

CR-Form-v7

CHANGE REQUEST

23.125 CR 47 # rev - # Current version: 6.0.0

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

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

Title:	# Combined CR for CR#3, CR#12, CR#14		
Source:	# Nokia, Nortel, Ericsson		
Work item code:	# CH	Date:	# 08/06/2004
Category:	# C	Release:	# Rel-6
	Use <u>one</u> 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 <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	# There are overlapping changes in CR#3, CR#12, CR#14, hence the unambiguous implementation of these CRs would not be possible.		
Summary of change:	# This CR combines and hence supersedes the changes approved at SA2#39 and SA2#40 in CR#3, CR#12, CR#14.		
Consequences if not approved:	#		

Clauses affected:	# 5.2, 5.4, 5.7 (new section), 6.2.4, 6.3.1.2, 6.3.1.3, 7.2.1, 7.2.2, 7.2.3, 7.2.4, 7.3										
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> </tr> </table>	Y	N	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Other core specifications # Test specifications # O&M Specifications #	#
Y	N										
<input type="checkbox"/>	<input checked="" type="checkbox"/>										
<input type="checkbox"/>	<input checked="" type="checkbox"/>										
<input type="checkbox"/>	<input checked="" type="checkbox"/>										
Other comments:	#										

How to create CRs using this form:

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

- 1) Fill out the above form. The symbols above marked # contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

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

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

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

5.2 Charging rules

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

- The charging rules for bearer charging are defined by the operator.
- These charging rules are made available to the Traffic Plane function for both offline and online charging.
- Multiple charging rules are supported simultaneously per user.
- Filtering information within a charging rule is applied through filtering functionality at the Traffic Plane Function to identify the packets belonging to a particular service data flow.
- Charging rules with dynamically provisioned filtering information (i.e. made available to the Traffic Plane Function) are supported in order to cover IP service scenarios where the filtering information is dynamically negotiated (e.g. negotiated on the application level (e.g. IMS)).
- Pre-defined charging rules are supported.
- 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.

***** Next 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.

***** Next 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.

***** 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.

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.

