**3GPP TSG-CN Meeting #26** **NP-040554**
**8th – 10th December 2004. Athens, Greece.**

**Source:** **CN3**

**Title:** **All LSs send from CN3 since CN#25 Meeting**

**Agenda item:** **6.3.1**

**Document for:** **INFORMATION**

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**Introduction:**

This document contains all the LSs APPROVED and sent by CN3 since the last CN Plenary.

| Tdoc | Title | LS To | LS Cc | Attachment |
|---|---|---|---|---|
| N3-040681 | Clarifications on the Rx interface | SA2 | - | - |
| N3-040725 | LS on Diameter codes and identifiers | CN4 | | TS 29.210 V1.1.0 |
| N3-040849 | Reply LS on MBMS information Elements | RAN3, GERAN2 | SA2, SA4, CN1, CN4, RAN2 | |
| N3-040867 | LS on CN3 assumption on the scope of FBC for Rel6 | SA2 | | |
| N3-040868 | Reply on LS on completion of network initiated SCUDIF support | RAN3 | CN4, CN1, SA2 | |
| N3-040872 | Reply LS on Cooperation on TISPAN NGN | ETSI, TISPAN | SA1, SA2, CN1 | |
| N3-040884 | CN3 impacts on Early IMS security | SA3 | CN | |

**3GPP TSG-CN WG3 Meeting #33bis** **N3-040681**
**Sophia Antipolis, France. 4th – 7th October 2004.**

| | |
|---|---|
| **Title:** | **LS on Request for clarifications on the Rx interface** |
| **Release:** | **Rel-6** |
| **Work Item:** | **Rx Interface** |
| **Source:** | **CN3** |
| **To:** | **SA2** |
| **Cc:** | **-** |
| **Attachments** | **-** |

**Contact Person:**
**Name:** Thomas Belling
**Tel. Number:** +49 89 636 75207
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**1. Overall Description:**

CN3 has started work on the Rx interface for FBC and would kindly like to seek guidance from SA2 on several issues that CN3 regards as important to progress this work:

1. Does an application function require the capability to address a CRF or PDF selectively, or is it irrelevant for the AF whether the network provides FBC or SBLP functionality?

2. Does the Rel-6 architecture allow a combined CRF/PDF controlled over a combined Gq/Rx interface?

3. How does the CRF bind a Gx session between TPF and CRF and an Rx session between AF and CRF? Which mechanism(s) apply in the GPRS case and the non-GPRS case?

4. Does the CRF require the capability to correlate flows described in Rx session description with the PDP contexts used to transport these flows? If so, by which mechanism?
   CN3 noted that SA2 studied a mechanism in informative Annex D of TS 23.125.

5. Which bearer events shall the CRF report to the AF? Shall the CRF report a QoS change of bearer(s) and the establishment of bearer(s) related to an Rx session? Is the reporting mandatory or optional?

6. Do the interactions on the Rx and Gx interfaces need to support the transport the access network charging identifier (e.g. GCID) from TPF to the AF? If so, is a transport of the related flow identifiers also required?

**2. Actions:**

**To SA2 group.**

**ACTION:** CN3 kindly asks SA2 to answer the above questions.

**3. Date of Next CN3 Meetings:**

| | | |
|---|---|---|
| CN3_34 | 15th - 19th November 2004 | Seoul, Korea. |
| CN3_35 | 14th - 18th February 2005 | Sydney, Australia. |

# 3GPP TSG-CN3 Meeting #34 Tdoc N3-040872
# Seoul, Korea, 15-19 November 2004

**Title:** LS on **Cooperation on TISPAN NGN supplementary services**

**Response to:** LS (N3-040743) on **Cooperation on TISPAN NGN supplementary services** from ETSI TISPAN

**Work Item:** System enhancements for fixed broadband access to IMS

**Source:** 3GPP WG CN3

**To:** ETSI TISPAN

**Cc:** SA1, SA2, CN1, CN4

**Contact Person:**

**Name:** **Alf Heidermark**

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**E-mail Address:** Alf.Heidermark@ericsson.com

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### 1. Overall Description:

3GPP WG CN3 thanks ETSI TISPAN for their liaison statement on Cooperation on TISPAN NGN supplementary services.

CN3 has the following comments to make:

- 3GPP CN 3 is responsible for interworking of the 3GPP system and external networks. In particular, CN3 has developed TS 29.163, which defines the interworking between ISUP/BICC and IMS.
- In Release 6 of TS 29.163 the interworking is already defined for a number of supplementary services as Calling line presentation, Calling line restriction, Connected line presentation, Connected line restriction and Call hold.
- .
- Regarding the other supplementary services defined in your LS we feel that some of them may be subject for interworking at the MGCF and IM-MGW , e.g. the call forwarding services. However, we also feel that some of the supplementary services may be local to IMS, as advice of charge. As we understand the supplementary services mentioned in your LS are already defined in PSTN/ISDN/PLMN. However, the same type of definitions does not exist for IMS. We therefore see a need for some documentation that defines which information flows the MGCF shall interwork to the CS domain. CN3 expects that ETSI TISPAN develops these information flows.
- We also assume that these information flows is also reviewed by 3GPP CN1.
- Therefore, CN3 welcomes input to develop the interworking for the concerned supplementary services.

