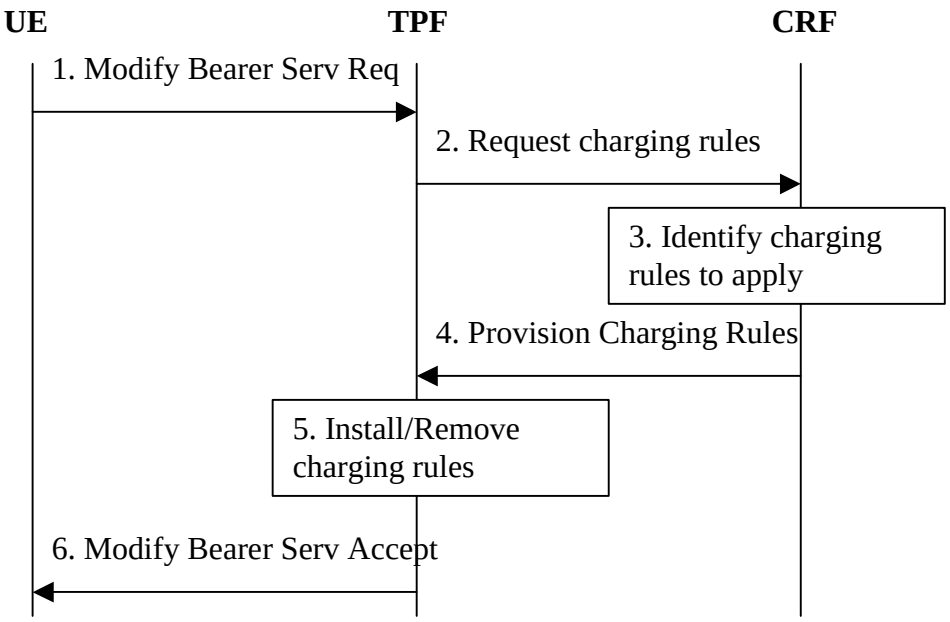

Figure 7.2: Bearer Service Modification

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 indicating a bearer modification, and provides relevant input information for the charging rule ~~decision~~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 added, and/or removed.

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 installs/removes the charging rules as indicated.

6 The TPF continues with the bearer service modification procedure.

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

Editor's Note: It is FFS whether the bearer service modification procedure can proceed in parallel with the charging rules request.

7.2.3 Bearer Service Termination

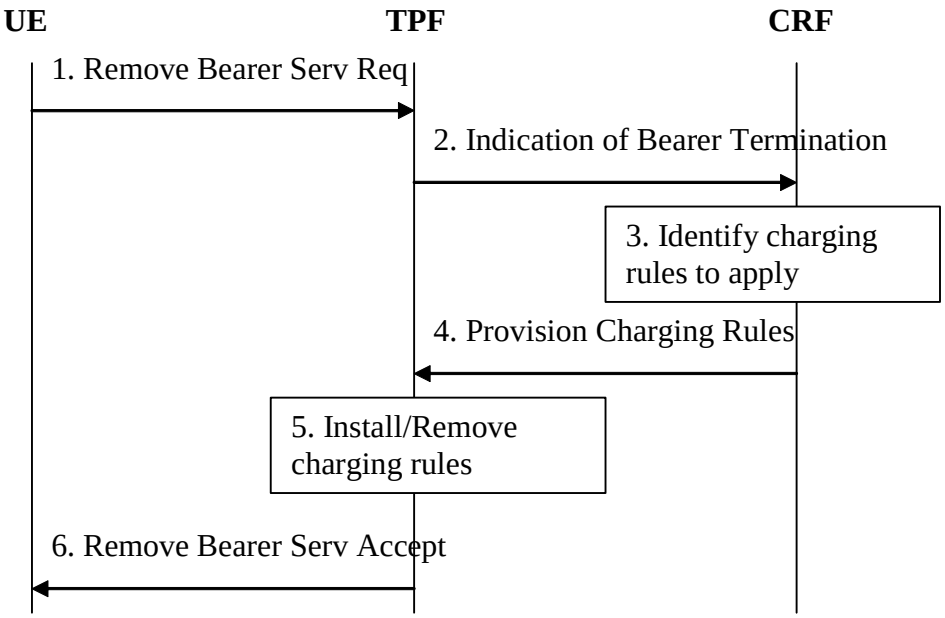

Figure 7.3: Bearer Service Termination

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~~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 added, and/or removed.