***** Next 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.

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 Change *****

7.2.1 Bearer Service Establishment

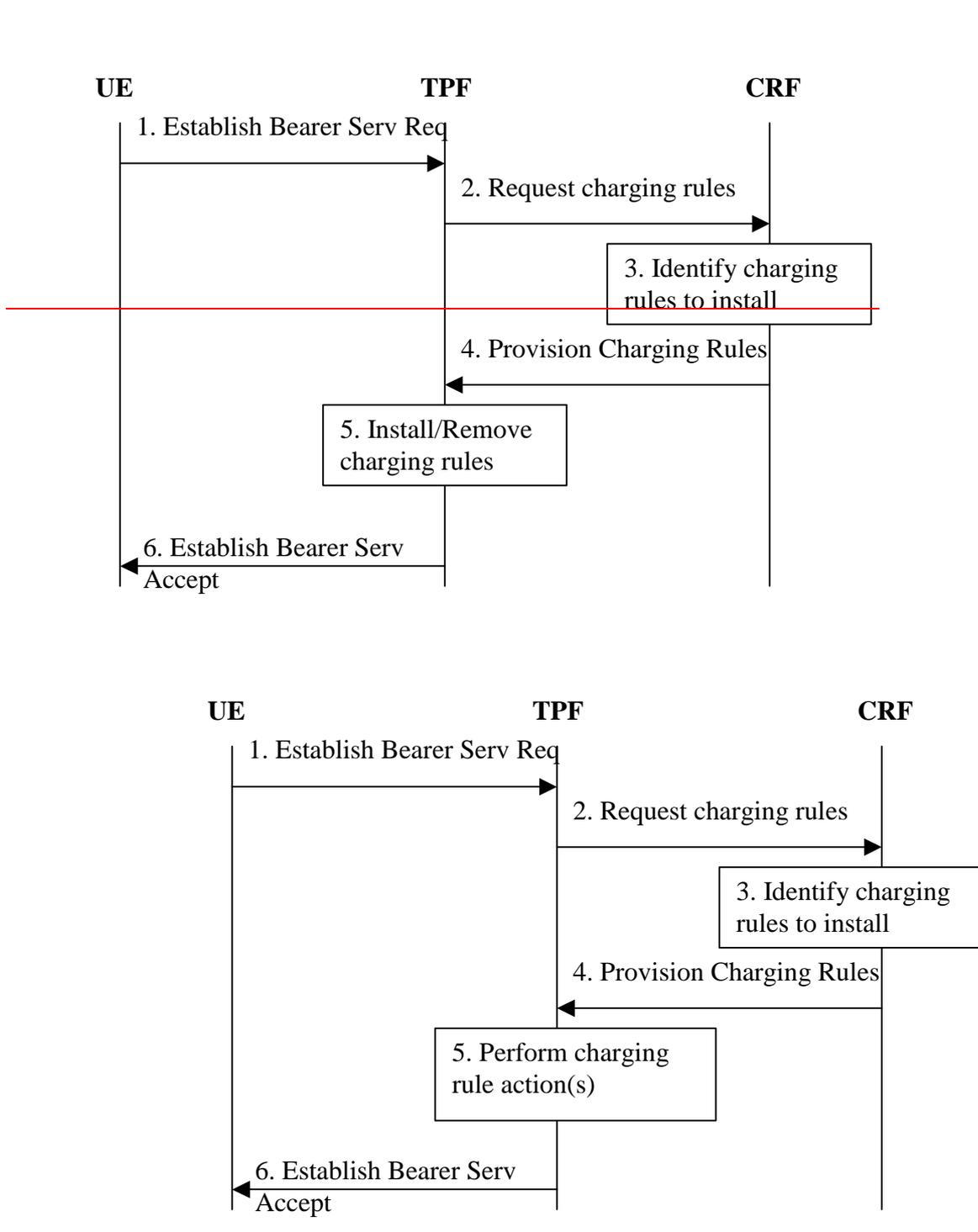


Figure 7.1: Bearer Service Establishment in case of offline charging

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~~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~~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.

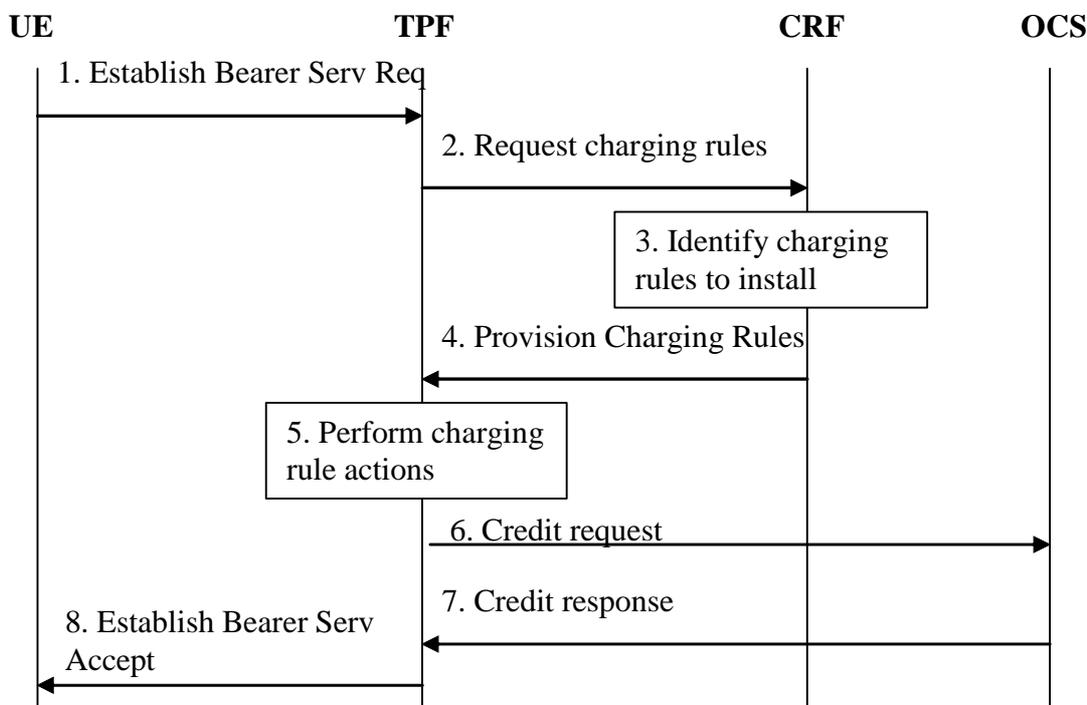


Figure 7.2: Bearer Service Establishment in case of online charging

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.