### 2. Actions:

None

### 3. Date of Next CN3 Meetings:

| | | |
|---|---|---|
| CN3_35 | 14th – 18th February 2005 | Sidney, Australia |
| CN3_36 | 25th -30th April 2005 | Cancun, Mexico |

**3GPP TSG-CN WG3 Meeting #34** **N3-040868**
**Seoul, Korea. 15th - 19th November 2004.**

**Title:** **LS on completion of network initiated SCUDIF support**
**Response to:** **LS R3-041408 from RAN3**
**Release:** Release 6
**Work Item:** **TEI6**

**Source:** **CN3**
**To:** **RAN3**
**Cc:** **CN4, CN1, SA2**

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**Attachments:** -

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**1. Overall Description:**

CN3 would like to thank RAN3 for their LS from RAN3 #44 in R3-041408, and inform RAN3 that the LS and its attachments were reviewed at CN3 #34. A related CN3 CR in N3-040729 had been provided to the CN3, but the group could not agree on the proposed solution at this time.

CN3 would like to study the issue further and also evaluate other possible solutions, e.g. UE based approach. As such, CN3 requests RAN3 to put any proposed related CRs on hold to allow CN,3 who is the stage 2 owner, more time for further studies.

During the CN3 discussion, a question was raised to the proposed RAN3 solution. CN3 would appreciate to know why the current "RAB negotiation" functionality cannot be used for this purpose. Would that not exclude the need for a new flag, as "Alternative Guaranteed Bit Rate Information" can be used as the enabler for the RNC to be allowed to request downgrade/upgrade of the RAB.

**2. Actions:**

**To RAN3 group.**

**ACTION:** CN3 asks RAN3 to kindly answer the question above and put any related RAN3 CRs on hold until further notice.

**3. Date of Next CN3 Meetings:**

| | | |
|---|---|---|
| CN3#35 | 14th - 18th February 2004 | Sydney, AUSTRALIA |
| CN3#36 | 25th - 29th April 2004 | Cancun, MEXICO |

**3GPP TSG-CN WG3 Meeting #34** **N3-040867**
**Seoul, Korea. 15th - 19th November 2004.**

**Title:** **LS on Interactions between FBC and SBLP**

**Source:** **CN3**
**To:** **SA2**

**Contact Person:**
**Name:** Thomas Belling
**Tel. Number:** +49 89 636 75207
**E-mail Address:** Thomas.Belling@siemens.com

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**1. Overall Description:**

CN3 has discussed implications of the simultaneous application of FBC and SBLP for a single AF session and would like to seek related clarifications from SA2:

1. Is the simultaneous application of FBC and SBLP for a single AF session in the scope of Rel.6?

2. Does the GGSN need to apply special procedures if both SBLP and FBC are used simultaneously for a single PDP context? For instance:
   - How is it avoided that IP flows are charged, although the corresponding SBLP gates are disabled and the flows will therefore be discarded?
   - Shall the GGSN supply SBLP filter information and/or SBLP binding information over the Gx interface instead of TFT filters, which are not available in this scenario?

3. FBC and SBLP applied simultaneously may either be controlled by a PDF/CRF combined in a single physical entity or by a PDF and a CRF in two physical entities that do not directly interact with each other. Are both scenarios in scope of Rel-6?

4. For the scenario where the PDF and CRF are separate, CN3 discussed as a possible solution for an optimal binding at the CRF that the AF forwards the SBLP authorization token received from the PDF towards the CRF via the Rx interface. The binding information would also be supplied via the Gx interface.
   - Is a transport of the SBLP authorization token over the Rx interface from the AF towards the CRF required in Rel-6?
   - Shall the AF forward an authorization token received from the PDF towards the CRF?
   - Shall the CRF be able to support a fine granularity of binding using the authorization token?

5. One could also imagine scenarios where one AF requests SBLP authorization and another AF requests FBC to be applied for a single AF session. For instance, for a single IMS session the P-CSCF may interact with the PDF for SBLP and a distinct AF may interact with the CRF for FBC. Are such scenarios in scope of Rel-6?

6. CN3 is aware of some related information provided for the IMS case in informative Annex B of TS 23.125. Does SA2 consider this Annex to be mature enough to be used in stage 3 work for Rel.6?

7. Has SA2 undertaken additional work on the simultaneous application of FBC and SBLP?
   CN3 would welcome any further information SA2 can provide.

