

3GPP TSG-SA Meeting #26
13th ñ 16th December 2004. Athens, Greece.

TSGS#26(04)0882

Source: Ericsson, Nokia, Nortel
Title: Combination of 23.125 CRs 076r1, 082r2 and 102r2
Agenda item: 7.2.3
Document for: APPROVAL

During the preparation of the 23.125 CR package for SA#26 there was some overlap problems discovered with CR076r1, CR082r2 and CR102r2. The problematic CRs are placed in a separate package in document SP-040875.

The authors have studied the CRs and found that

- CR076r1 can be withdrawn as the same changes are covered in CR102r2
- CR082r2 can be merged into a new revision of CR102

Ericsson, Nokia and Nortel propose that the CR076r, CR082r2 and CR102r2 in (SP-040875) are replaced by CR102r4*.

| Tdoc | Title | Spec | CR | Rev | Cat | C_Ver | Rel | WI |
|-------------|---|-------------|-----------|------------|------------|--------------|------------|-----------|
| SP-040882 | Reporting and credit management granularity | 23.125 | 102 | 4* | F | 6.2.0 | Rel-6 | CH-FBC |

* Note: We use CR revision number 4 as there was a different version numbered CR102r3 circulating among the companies during the discussions.

Athens, Greece, 13th - 16th December 2004.

CR-Form-v7.1

CHANGE REQUEST

23.125 CR 102 rev **4** Current version: **6.2.0**

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

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|---|---|---|-----------|
| Title: | Reporting and credit management granularity | | |
| Source: | Ericsson, Nokia, Nortel Networks | | |
| Work item code: | CH-FBC | Date: | 7/12/2004 |
| Category: | F | Release: | Rel-6 |
| Use <i>one</i> 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 <i>one</i> of the following releases: Ph2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6) Rel-7 (Release 7) | |

Reason for change: - CR#82Rev2

The specification is ambiguous about the granularity for reporting of charging information and application of online credit control.

The TPF should, by default, aggregate charging rules with the same Charging Key for reporting and online charging purposes.

However, it should also be possible for the CRF to indicate that a specific charging rule requires independent usage reporting.

- CR#102Rev3

In the Overview section, the function Identification of the service data flows includes a superfluous distinction on what rates apply for the service data flow. Flow based charging is able to detect service data flows, regardless the purpose.

The specification uses the term service data flow in two ways (a) designating a set of packets rendering a specific service and (b) the packets that, in the service data flow filtering, yield the same charging key value. Service data flows of kind (a) exist per se, whereas service data flows of kind (b) is a result of the service data flow filtering in the TPF. For the two concepts to coincide, the charging rule filters must accurately match the packets that render the service of interest. Even a slightly inaccurate filter may cause a deviation from the expected outcome that there is a 1:1-relation between service data flows of kind (a) and kind (b).

The precise requirements for charging rules accuracy to achieve this is out of scope for the present WI. It is however worth noting that the TS relies on the charging rules being accurate.

The requirements for reporting and credit management granularity and the information elements defined for the charging rule are not consistent. The charging rule includes an indicator that indicates that separate reporting for the charging rule is required. There is however no identifier specified that is guaranteed to be unique for the charging rule. Thus it is not possible to require separate reporting for a single charging rule. However it is feasible to request separate reporting at the finest granularity possible.

The service identifier (in present version identification of the service) may serve the purpose of adding one level of granularity to the charging key level. Requesting separate reporting should yield reports on the service identifier level.

The Service data flow and counting section lacks from information on by what identity a service data flow may be recognized.

It is suggested to use the charging key and the service identifier for providing the service data flow identity.

The Reporting section, reporting is indicated to be separate from online credit control, whereas reporting is required for credit control in order to properly maintain the user's account. Thus the credit control may use the reporting in credit management, rather than being something different.

No other reporting for service data flow based online charging is specified than in the Reporting section. Thus the reporting structure for credit management shall follow the same structure as defined in section Reporting.

Summary of change: ☒ - CR#82Rev2

It is clarified that online credit control applies to aggregates of charging rules with the same charging key.

Reporting of information (for both offline and online) may be per charging key or per individual charging rule, as indicated in the charging rule.

- CR#102Rev3

Service data flow based charging includes the identification of the service data flows regardless purpose.

Service identifier level reporting is either mandated or not required.

Arrange for an identifier that, apart from the charging key, may be used for identifying a service data flow.

The occasions for reporting for online charging purposes is clarified.

Clarify that quota is granted on a per charging

Consequences if not approved: ☒ - CR#82Rev2

Unclear specification. Stage 3 work cannot be completed.

- CR#102Rev3

The identification of service data flows remains confined to support certain kinds of charging.

There is no hint in the specification on the relation between service data flows, existing per se, and those detected by service data flow based charging.