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 installs/removes the charging rules as indicated.

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.

Editor's Note: It is FFS whether the bearer service termination procedure can proceed in parallel with the indication of bearer termination.

End of 4th modified section

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Shenzhen, China, 19th – 23rd April, 2004

Tdoc ⌘ S2-041290

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CHANGE REQUEST

⌘ **23.125** **CR** **019** ⌘ **rev** **-** ⌘ Current version: **6.0.0** ⌘

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

Title:	⌘	Gx connection maintenance
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	14/04/2004
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 specifies requirements for the maintenance of the connection between the CRF and the TPF. The possibility of redirecting and failover is described. However it is not clear which entities may change.
Summary of change:	⌘	It is clarified that only the CRF may change. Furthermore, a change is only possible if the new CRF is responsible for the same UE identity information.
Consequences if not approved:	⌘	The text could be misunderstood that also the TPF could change. However, a change of the TPF and thus the GGSN is in general not possible for an ongoing service.

Clauses affected:	⌘	6.3.1.1

		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.

Start of modified section

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 ~~node~~CRF.

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

End of modified section

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Tdoc ⌘ S2-041291

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CHANGE REQUEST

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

Title:	⌘	Rx connection maintenance
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	14/04/2004
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:
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 specifies requirements for the maintenance of the connection between the CRF and the AF. The possibility of redirecting and failover is described. However it is not clear which entities may change.
Summary of change:	⌘	It is clarified that only the CRF may change. Furthermore, a change is only possible if the new CRF is responsible for the same UE identity information.
Consequences if not approved:	⌘	The text could be misunderstood that also the AF could change. However, a change of the AF would be very complex for an ongoing service.

Clauses affected:	⌘	6.3.4.2

		Y	N		
Other specs affected:	⌘		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 modified section

6.3.4.2 Initialisation and Maintenance of Connection

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

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

End of modified section

3GPP TSG-SA2 Meeting #39
Shenzhen, China, 19th – 23rd April 2004

Tdoc ⌘S2-041661

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **021** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	FBC online charging
Source:	⌘	SA2 (Ericsson)
Work item code:	⌘	CH
Date:	⌘	30/04/04
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:	⌘	It is FFS how online GPRS charging can be applied for packets not accounted by FBC. This is issue needs to be clarified.
Summary of change:	⌘	It is proposed that FBC shall provide complete coverage of all traffic and that other online procedures shall not be required when FBC is used.
Consequences if not approved:	⌘	It is unclear how online FBC is done.

Clauses affected:	⌘	4.2, 4.3.1, 5.4

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

Other comments: ⌘

How to create CRs using this form:

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

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

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

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

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

4.2 Backwards compatibility

The capabilities of the enhanced architecture introduced with flow based charging shall be backwards compatible with the release 5 charging capabilities. These new functions shall be compatible and coherent with the authentication, authorization, PDP context management, roaming and other functions provided by the release 5 architecture.

It shall be possible to collect data volumes per PDP context for use in billing and operational management systems.

Flow based charging is assumed to provide complete coverage of all traffic, but i~~I~~t shall be possible to collect statistics on ~~derive~~ data volumes, which were ~~are~~ not subject to service data flow based charging.

In case of GPRS ~~The~~ the data volumes may be charged according to the GPRS offline charging mechanisms.

In case of GPRS, when service data flow based online charging is applied in the GGSN, other GPRS online charging procedures need not be applied to packets counted by FBC.

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

****** NEXT 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.

Editor's 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).

In the case of online charging, ~~and where information is available to enable service data flow packets to be associated with a specific PDP context,~~ 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).

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).

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

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

5.4 Reporting

This refers to the differentiated charging information being reported to the charging functions. Basic example: those 20 packets were in rating category A, include this in your global charging information.

- The Traffic Plane function shall report bearer charging information for online charging;
- The Traffic Plane function shall report bearer charging information for offline charging;
- Charging information is reported based on the application of the bearer charging rules in the TPF (service data flow related charging information), and in the case of GPRS, as specified in [3] (per PDP context);
- It shall be possible to report charging information showing usage for each user for each charging rule, e.g. a report may contain multiple containers, each container associated with a charging key;
- It shall be possible to associate per PDP context charging information with the corresponding service data flow based charging information. It shall be possible to derive or account the data volumes per PDP context for traffic not accounted via any applicable charging rule.