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

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

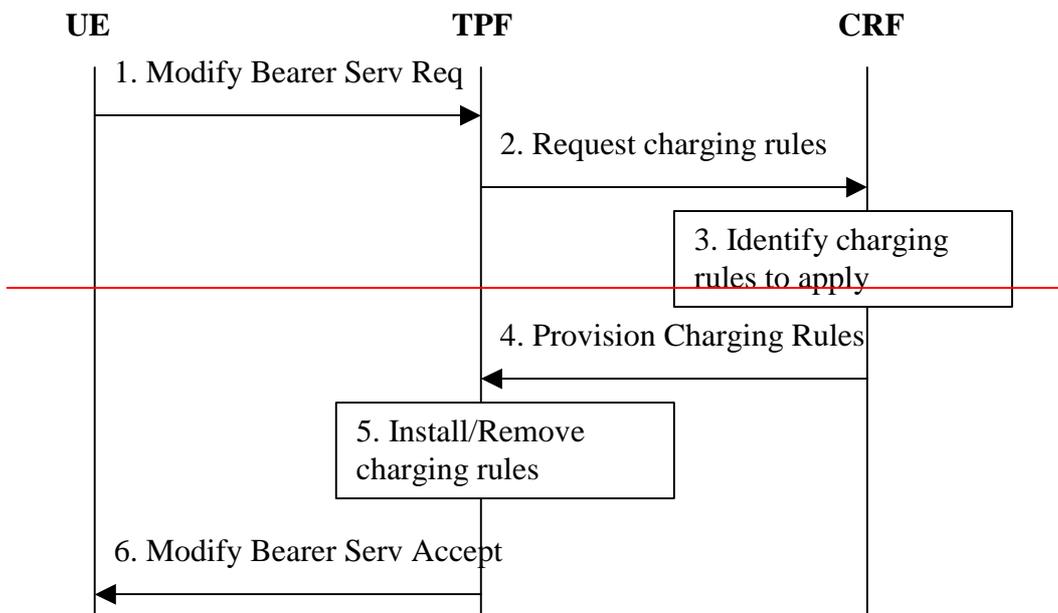
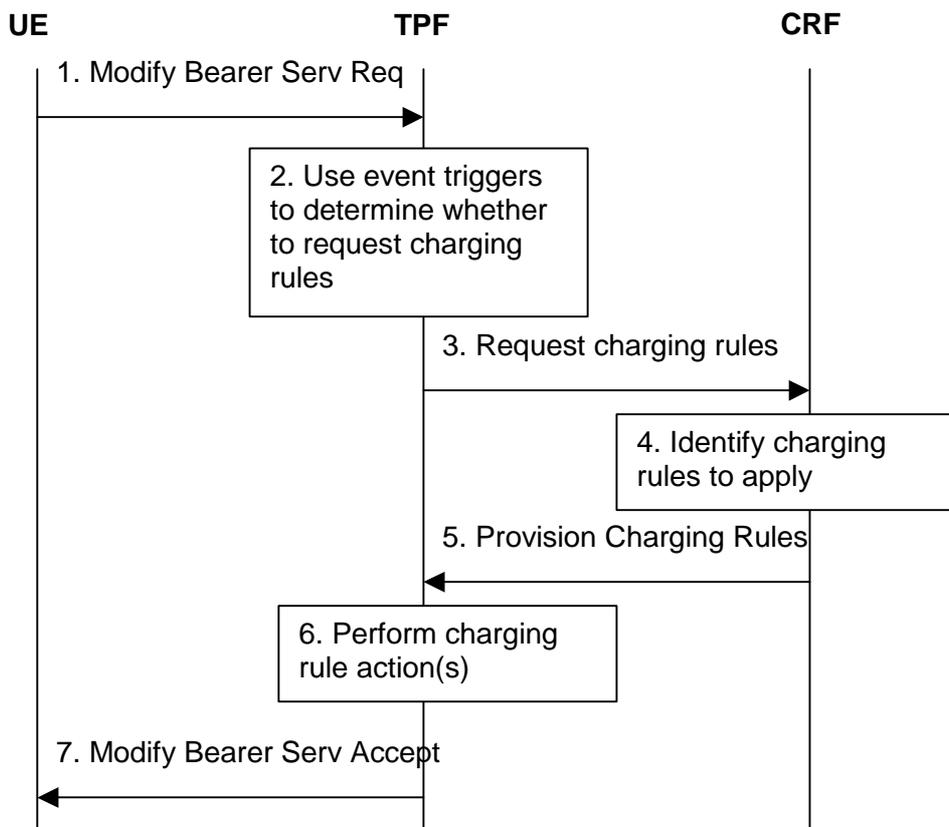


Figure 7.2a: Bearer Service Modification triggered Charging Rule Request

- 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

~~23~~ The TPF requests the applicable charging rules, and provides relevant input information for the charging rule decision.