**2. Actions**

**To SA2 group.**

**ACTION:** CN3 kindly asks SA2 to answer the above questions.

**3. Date of Next CN3 Meetings:**

| | | |
|---|---|---|
| CN3#35 | 14th - 18th February 2005 | Sydney, Australia. |
| CN3#36 | 25th - 29th April 2005 | Cancun, Mexico (tbc) |

**3GPP TSG-CN WG3 Meeting #34** **N3-040849**
**Seoul, Korea. 15th - 19th November 2004.**

| | |
|---|---|
| **Title:** | **Reply LS on MBMS information elements** |
| **Response to:** | **RAN3: R3-041407 (LS on MBMS Information Element coding),** |
| | **GERAN2: GP-042909 (LS on GERAN Assumptions on common MBMS Information Elements) and** |
| | **RAN3: R3-041648 (LS on MBMS Information Elements over Iu interface)** |
| **Release:** | **Rel-6** |
| **Work Item:** | |
| **Source:** | **CN3** |
| **To:** | **RAN3, GERAN2** |
| **Cc:** | **SA2, SA4, CN1, CN4, RAN2** |

**Contact Person:**
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**1. Overall Description:**

CN3 has received three liaison statements on MBMS information element coding from RAN3 and GERAN2:

- RAN3: R3-041407 (LS on MBMS Information Element coding),
- GERAN2: GP-042909 (LS on GERAN Assumptions on common MBMS Information Elements),
- RAN3: R3-041648 (LS on MBMS Information Elements over Iu interface),

asking CN3's view on the coding of certain information elements.

The questions addressed to CN3 and answers from CN3:

**Questions from R3-041407:**

*MBMS Session Duration*

- *Should it indicate MBMS session that could last for more than a day?*
- *Should it have an "infinite" value that would correspond to very long MBMS session for which the session stop is difficult to predict.*

CN3's answer:
CN3 regards the question about the session duration as a service related issue and has no preference for it.

**Questions from GP-042909:**

*Is the GERAN2 assumption of 3GPP TS 26.346 & 3GPP TS 29.061 as the locations for the common MBMS Information Elements correct?*

CN3's answer:
CN3 has defined Gmb interface related information elements in TS 29.061.

*The MBMS Session Duration defines the duration of the MBMS Session. The length of the data in the MBMS Session Duration information element is 5 bits.*
*Is the GERAN2 assumption of the definition and length of the MBMS Session Duration information element correct?*

CN3's answer:

The MBMS-Session-Duration indicates the estimated duration of the MBMS session (MBMS service data transmission). The MBMS-Session-Duration AVP used at the Gmb interface is of type Unsigned32. It indicates the time in seconds.

*GERAN2 have the following working assumption of the definition the MBMS Service Area Identity List information element:*

- *The MBMS Service Area Identity List identifies the MBMS Service Areas Identities for the MBMS Service Areas where the MBMS Service should be activated.*

*GERAN2 have the following working assumption of the maximum number of MBMS Service Area Identities that can be defined in the BM-SC:*

- *The maximum number of MBMS Service Area Identities that can be defined in the BM-SC are 65536. This gives that the length of the MBMS Service Area Identity is 16 bits (2 octets).*

*GERAN2 have the following working assumption of the number of MBMS Service Areas that can be sent in a MBMS Service Area Identity List:*

- *The minimum number of MBMS Service Area Identities that can be sent in a MBMS Service Area Identity List is 1.*
- *The maximum number of MBMS Service Area Identities that can be sent in a MBMS Service Area Identity List are 256.*

*Is the GERAN2 assumption of the definition, length and number of MBMS Service Area Identities in the MBMS Service Area Identity List information element correct?*

CN3's answer:
CN3 regards the questions about the length and maximum number of service area codes as a service and architecture related issue and has no preference for it.

**Questions from R3-041648:**

*MBMS Session Duration (optional IE in SESSION START message)*
*This IE defines the duration of the MBMS Session. It should be set in BM-SC and should be useful information for RAN. In previous RAN3 LS to CN3 and SA2 on MBMS Information Element coding (R3-041407), RAN3 asked whether the MBMS Session could last for more than a day and whether the MBMS Session Duration could have an "infinite" value that would correspond to very long MBMS session for which the session stop is difficult to predict. The proposed coding in MBMS RANAP draft CR is as follows:*

| | | | | |
|---|---|---|---|---|
| *MBMS Session Duration* | *M* | | | |
| *>Seconds* | *M* | | *INTEGER (0..86399)* | *The value represents the estimated elapsed time in seconds corresponding to the duration of the MBMS Session. See [23.246]* |
| *>Day* | *O* | | *INTEGER (1..8)* | *The value represents number of days in addition to the duration in seconds of the MBMS Session.* |

► *RAN3 would like to ask SA2 and CN3 to confirm the RAN3 current coding of MBMS Session Duration IE.*

CN3's answer:
In the current CN3 specification (TS29.061) the MBMS-Session-Duration AVP used at the Gmb interface is of type Unsigned32. It indicates the time in seconds.