  For example, in the case of GPRS, output of FBC data per charging rule on a per PDP context basis would allow non-FBC charged data volumes to be determined, and existing per PDP context ~~GPRS~~ charging mechanisms in the GGSN to be applied.

~~Editor's Note: How online GPRS charging can be supported for packets not accounted by FBC is FFS.~~

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

3GPP TSG-SA WG2 Meeting #39
Shenzhen, China, April 19-23, 2004

Tdoc ⌘ S2-041610
Revised S2-041273 S2-041606

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **024** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Message flow for input to provision of charging rules in Ry interface
Source:	⌘	SA2 (China Mobile, Huawei)
Work item code:	⌘	CH
Date:	⌘	22/04/2004
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:	⌘	In the current TS 23.125, Ry interface between OCS and CRF is introduced to allow OCS to input charging rule selection information to CRF.Section 6.3.5 states " The functionality supported over the Ry reference point should be the same as for the Rx reference point and a common interface specification is expected." But in section 7 Message Flows, no related message flow is included.
Summary of change:	⌘	Add message flow of Ry interface Missing figure numbering added to section 7.1
Consequences if not approved:	⌘	Message flow of Ry interface will not be reflected in the specification.

Clauses affected:	⌘	7.1, New section 7.1a

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.

<< The first modification >>

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.

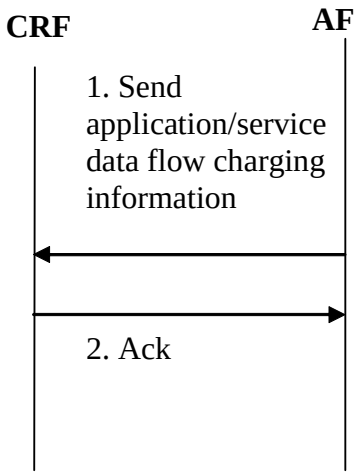

Figure 7.0a: AF input to provision of charging rules

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

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.

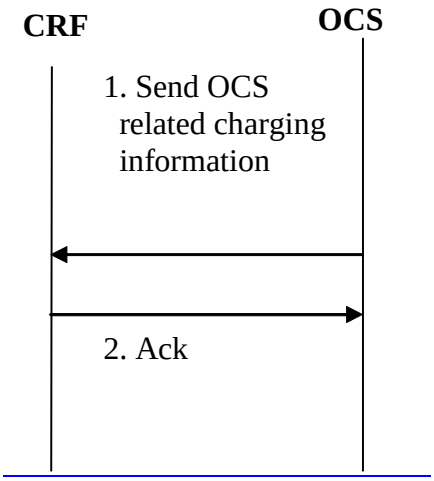

Figure 7.0b: OCS input to provision of charging rules

1. The OCS sends OCS related charging information

2. The CRF acknowledges the OCS input.

<< End of modification >>

3GPP TSG-SA WG2 Meeting #40 ***Tdoc ⌘ S2-042245***
Sophia Antipolis, France, 17-21 May 2004 Revised S2-041924 and S2-041952

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **025** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Correction to the Termination Action
Source:	⌘	SA2 (Huawei, China Mobile)
Work item code:	⌘	CH
Date:	⌘	19/05/2004
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:	⌘	In current TS 23.125, how the OCS provide termination action to the TPF is not clarified clearly.
Summary of change:	⌘	Add description to clarify how the OCS provides the termination action to the TPF.
Consequences if not approved:	⌘	The understanding of Termination Action is incomplete.

Clauses affected:	⌘	5.6

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

Other comments:	⌘	

How to create CRs using this form:
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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.

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 online charging system indicates~~ the credit for the service data flow has expired.

The defined termination actions include:

- Dropping the packets corresponding to a terminated service data flow as they pass through the Traffic Plane Function;
- ~~A termination action may indicate~~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.

Default termination behaviour shall be pre-configured in the TPF according to operator's policy. For instance, a default behaviour may consist of allowing packets of the corresponding service data flow to pass through the TPF.