The required structure for reporting will remain impossible to achieve in stage 3. The lack of a unique identifier for the charging rule (except for the CRF ñ TPF communication) makes any processing on a per charging rule basis impossible.

Reporting, even for online charging, and credit management have different requirements for reporting structure.

Clauses affected: ☒ 3.1, 5.1, 5.2, 5.4, 5.5

**Other specs
affected:**

| | Y | N |
|---|---|---|
| ⌘ | X | |
| | | X |
| | | X |

Other core specifications
Test specifications
O&M Specifications

⌘ 29.210, 32.299, 32.251, 32.252

Other comments:

⌘ This CR combines CR#82Rev2 and CR#102Rev3

***** Start of Changes *****

3.1 Definitions

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

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

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

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

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

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

Service identifier: An identifier for a service. The service identifier may designate an end user service, a part of an end user service or an arbitrarily formed group thereof. The service identifier provides the most detailed identification specified for flow based charging, of a service data flow.

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

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

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

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

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

5.1 Overview

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), and those that can be handled as an aggregate;
- 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.

***** Next 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 stored in the TPF are supported. The charging rule identifiers of the pre-defined charging rules shall be different from the charging rule identifiers allocated by the CRF.
- Elements of charging rules may be statically configured at the Traffic Plane Function, or dynamically provisioned.

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

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

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

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

Note: It's operators' responsibility to ensure that overlap between the pre-defined charging rules can be resolved based on precedence of each pre-defined charging rule in the TPF. It's CRF's responsibility to ensure that overlap between the dynamically allocated charging rules can be resolved based on precedence of each dynamically allocated charging rule.

- Charging rules contain information on:
 - How a particular service data flow is to be charged: online, offline or neither;

- In case of offline charging whether to record volume- or time-based charging information or both;
- Charging key;
- Service data flow filter(s);
- [Service identifier](#)
- Precedence (used at the TPF to determine the order in which charging rules shall be applied to a service data flow);
- Charging rule identifier (used between CRF and TPF for referencing charging rules);
- Application Function Record Information.
- [Service identifier level reporting: mandated or not required](#)
- Event triggers and/or CCF/OCS addresses are associated with all charging rules for a user and IP network connection.
- The charging rule identifiers allocated by the CRF shall be unique for a CRF/TPF instance.
- The Application Function Record information (e.g. ICID and flow ID(s)) is included in the charging rule, and in subsequently generated charging information generated as a result of the rule, if it is provided by an Application Function and the rule filters are based on the Application Function provided information. It should be noted that, in order to associate a single Application Function Record with specific counts/credits, it is necessary that new counts/credits be generated for the user by the TPF each time the AF generates new Application Function Record information.
- Once the charging rule is determined it is applied to the service data flow at the Traffic Plane Function and packets are counted and categorised per the rule set in the charging rule.
- Separate charging rules can be provided for downlink and uplink.
- Charging rules can be configured for both user initiated and network initiated flows.
- [The charging key value and, optionally, the service identifier value of the charging rule identifies the service data flow](#)
- Charging rules can change and be overridden, e.g. for a previously established PDP context in the GPRS case, based on specific events (e.g. IM domain events or GPRS domain events, credit control events).
- Different charging rules can be applied for different users.
- The same charging rule can be applied for multiple users.
- Different charging rules can be applied based on the location of the user (e.g. based on identity of the roamed to network).
- Charging rule assignment can occur at bearer service establishment, modification and termination. For GPRS, charging rule assignment can occur at PDP context activation, modification and deactivation.
- For GPRS, the charging rules can be dependent on the APN used.

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

5.4 Reporting

This refers to the differentiated charging information being reported to the [online or offline](#) charging functions. [Note that reporting usage to the online charging function is distinct from requesting quotas for online credit control.](#) 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~~ keys for on-line charging;
- The TPF shall report charging information for each bearer and charging key value;
- Depending on the configuration of a charging rule the TPF may report charging information for each charging key/service identifier
- ~~It shall be possible to report charging information showing usage for each user for each charging rule, e.g. a~~ A report may contain multiple containers, each container associated with a charging key/service identifier;
- .
- 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 charging mechanisms in the GGSN to be applied.

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

5.5 Credit management

Online charging credits shall operate on a per charging key basis. This implies that where independent credit control is required for an individual service data flow, then the charging rule applying to that flow must have a unique charging key value. The TPF shall support credit management on a per bearer basis.

In case of online charging, it shall be possible for the OCS to apply re-authorisation of credit in case of particular events as described in section 5.7.

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

~~Rating decisions shall be strictly controlled by~~ The OCS shall strictly control the rating decisions for each service. The OCS shall also control the credit pooling decisions ~~for charging rules~~. The OCS shall, when credit provision is sought, 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~~ keys 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 ~~key~~ rule of the pool.

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

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

***** End of Changes *****