~~34~~ 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~~~~added~~, and/or removed, ~~and/or modified~~.

~~45~~ The CRF provides the charging rule information to the TPF. This message is flagged as the response to the TPF request.

~~56~~ The TPF ~~performs charging rule actions~~~~installs/removes the charging rules~~ as indicated.

~~67~~ The TPF continues with the bearer service modification procedure.

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

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

~~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 (online charging)

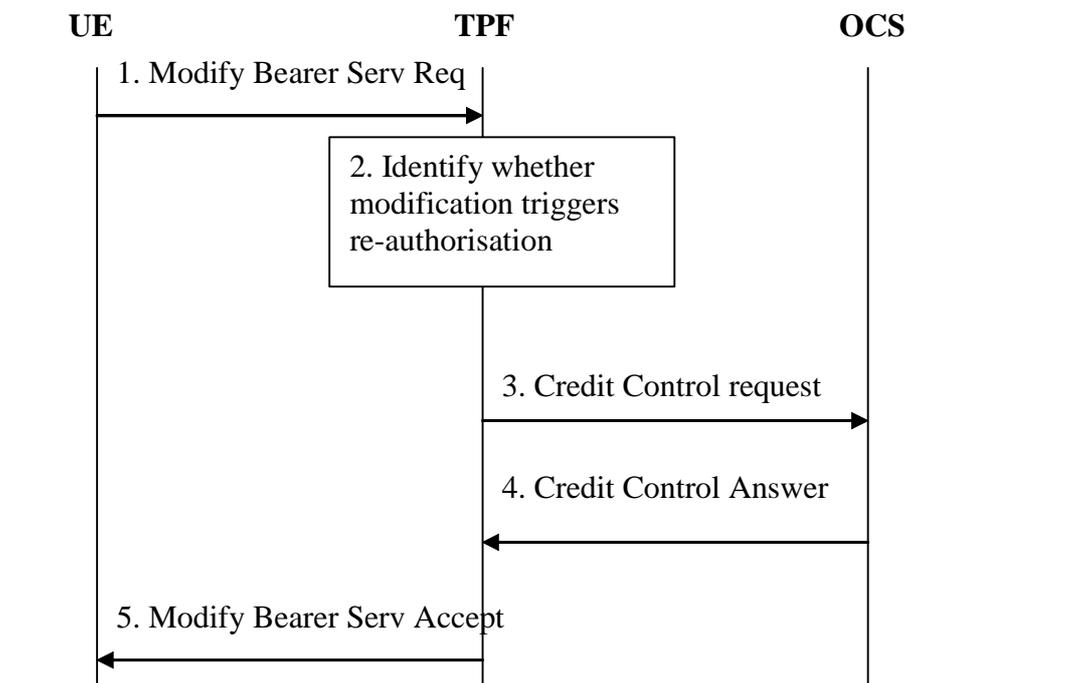


Figure 7.2b: Bearer Service Modification triggered re-authorization

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