The OCS may provide the ~~t~~Termination ~~a~~Action over the Gy interface.

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.

3GPP TSG-SA WG2 Meeting #40
Sophia Antipolis, France, 17-21 May 2004

Tdoc ⌘ S2-041953
Revised S2-041926

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **027** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Clarification to the charging rule
Source:	⌘	SA2 (Huawei, China Mobile)
Work item code:	⌘	CH
Date:	⌘	19/05/2004
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:	⌘	In current TS 23.125, the relationship between charging rules and group of users is not clarified clearly. The description "Different charging rules can be applied for different users or groups of users." is very general and cannot reflect the difference in many kinds of situations. For example, a group is formed by both prepaid and postpaid users, besides the same charging rules applied for this group, different charging rules can be applied to different type of users in this group.
Summary of change:	⌘	Add some clarifications to the requirement of charging rules.
Consequences if not approved:	⌘	Some implementations based on the Flow Based Charging will not be reflected in the specification.

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

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.
- 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 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.
- 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 ~~or groups of 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).
- For GPRS, charging rule assignment can occur at PDP context establishment and modification.
- For GPRS, the charging rules can be dependent on the APN used.

3GPP TSG SA WG2 Meeting #40
Sophia Antipolis, France, 17-21 May 2004

Tdoc ⌘ S2-041954
Revised S2-041927

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** CR **028** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Information to support charging rule selection
Source:	⌘	SA2 (China Mobile, Huawei)
Work item code:	⌘	CH
Date:	⌘	19/05/2004
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 v6.0.0 section 4.3.1 describes that 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 post-paid users). Also, it's very likely that Application Function (AF) will provide charging rule selection information on a per user and per group basis. To fufill this requirement, information to select charging rules should include user information in some instances.
Summary of change:	⌘	Update section 6.2.5 to add user information in charging rule selection input.
Consequences if not approved:	⌘	There maybe exist some problems for charging rule selection on a per user basis.

Clauses affected:	⌘	6.2.5.

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.

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.

Editors 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).

Editor's Note: Additional information is FFS.

The "Application Identifier" 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 "Application event identifier" 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 #40
Sophia Antipolis, France, May 17-21, 2004

Tdoc ⌘ S2-042255
S2-041932

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **033** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Re-authorization in case of charging rule change
Source:	⌘	SA2 (Huawei, China Mobile)
Work item code:	⌘	CH
Date:	⌘	20/05/2004
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:	⌘	The current re-authorisation of credit cannot cover the case of charging rule changed, however, this requirement is obvious especially when the charging key is changed, the TPF shall inform new charging key to the OCS, then the OCS can account the credit according to the new charging key.
Summary of change:	⌘	"Charging rule is changed" is added as an event to trigger credit re-authorisation. Online charging case is added to the procedure of Provision of Charging Rules triggered by other event to the CRF.
Consequences if not approved:	⌘	When the charging rule is changed, the credit cannot be re-authorisationed, then the credit may be calculated in error.

Clauses affected:	⌘	5.5, 7.3

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

⌘

Other comments: ⌘

How to create CRs using this form:
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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.

<< First changed clause >>

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.

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: ‘credit’ 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).