*MBMS Service Area (MBMS Service Area Code list, mandatory IE in SESSION START message)*
*The MBMS Service Area IE consists of a list of one or several MBMS Service Area Identities where each MBMS Service Area represents one or more cells, in which the MBMS Service should be available.*
*As discussed in earlier LSes, the MBMS Service Area is set in BM-SC and the mapping between MBMS Service Area Codes and cells is configured in every relevant RAN nodes via O&M with the assumption that accordingly all cells corresponding to a MBMS Service Area Code (except for the specific MBMS Service Area Code with value 0, see below) are MBMS capable. A cell may be mapped to one or several MBMS Service Area Codes.*

*The MBMS Service Area Code shall be globally unique. If no mapping is configured for a certain MBMS Service Area Code in RNC, it shall simply ignore it.*
*In previous RAN3 LS to CN3 and SA2 on MBMS Information Element coding (R3-041407), RAN3 informed SA2 and CN3 about RAN3 agreement to have a special MBMS Service Area code point (e.g. 0) indicating to the RNC that all its cells are part of the MBMS Service Area.*
*A MBMS Service Area Code could be coded in RANAP as INTEGER.*
*► RAN3 would like to ask SA2 and CN3 to confirm GERAN suggestions about the maximum number of MBMS Service Area Codes that can be defined in the BM-SC (65536) and the maximum number of MBMS Service Area Codes that can be indicated for a given MBMS Service Area (256).*

CN3's answer:
CN3 has no preferences for the maximum numbers of MBMS Service Area Codes. In the current CN3 specification (TS29.061) the MBMS-Service-Area AVP used at the Gmb interface is of type OctetString.

*TMGI (mandatory IE in many MBMS messages)*
*The TMGI uniquely identifies the MBMS Bearer Service. Although it is common MBMS IE for BM-SC, GGSN, SGSN, RAN and UE, RAN3 do not plan to have it as container as the RNC needs to understand the PLMN-ID part of the TMGI (e.g. in Rel-6 network sharing scenario).*
*► RAN3 would like to ask SA2 and CN3 to confirm the final coding for the TMGI i.e. whether Service ID part should remain OCTET STRING (SIZE (3)).*

CN3's answer:
CN3 has aligned its Gmb interface specification to the TMGI being an octet string. Otherwise CN3 has no preference for the coding of PLMN-ID.

**2. Actions:**

None

**3. Date of Next CN3 Meetings:**

| | | |
|---|---|---|
| CN3#35 | 14th - 18th February 2005 | Sydney, Australia. |
| CN3#36 | 25th - 29th April 2005 | Cancun, Mexico |

# 3GPP TS 29.210 V1.1.0 (2004-10)

*Technical Specification*

## 3rd Generation Partnership Project; Technical Specification Group Core Network; Charging rule provisioning over Gx interface; (Release 6)



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# Contents

# Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

# 1 Scope

The present document provides the stage 3 specification of the Gx reference point. The functional requirements and the stage 2 specifications of the Gx reference point are contained in 3GPP TS 23.125 [3]. The Gx reference point is for provisioning service data flow based charging rules between the Traffic Plane Function (TPF) and the Charging Rules Function (CRF), also known as Service Data Flow Based Charging Rules Function.

The present document defines:

- the protocol to be used between TPF and CRF over the Gx reference point;
- the information to be exchanged between TPF and CRF over the Gx reference point.

Whenever it is possible the present document specifies the requirements for this protocol by reference to specifications produced by the IETF within the scope of Diameter. Where this is not possible, extensions to Diameter are defined within the present document.

# 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 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 23.002: "Network architecture".

[3] 3GPP TS 23.125: "Overall high level functionality and architecture impacts of flow based charging; Stage 2".

[4] IETF RFC 3588: "Diameter Base Protocol".

[5] IETF RFC 2234: "Augmented BNF for syntax specifications: ABNF".

[6] 3GPP TS 33.210: "3G security; Network Domain Security (NDS); IP network layer security".

[7] 3GPP TS 29.207: "Policy control over Go interface".

[8] draft-ietf-aaa-diameter-cc-06.txt: "Diameter Credit-Control Application".

[9] 3GPP TS 32.299: "Telecommunication management; Charging management; Diameter charging applications".

[10] 3GPP TS 29.209: "Policy control over Gq interface".

[11] 3GPP TS 29.061: "Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN)".

[12] draft-ietf-aaa-diameter-nasreq-17.txt: "Diameter Network Access Server Application", work in progress.

[13] 3GPP TS 32.251: "Packet Switched (PS) domain charging".

[14] 3GPP TS 24.008: "Mobile radio interface Layer 3 specification; Core network protocols; Stage 3".

# 3 Definitions, symbols and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1], in 3GPP TS 23.125 [3] and the following apply:

**Application Function (AF):** element offering applications using IP bearer resources
The AF is capable of communicating with the TPF to transfer dynamic charging rules related information. One example of an AF is the P-CSCF of the IM CN subsystem.