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

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

4 The OCS re-authorizes the appropriate charging rules.

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

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

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

7.2.2.4 Bearer Service Modification in case of online charging

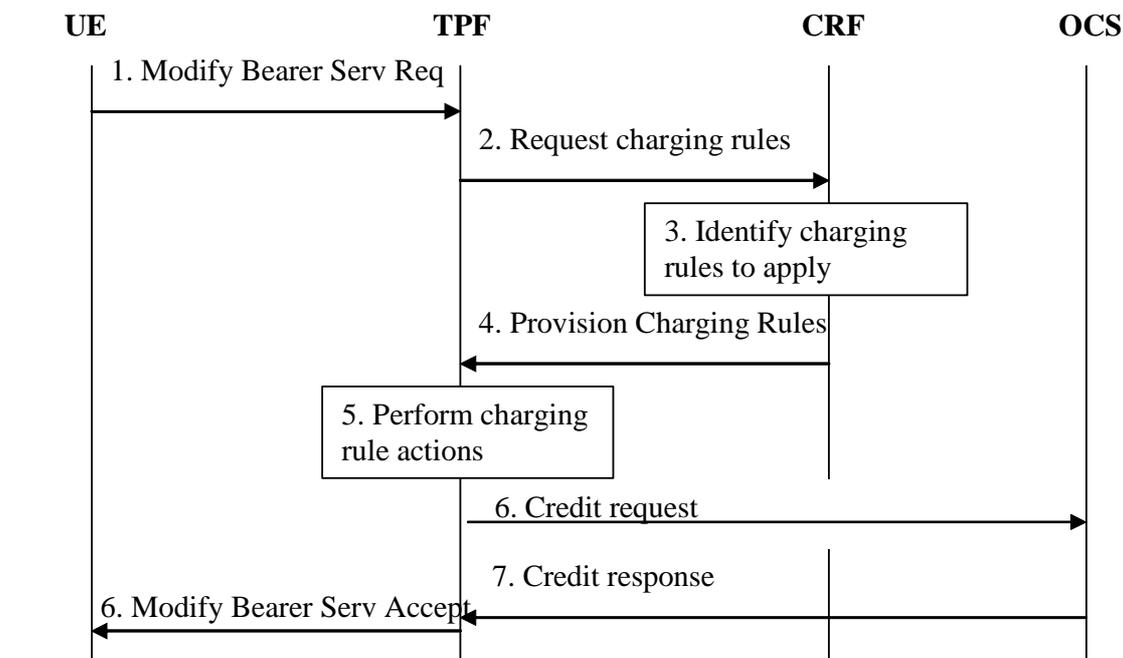


Figure 7.2c: Bearer Service Modification in case of online charging

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

2. The TPF 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.

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

7.2.3 Bearer Service Termination

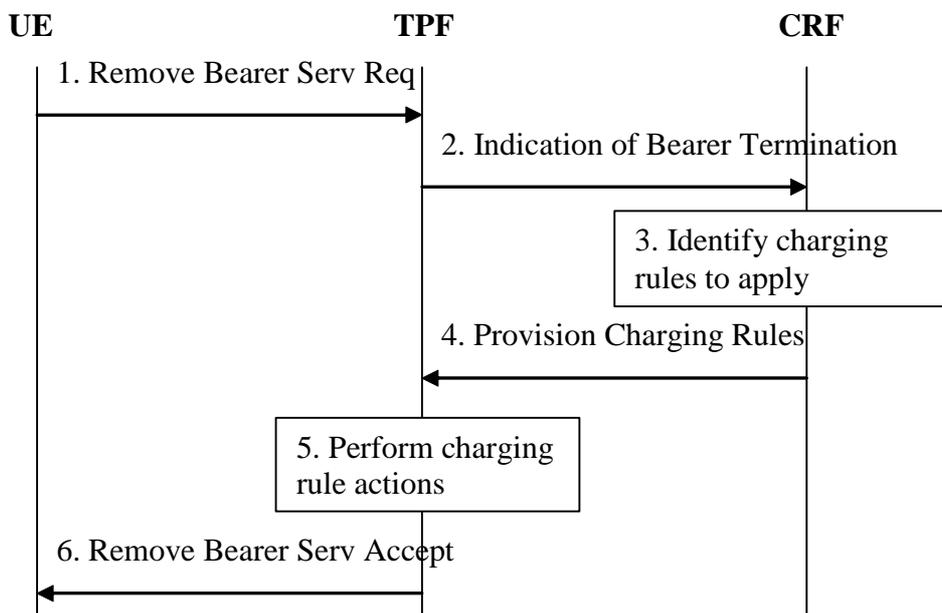
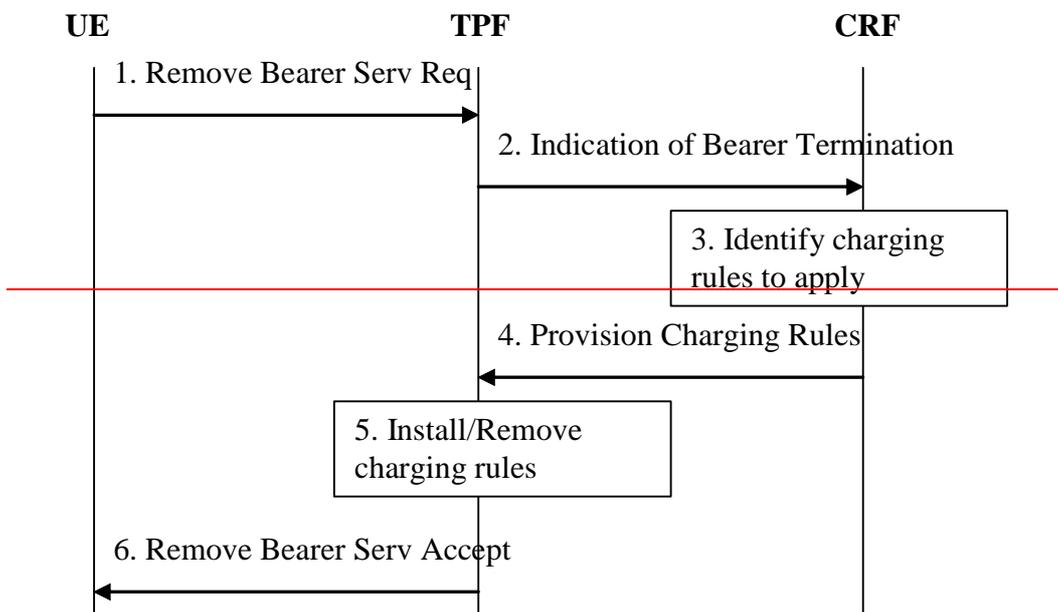