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

<< Next changed clause >>

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

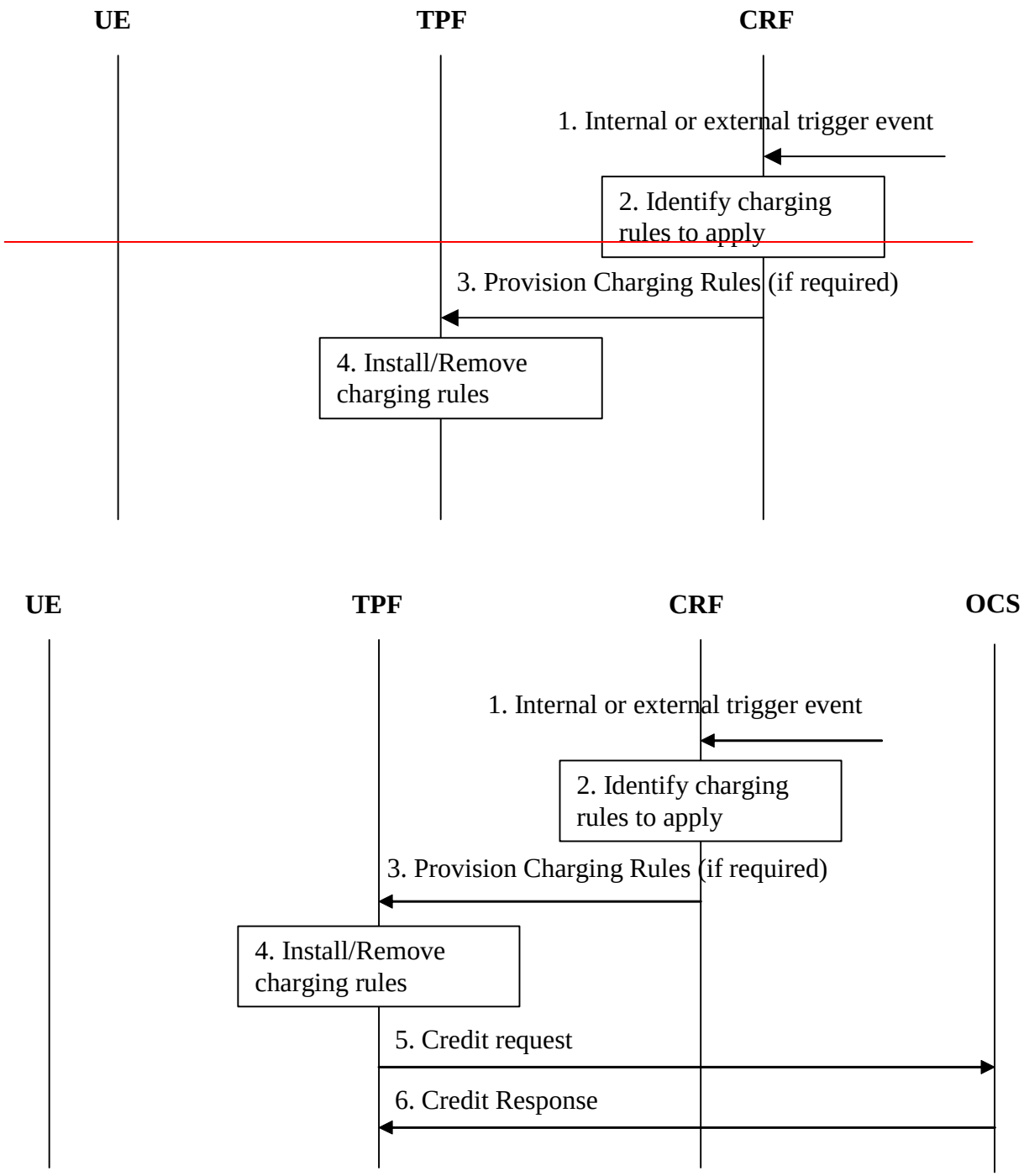

Figure 7.4: Provision of Charging Rules due to external or internal Trigger Event

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 added/removed, 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 added, and/or removed.

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

4 The TPF installs/removes the charging rules as indicated.

5 In case of online charging, the TPF interacts with the OCS.

6 The OCS answers to the TPF.

<< End of changed clause >>

3GPP TSG-SA2 Meeting #40
Sophia-Antipolis, France, 17-21 May 2004

Tdoc ⌘S2-041947

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **035** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Applying charging rules input from AF
Source:	⌘	SA2 (Nortel Networks)
Work item code:	⌘	CH
Date:	⌘	17/05/2004
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: ⌘

For a charging rules request upon bearer establishment, each PDP context could have different charging rules so a separate request to the CRF is done.

In case of Rx input, this poses the question of how the CRF decides which of the user's bearer(s)/PDP Context(s) the charging rule input needs to be applied to. This could be based on analysis of the Traffic Flow Templates against the IP flow definitions in the new charging rule, but this does not work for uplink.

Instead it is proposed that the CRF applies the Rx input to all bearers of the user i.e. all PDP contexts in the PDP session. This means that even if each PDP context of the PDP session had a different set of charging rules, the new charging rule will be applied to each set. It means that any of the PDP contexts can carry flows for that AF session - the flow will be covered by a charging rule and associated with the given charging key.