**Attribute-Value Pair:** See IETF RFC 3588 [4], corresponds to an Information Element in a Diameter message.

**PDP Session:** unique association of a subscriber with a network access service given by the combination of MSISDN, APN and IP address
A PDP session can consist of one or more PDP contexts (one primary and zero or more secondary)

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply:

| | |
|---|---|
| AF | Application Function |
| AVP | Attribute-Value Pair |
| CCF | Charging Collection Function |
| CGF | Charging Gateway Function |
| CRF | Charging Rules Function |
| CSCF | Call Session Control Function |
| DCC | Diameter Credit Control |
| GCID | GPRS Charging ID |
| ICID | IMS Charging IDentifier |
| IM | IP Multimedia |
| IMS | IP Multimedia core network Subsystem |
| IMSI | International Mobile Subscriber Identity |
| OCS | Online Charging System |
| P-CSCF | Proxy-CSCF |
| PDGw | Packet Data Gateway |
| PLMN | Public Land Mobile Network |
| QoS | Quality of Service |
| SBLP | Service Based Local Policy |
| S-CSCF | Serving-CSCF |
| SDF | Service Data Flow |
| SGSN | Serving GPRS Support Node |
| SIP | Session Initiation Protocol |
| TPF | Traffic Plane Function |
| UE | User Equipment |
| WAP | Wireless Application Protocol |
| WLAN | Wireless LAN |

# 4 Gx reference point

## 4.1 Overview

The Gx reference point is used for provisioning service data flow based charging rules. The reference point is located between the Traffic Plane Function (TPF) and the Charging Rules Function (CRF), also known as Service Data Flow Based Charging Rules Function. The stage 2 level requirements for the Gx reference point are defined in 3GPP TS 23.125 [3].

## 4.2 Charging Rules

Charging rules determine how service data flows are identified and charged. The TPF shall apply charging rules by evaluating received packets against service data flow filters. When a packet is matched against a service data flow filter, the packet matching process for that packet is complete, and the charging rule for that filter shall be applied.

Charging rules in this regard may be:

- Pre-defined and active within the TPF (e.g. default rules that are statically configured within the TPF).
- Pre-defined within the TPF but not active (e.g. static charging rules that are activated dynamically via provisioning over the Gx reference point).
- Partially pre-defined within the TPF dynamically activated and completed by the CRF (e.g. dynamic charging rules for example for IMS service data flows, where the service data flow filter is dynamically identified for a pre-defined charging rule).
- Pre-defined within the CRF (e.g. static charging rules that are provisioned dynamically over the Gx reference point).
- Dynamically defined and activated by the CRF (e.g. dynamic charging rules for example for IMS peer to peer service data flows, where both the service data flow filter and the charging rule are identified dynamically).

NOTE: Whether the charging rule is pre-defined or dynamically defined by the CRF does not impact the procedures at the Gx reference point

- Pre-defined rules within the TPF may be grouped allowing CRF to dynamically activate a set of rules over the Gx reference point.

A dynamically defined charging rule over the Gx reference point shall consist of a charging rule name, charging key (i.e. rating group), service flow filter and other charging parameters. The charging rule name shall be used to reference to a charging rule in the communication between the TPF and the CRF. The service flow filter shall be used to select the traffic for which the charging rule applies. The charging parameters define whether online and offline charging interfaces are used, what is to be metered in offline charging, what is the precedence of the charging rule in case of overlapping charging rules, etc. Charging rule also includes Application Function record information for enabling charging correlation between the application and bearer layer if the Application Function has provided this information via the Rx interface. For IMS this includes the IMS Charging Identifier (ICID) and flow identifiers. See the AVPs in clauses 5.2 and 5.3.

## 4.3 Functionality of the Gx reference point

### 4.3.1 Initialization and maintenance of connection

The initialization and maintenance of the connection between each interworking CRF and TPF pair is defined by the underlying protocol. Establishment and maintenance of connections between Diameter nodes is described in IETF RFC 3588 [4].

### 4.3.2 Request for charging rules from the TPF

The TPF shall indicate, via the Gx reference point, a request for charging rules in the following instances.

1) At bearer establishment:

   The TPF shall supply user identification and those bearer attributes that are necessarily or optionally required (e.g. MSISDN, APN, MCC/MNC where the subscriber is located) to allow the CRF to identify the charging rules to be applied.

2) At bearer modification if an Event trigger is met:

   The TPF shall supply those attributes that have changed within the charging rule request. The bearer attributes that have been modified since the last request are required items.

3) When the specific event of the Event trigger is detected:

   The TPF shall supply those attributes that have changed within the charging rule request. The attributes that have been modified since the last request are required items.

4) At provisioning error within the previous charging rule provision:

   The TPF re-requests charging rules that could not be interpreted at the previous charging rule provisioning. The TPF shall supply the identification of the erroneous charging rules within the charging rule request. The procedure also serves the purpose of error indication.

Editor's Note: The error indication procedure is FFS loop detection being one of the items.