Figure 7.3: Bearer Service Termination [in case of offline charging](#)

- 1 The TPF receives a request to remove a bearer service. For GPRS, this is the GGSN that receives a delete PDP context request.
- 2 The TPF indicates that a bearer (for GPRS, a PDP context) is being removed and provides relevant input information for the charging rule 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 t~~ The bearer service termination procedure can proceed in parallel with the indication of bearer termination.

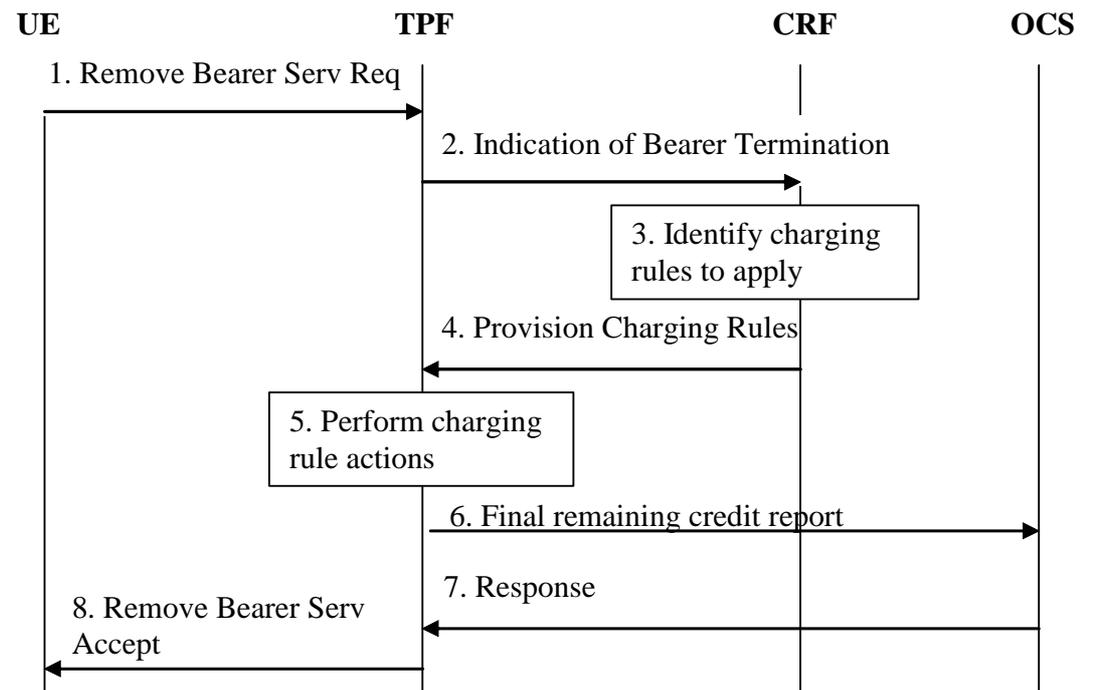


Figure 7.3a: Bearer Service Termination in case of online charging

1. The TPF receives a request to remove a bearer service. For GPRS, this is the GGSN that receives a delete PDP context request.
 2. The TPF indicates that a bearer (for GPRS, a PDP context) is being removed and provides relevant input information for the charging rule decision.
 3. The CRF determines the charging rules to be provisioned, based on information available to the CRF (e.g. information may be available from the AF as described in 7.1 and the new information received from the TPF). Charging rules may need to be installed, and/or removed, and/or modified.
 4. The CRF provides the charging rule information to the TPF. This message is flagged as the response to the TPF request.
 5. The TPF performs charging rule actions as indicated.
 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.