The TPF then does separate counts for the separate PDP contexts. This means that for each PDP context there will be a report of the counts for the charging key associated with the AF session, which allows the Offline Charging System to adapt the actual billing depending on the combination of charging key/PDP context characteristics.

Since the TPF does requests credit for each PDP context, the OCS may enforce that the charging keys related to an Application are only used on bearers with the right QoS by only providing credit at the rates for this application if the QoS matches that which is authorised for that special charging key.

Summary of change: ⌘ Rx input is applied by the CRF on all bearers for this user.

Consequences if not approved: ⌘ Unresolved issue remains.

Clauses affected: ⌘ 6.2.1.

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

Other comments:	⌘	Update of CR 008 in S2-0416985 could also be provided to resolve the FFS note for the IMS case, with the solution described in the body of the TS as proposed below.

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

6.2.1 Service Data Flow Based Charging Rules Function

The Service Data Flow Based Charging Rules Function provides service data flow level charging rules. This functionality is required for both offline and online charging. The Service Data Flow Based Charging Rules Function accesses information stored in the service data flow based charging rules data repository. An external interface to the charging rules data repository may be used for management of the charging rules within the data repository. Specification of interfaces to the data repository is out of scope of this TS.

The service data flow based charging rules function supports both static and dynamic charging rules.

The service data flow based charging rules function determines what charging rules (including precedence) to apply for a user. The applicable charging rules are determined based on information available to the CRF including that received from the Traffic Plane Function, i.e. information about the user, the bearer characteristics and whether it is an initial request or not. When a further request for charging rules from the Traffic Plane Function or information from an AF arrives the service data flow based charging rules function shall be able to identify whether new charging rules need to be transferred to the Traffic Plane Function and respond accordingly.

The service data flow based charging rules function will receive information from the application function that allows a service data flow to be identified, and this information may be used within the charging rule (i.e. protocol, IP addresses and port numbers). Other information that is received by the service data flow based charging rules function (i.e. application identifier, type of stream) may be used in order to select the charging rule to be applied.

For a specific AF, the CRF shall apply the AF input to the charging rule completion and selection to all charging rules of the user.

A CRF node may serve multiple TPFs.

3GPP TSG-SA2 Meeting #40 ***Tdoc ⌘S2-041948***
Sophia-Antipolis, France, 17-21 May 2004

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **036** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	Set of charging rules
Source:	⌘	SA2 (Nortel Networks)
Work item code:	⌘	CH
Date:	⌘	17/05/2004
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)*
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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:	⌘	The contents of each charging rule is described in the TS but it needs to be clarified that multiple charging rules are sent as Gx information input. Three ways can be used to send the set, and these can be combined: 1. send the details of applicable charging rules 2. send identifiers of applicable charging rules 3. send an identifier which identifies the whole rube-base
Summary of change:	⌘	Gx provides a set of charging rules or rule-base.
Consequences if not approved:	⌘	Text could be misinterpreted that each charging rule input needs to be sent over Gx in separate messages, which would be very inefficient.

Clauses affected:	⌘	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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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~~.

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 rules,
- identifiers for pre-defined charging rules,
- a single identifier for a set of pre-defined charging rules.

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 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.

3GPP TSG-SA2 Meeting #40 ***Tdoc ⌘S2-042338***
Sophia-Antipolis, France, 17-21 May 2004

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CHANGE REQUEST

⌘ **23.125** **CR** **037** ⌘ **rev** **3** ⌘ Current version: **6.0.0** ⌘

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

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

Title: ⌘	Policy functions provided by FBC	
Source: ⌘	SA2 (Nortel Networks, Ericsson)	
Work item code: ⌘	CH	***Date:*** ⌘ 1/06/2004
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)*
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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 was agreement at SA2#39 to study how the FBC architecture can provide policy functions, and to document this in a new informative annex of 23.125. 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. One of the aims is to see whether equivalent functionality to that provided by Go/Gq can be provided over the reference points created for FBC (Gx, Gy, Rx, Ry).
Summary of change: ⌘	Addition of an annex showing how FBC reference points can provide policy functions.
Consequences if not approved: ⌘	

Clauses affected: ⌘	Informative Annex D (new)			
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 some parts will be 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).

Since the charging systems may need to be upgraded in rel6 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.