In case of GPRS, the TPF shall indicate to the CRF if the bearer is used as IMS signalling PDP context.

NOTE: For GPRS the same procedures are applied to both primary and secondary PDP contexts.

### 4.3.3 Provision of charging rules from the CRF

The CRF shall indicate, via the Gx reference point, charging rules to be applied at the TPF. This may be:

- in response to a request for charging rules., i.e. to a request made as described in the preceding section; or
- unsolicited by the TPF, e.g. in response to information provided to the CRF via the Rx or Ry reference points, or in response to an internal trigger within the CRF.

For each request from the TPF and upon the unsolicited provision the CRF shall provision zero or more charging rules. For charging rules to be provisioned the CRF shall provide:

- References to charging rules statically configured at the TPF and the required actions, e.g. activation of charging rules. This may include additional charging attributes to be included to the statically configured charging rules, or
- References to charging rules previously notified by the CRF to the TPF and the required actions, e.g. modification of charging rules, or
- 'Fully formed' charging rules and the required actions, e.g. installation of a CRF constructed charging rules,or
- A mixture of the above.

To activate a predefined charging rule at the TPF, charging rule name shall be used as a reference to the predefined charging rule. To activate a group of predefined charging rules within the TPF (e.g. gold users or gaming services) charging rule base name shall be used as a reference to the group of predefined charging rules. Similar methods shall be used for removing active charging rules from a bearer session. See the AVPs definition in clause 5.2.

To include additional charging attributes to partially pre-defined charging rule or to provision a CRF defined charging rule, charging rule definition shall be used. If a charging rule with the same charging rule name already exists at the TPF, the charging rule definition shall update the current definition. If the existing charging rule already has charging attributes also included in the new charging rule definition, the existing attributes shall be overwritten. Any charging attribute in the existing charging rule not included in the new charging rule definition shall remain valid. All attributes of a charging rule may also be overwritten by removing and installing the charging rule within a single message.

The CRF may also provide event triggers to the TPF using the charging rule provision procedure. Event triggers are used to determine which bearer modification or specific event causes the TPF to re-request charging rules. Event triggers apply for a bearer and may be included to the initial or subsequent charging rule provision.

Within the initial charging rule provisioning only, the CRF may provide CCF and/or OCS addresses to the TPF defining the offline and online charging system addresses respectively. These shall overwrite any predefined addresses at the TPF. Both primary and secondary addresses for CCF and/or OCS shall be provided simultaneously. Provisioning CCF or OCS addresses without charging rules for offline or online charged service data flows, respectively, shall not be considered as an error since such charging rules may be provided in later provisioning.

### 4.3.4 Indication of bearer termination (from TPF to CRF)

The TPF indicates to the CRF, via the Gx reference point, that a bearer is terminated. The bearer termination indication identifies the bearer being removed.

# 5. Gx Protocol

## 5.1 Protocol support

The Gx reference point shall be based on Diameter as specified in RFC 3588 [4] and Diameter Credit Control Application (draft-ietf-aaa-diameter-cc-06.txt) [8] except as modified by the defined Gx specific procedures and AVPs. Unless otherwise specified, the procedures (including error handling and unrecognized information handling) are unmodified. In addition to the AVPs defined within the clause 5.2, the existing Diameter AVPs are reused as specified in sub-clause 5.3. Diameter messages from the Diameter base application (RFC 3588 [4]) and DCC (draft-ietf-aaa-diameter-cc-06.txt [8]) are reused as specified in clause 6.

With regard to the Diameter protocol defined over the Gx reference point, the CRF acts as a Diameter server, in the sense that it is the network element that handles charging rule requests for a particular realm. The TPF acts as the Diameter Client, in the sense that it is the network element requesting charging rules.

## 5.2 Gx specific AVPs

Table 5.2 describes the Diameter AVPs defined for the Gx reference point, their AVP Code values, types, possible flag values and whether or not the AVP may be encrypted. The Vendor-Id header of all AVPs defined in the present document shall be set to 3GPP (10415).