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

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

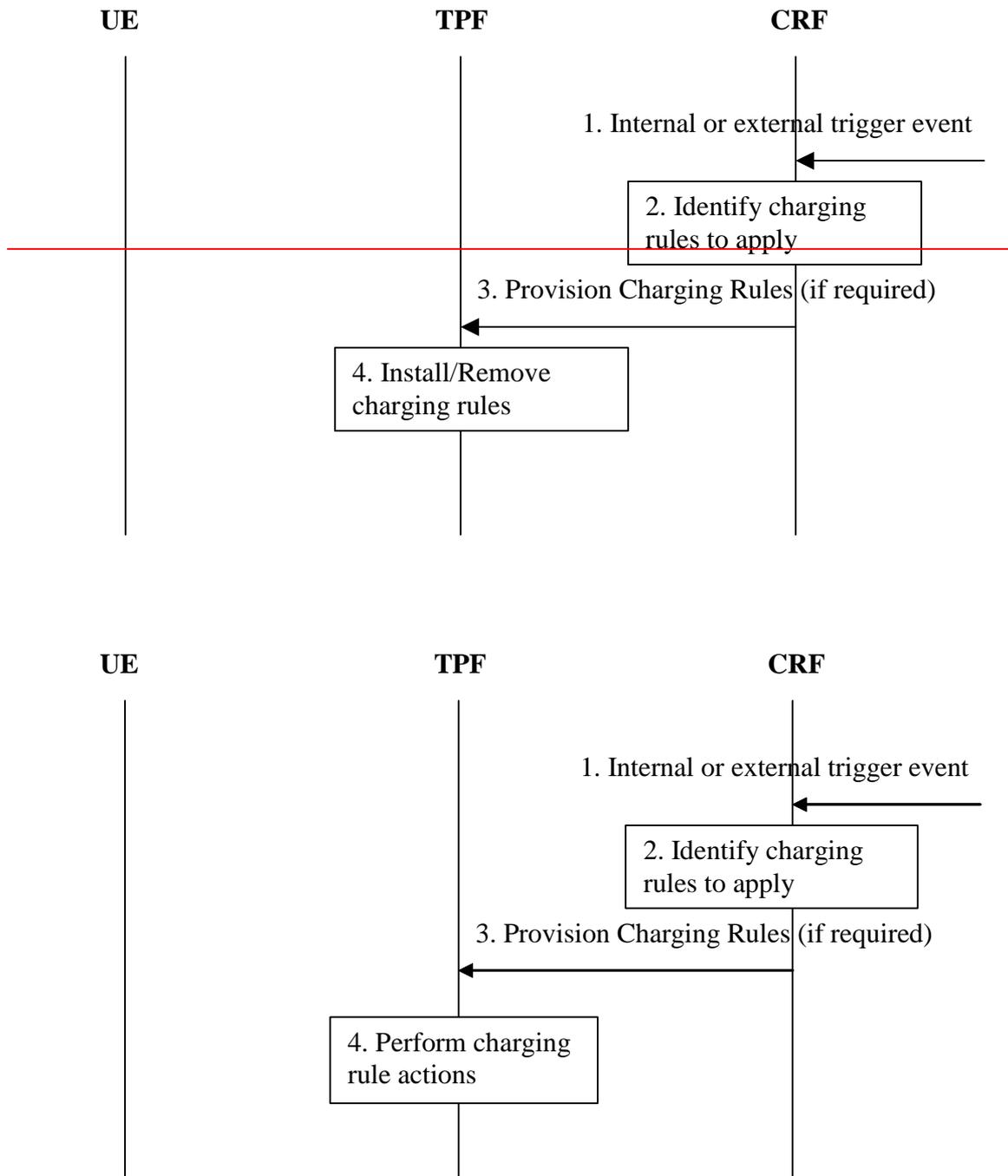


Figure 7.4: Provision of Charging Rules due to external or internal Trigger Event

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 Change*****