D.2.2 Gating

This refers to the ability to block or allow traffic to flow. This is already 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.

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 doesn't 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.

D.2.3 QoS control

This refers to the ability to provide 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.

Editor's note: It is FFS how 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).

Editor's 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 AF session signalling releases 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).

Editor's 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**
Authorize QoS Resources, AF session establishment	QoS control, charging correlation	Instead of charging correlation, relies on charging key for rating QoS control is FFS
Authorize QoS Resources, bearer establishment	QoS control, charging correlation	Instead of charging correlation, relies on charging key for rating QoS control is FFS
Enable Media procedure	Gating (open)	Provide charging rules over Gx for the traffic flow Provide credit over Gy for the traffic flow
Disable Media procedure	Gating (close)	Provide no charging rule over Gx for the traffic flow Provide no credit over Gy for the traffic flow
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 QoS control is FFS
Indication of PDP Context Release	Bearer events	Bearer service termination over Gx and Gy Rx is FFS
Authorization of PDP Context Modification	QoS control	Bearer service modification over Gx QoS control is FFS Rx is FFS
Indication of PDP Context Modification	Bearer events	Bearer service modification over Gx Rx 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 CRF over Gx, Or OCS initiated re-authorisation QoS control is FFS

3GPP TSG-SA2 Meeting #40 ***Tdoc ⌘S2-042257***
Sophia Antipolis, France, 17-21 May 2004

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CHANGE REQUEST

⌘ **23.125** **CR** **043** ⌘ **rev** **1** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	TPF in the GGSN for WLAN access
Source:	⌘	SA2 (Ericsson)
Work item code:	⌘	CH
Date:	⌘	20/05/04
Category:	⌘	**C**
Release:	⌘	R6

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:

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:	⌘	SA2 has agreed to implement the option to re-use GGSN functionality such as TPF and charging. This has not yet been considered in the TS 23.125 for Flow Based Charging.
Summary of change:	⌘	Specify what TPF to use when an operator is using the Gn' reference point
Consequences if not approved:	⌘	

Clauses affected:	⌘	2, Annex C			
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.

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

2 References

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

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

[1] 3GPP 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: “Telecommunication management; Charging management; Charging data description for the IP Multimedia Subsystem (IMS)”.

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

[9] 3GPP TS 23.234: “3GPP system to Wireless Local Area Network (WLAN) Interworking”

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

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

Annex C (informative):

WLAN and flow based charging

C.1 TPF usage for WLAN

For WLAN, the ~~current working assumption is that the~~ TPF is a logical function allocated to the PDG.

NOTE: In case the PDG is implemented using the Gn’ reference point, then the TPF is allocated to the GGSN-part of the PDG. For further details cf. TS 23.234 [9].

~~It is FFS how this will be impacted by the ongoing WLAN/3GPP architecture work.~~

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

3GPP TSG-SA2 Meeting #40
Sophia Antipolis, France, 17-21 May 2004

Tdoc ⌘S2-042244

CR-Form-v7

CHANGE REQUEST

⌘ **23.125** **CR** **045** ⌘ **rev** **2** ⌘ Current version: **6.0.0** ⌘

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

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

Title:	⌘	FBC and GAA
Source:	⌘	SA2 (Ericsson)
Work item code:	⌘	CH
Date:	⌘	20/05/2004
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:	⌘	The current FBC TS does not reflect that an operator may use the GAA framework e.g. an Authentication Proxy towards the CRF re-using USIM based authentication functions. When a subscriber is charged for CS, PS and IMS usage it is based on that the IMSI has been properly authenticated. Similar principles can be applied for non-IMS based services through the use of GAA.
Summary of change:	⌘	Adds an example that the CRF may use the Rx reference point towards an Authentication Proxy which is part of the GAA. This may be useful for certain operators e.g. for the case when the operator employs multiple different vendor application servers. Hence an operator may want to consider the option not to require to implement the Rx interface in all AS:s within the network.
Consequences if not approved:	⌘	

Clauses affected:	⌘	2, 4.3.2			
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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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.

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

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: “Telecommunication management; Charging management; Charging data description for the IP Multimedia Subsystem (IMS)”.