**Table 5.2: Gx specific Diameter AVPs**

| | | | | AVP Flag rules (note 1) | | | | |
|---|---|---|---|---|---|---|---|---|
| **Attribute Name** | **AVP Code** | **Clause defined** | **Value Type (note 2)** | **Must** | **May** | **Should not** | **Must not** | **May Encr.** |
| Bearer-Usage | | 5.2.1 | Enumerated | M,V | P | | | Y |
| Charging-Rule-Install | | 5.2.2 | Grouped | M,V | P | | | Y |
| Charging-Rule-Remove | | 5.2.3 | Grouped | M,V | P | | | Y |
| Charging-Rule-Definition | | 5.2.4 | Grouped | M,V | P | | | Y |
| Charging-Rule-Base-Name | | 5.2.5 | OctetString | M,V | P | | | Y |
| Charging-Rule-Name | | 5.2.6 | OctetString | M,V | P | | | Y |
| Event-Trigger | | 5.2.7 | Enumerated | M,V | P | | | Y |
| Metering-Method | | 5.2.8 | Enumerated | M,V | P | | | Y |
| Offline | | 5.2.9 | Enumerated | M,V | P | | | Y |
| Online | | 5.2.10 | Enumerated | M,V | P | | | Y |
| Precedence | | 5.2.11 | Unsigned32 | M,V | P | | | Y |
| Primary-CCF-Address | | 5.2.12 | DiameterURI | M,V | P | | | Y |
| Primary-OCS-Address | | 5.2.13 | DiameterURI | M,V | P | | | Y |
| RAT-Type | | 5.2.14 | Enumerated | M,V | P | | | Y |
| Secondary-CCF-Address | | 5.2.15 | DiameterURI | M,V | P | | | Y |
| Secondary-OCS-Address | | 5.2.16 | DiameterURI | M,V | P | | | Y |
| TFT-Filter | | 5.2.17 | IPFilterRule | M,V | P | | | Y |
| TFT-Packet-Filter-Information | | 5.2.18 | Grouped | M,V | P | | | Y |
| ToS-Traffic-Class | | 5.2.19 | OctetString | M,V | P | | | Y |

NOTE 1: The AVP header bit denoted as 'M', indicates whether support of the AVP is required. The AVP header bit denoted as 'V', indicates whether the optional Vendor-ID field is present in the AVP header. For further details, see RFC 3588 [4].
NOTE 2: The value types are defined in RFC 3588 [4].

### 5.2.1 Bearer-Usage AVP

The Bearer-Usage AVP (AVP code x) is of type Enumerated, and it shall indicate how the bearer is being used. If the Bearer-Usage AVP has not been previously provided, its absence shall indicate that no specific information is available. If the Bearer-Usage AVP has been provided, its value shall remain valid until it is provided the next time. The following values are defined:

GENERAL (0)

This value shall indicate no specific bearer usage information is available.

IMS_SIGNALLING (1)

This value shall indicate that the bearer is used for IMS signalling only.

### 5.2.2 Charging-Rule-Install AVP

The Charging-Rule-Install AVP (AVP code TBD) is of type Grouped, and it is used for installing charging rules for a bearer session as instructed from the CRF to the TPF. Charging-Rule-Name AVP is a reference for a specific charging rule entirely pre-configured at the TPF. The Charging-Rule-Base-Name AVP is a reference for a group of charging rules entirely pre-configured at the TPF. The Charging-Rule-Definition AVP is used for installing charging rules where parts or entire charging rule is provisioned over the Gx interface.

AVP Format:

```
Charging-Rule-Install ::= < AVP Header: TBD >
                          *[ Charging-Rule-Definition ]
                          *[ Charging-Rule-Name ]
                          *[ Charging-Rule-Base-Name ]
                          *[ AVP ]
```

### 5.2.3 Charging-Rule-Remove AVP

The Charging-Rule-Remove AVP (AVP code TBD) is of type Grouped, and it is used for removing charging rules from a bearer session. Charging-Rule-Name AVP is a reference for a specific charging rule at the TPF to be removed. The Charging-Rule-Base-Name AVP is a reference for a group of charging rules at the TPF to be removed.

AVP Format:

```
Charging-Rule-Remove ::= < AVP Header: TBD >
                         *[ Charging-Rule-Name ]
                         *[ Charging-Rule-Base-Name ]
                         *[ AVP ]
```

### 5.2.4 Charging-Rule-Definition AVP

The Charging-Rule-Definition AVP (AVP code x) is of type Grouped, and it defines the charging rule for a service flow sent by the CRF to the TPF. The Charging-Rule-Name AVP uniquely identifies the charging rule within the bearer session and it is used to reference to a charging rule in communication between the TPF and the CRF. The Flow-Description AVP(s) determines the traffic that belongs to the service flow.

AVP Format:

```
Charging-Rule-Definition ::= < AVP Header: TBD >
                              { Charging-Rule-Name }
                              [ Rating-Group ]
                             *[ Flow-Description ]
                              [ Online ]
                              [ Offline ]
                              [ Metering-Method ]
                              [ Precedence ]
                              [ AF-Charging-Identifier ]
                             *[ Flows ]
                             *[ AVP ]
```

### 5.2.5 Charging-Rule-Base-Name AVP

The Charging-Rule-Base-Name AVP (AVP code TBD) is of type OctetString, and it indicates the name of a pre-defined group of charging rules residing at the TPF.

### 5.2.6 Charging-Rule-Name AVP

The Charging-Rule-Name AVP (AVP code TBD) is of type OctetString, and it uniquely identifies a charging rule within the bearer session.

### 5.2.7 Event-Trigger AVP

The Event-Trigger AVP (AVP code x) is of type Enumerated, and it indicates an event that shall cause a re-request of charging rules. The following values are defined:

SGSN_CHANGE (0)

This value shall be used to indicate that upon the change of the serving SGSN charging rules shall be requested.