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

[9] 3GPP TR 33.919: “Generic Authentication Architecture (GAA)”

********** *End of Change* **********

********** *Second Change* **********

4.3.2 Examples of Service Data Flow Charging

There are many different services that may be used within a network, including both user-user and user-network services. Service data flows from these services may be identified and charged in many different ways. A number of examples of configuring charging rules for different service data flows are described below.

A network server provides an FTP service. The FTP server supports both the active (separate ports for control and data) and passive modes of operation. A charging rule is configured for the service data flows associated with the FTP server for the user. The charging rule uses a filter specification for the uplink that identifies packets sent to port 20 or 21 of the IP address of the server, and the origination information is wildcarded. In the downlink direction, the filter specification identifies packets sent from port 20 or 21 of the IP address of the server.

A network server provides a “web” service. A charging rule is configured for the service data flows associated with the HTTP server for the user. The charging rule uses a filter specification for the uplink

that identifies packets sent to port 80 of the IP address of the server, and the origination information is wildcarded. In the downlink direction, the filter specification identifies packets sent from port 80 of the IP address of the server.

The same server also provides a WAP service. The server has multiple IP addresses, and the IP address of the WAP server is different from the IP address of the web server. The charging rule uses the same filter specification as for the web server, except the IP address is different.

An operator offers a zero rating for network provided DNS service. A charging rule is established setting all DNS traffic to/from the operators DNS servers as offline charged. The data flow filter identifies the DNS port number, and the source/destination address within the subnet range allocated to the operators network nodes.

An operator has a specific charging rate for user-user VoIP traffic over the IMS. A charging rule is established for this service data flow. The filter information to identify the specific service data flow for the user-user traffic is provided by the P-CSCF.

An operator is implementing UICC based authentication mechanisms for HTTP based services utilizing the GAA Framework as defined in TR 33.919 [9] by e.g. using the Authentication Proxy. The Authentication Proxy may appear as an AF and provide information to the CRF for the purpose of selecting an appropriate Charging Rule.

********** *End of Change* **********

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

Title:	⌘	Limitations of FBC for IMS
Source:	⌘	SA2 (Siemens)
Work item code:	⌘	CH
Date:	⌘	19/05/2004
Category:	⌘	**C**
Release:	⌘	Rel-6

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Reason for change:	⌘	There are three types of IMS Charging: Bearer, Session and Event Charging. In principle it seems that FBC could be used to realize all three types of IMS charging. Of course, the IMS entities CSCF and AS would have to provide the necessary information. However, to realize IMS Session or IMS Event Charging with FBC would be very complicated. All events (like message sizes) and service specific information (like media types) that are relevant for the rating would need to be transferred to the charging infrastructure through the CRF and the TPF. Furthermore, there are a number of limitations which prevent FBC from charging an IMS session or make it undesirable, e.g. S-CSCF chargeable services like call forwarding, IMS Roaming or the accounting of bearer resources. Consequently, for IMS Session Charging it is not appropriate to replace S-CSCF based charging with FBC. There are cases (e.g. call forwarding) where it is impossible to perform IMS Session Charging by means of FBC. Other cases would require architectural extensions to cover inter-operator administrative and security issues.
Summary of change:	⌘	It is clarified, that FBC shall not be used for IMS Session or IMS Event Charging but may be used for IMS Bearer Charging.
Consequences if not approved:	⌘	It is not clear to which extend FBC could be used for IMS Charging.

Clauses affected:	⌘	Annex B			
Other specs	⌘	Y: ☐ N: ☒	Other core specifications	⌘	

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

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Annex B (informative): IMS and Flow based charging

Flow Based Charging ~~offers other ways that IMS service may be charged~~ could be used to provide IMS Bearer Charging in addition to IMS Session Charging which is done at the S-CSCF or IMS Event Charging which is done at the AF. This requires the transfer of information about the IMS session.

Considering this, we need to study the usage of Flow Based Charging for IMS Bearer Charging in relation to IMS Session Charging or IMS Event Charging.

The following needs to be studied:

1. Flow Based Charging needs to provide a solution to the issues solved by Rel5 IMS charging correlation, considering issues such as backwards compatibility.
2. It needs to be clarified whether having multiple filters provided to the GGSN (over Go and Gx) is an issue (and if it is, it needs to be resolved).
3. How charging rules can be applied to the SIP signalling used for IMS session control