QOS_CHANGE (1)

This value shall be used to indicate that the upon QoS change charging rules shall be requested.

RAT_CHANGE (2)

This value shall be used to indicate that the upon RAT change charging rules shall be requested.

TFT_CHANGE (3)

This value shall be used to indicate that the upon TFT change charging rules shall be requested.

### 5.2.8 Metering-Method AVP

The Metering-Method AVP (AVP code x) is of type Enumerated, and it defines what parameters shall be metered for offline charging. The following values are defined:

DURATION (0)

This value shall be used to indicate that the duration of the service flow shall be metered.

VOLUME (1)

This value shall be used to indicate that volume of the service flow traffic shall be metered.

DURATION_VOLUME (2)

This value shall be used to indicate that the duration and the volume of the service flow traffic shall be metered.

### 5.2.9 Offline AVP

The Offline AVP (AVP code x) is of type Enumerated, and it defines whether the offline charging interface from the TPF for the associated charging rule shall be enabled. The absence of this AVP indicates that the default configuration shall be used. The following values are defined:

DISABLE_OFFLINE (0)

This value shall be used to indicate that the offline charging interface for the associated charging rule shall be disabled.

ENABLE_OFFLINE (1)

This value shall be used to indicate that the offline charging interface for the associated charging rule shall be enabled.

### 5.2.10 Online AVP

The Online AVP (AVP code x) is of type Enumerated, and it defines whether the online charging interface from the TPF for the associated charging rule shall be enabled. The absence of this AVP indicates that the default configuration shall be used. The following values are defined:

DISABLE_ONLINE (0)

This value shall be used to indicate that the online charging interface for the associated charging rule shall be disabled.

ENABLE_ONLINE (1)

This value shall be used to indicate that the online charging interface for the associated charging rule shall be enabled.

### 5.2.11 Precedence AVP

The Precedence AVP (AVP code x) is of type Unsigned32, and it defines the precedence of a charging rule in case of overlapping charging rules. A charging rule with the Precedence AVP with lower value shall take the priority over a charging rule with the Precedence AVP with higher value. The Precedence AVP is also used to indicate the evaluation precedence of the TFT packet filters.

### 5.2.12 Primary-CCF-Address AVP

The Primary-CCF-Address AVP (AVP code x) is of type DiameterURI, and it defines the address of the primary offline charging system for the bearer. The absence of the protocol definition in the DiameterURI shall indicate the default protocol defined for the Gz interface.

### 5.2.13 Primary-OCS-Address AVP

The Primary-OCS-Address AVP (AVP code x) is of type DiameterURI, and it defines the address of the primary online charging system for the bearer. The absence of the protocol definition in the DiameterURI shall indicate the default protocol defined for the Gy interface.

### 5.2.14 RAT-Type AVP

The RAT-Type AVP (AVP code x) is of type Enumerated, and it defines the radio access technology type of the bearer sent from the TPF to the CRF. The CRF may use this information for charging rule decision. The following values are defined:

UTRAN (1)

This value shall be used to indicate that UTRAN is used.

GERAN (2)

This value shall be used to indicate that GERAN is used.

WLAN (3)

This value shall be used to indicate that WLAN is used.

### 5.2.15 Secondary-CCF-Address AVP

The Secondary-CCF-Address AVP (AVP code x) is of type DiameterURI, and it defines the address of the secondary offline charging system for the bearer. The absence of the protocol definition in the DiameterURI shall indicate the default protocol defined for the Gz interface.

### 5.2.16 Secondary-OCS-Address AVP

The Secondary-OCS-Address AVP (AVP code x) is of type DiameterURI, and it defines the address of the secondary online charging system for the bearer. The absence of the protocol definition in the DiameterURI shall indicate the default protocol defined for the Gy interface.

### 5.2.17 TFT-Filter AVP

The TFT-Filter AVP (AVP code x) is of type IPFilterRule, and it contains the flow filter for one TFT packet filter. The TFT-Filter AVP is derived from the Traffic Flow Template (TFT) defined in 3GPP TS 24.008 [14]. The following information shall be sent:

- Source IP address (possibly masked).
- Source and destination port (list or ranges)

The IPFilterRule type shall be used with the following restrictions:

- Action shall be to "permit"
- Direction shall be set to "in"
- No options shall be used
- Destination IP address shall be wildcarded

The direction "in" refers to uplink direction in order to define the source and destination addresses and ports unambiguously.

### 5.2.18 TFT-Packet-Filter-Information AVP

The TFT-Packet-Filter-Information AVP (AVP code x) is of type Grouped, and it contains the information from a single TFT packet filter including the evaluation precedence, the filter and the Type-of-Service/Traffic Class sent from the TPF to the CRF. The TPF shall include all the TFT packet filters in separate TFT-Packet-Filter-Information AVPs to the charging rule request. TFT-Packet-Filter-Information AVPs are derived from the Traffic Flow Template (TFT) defined in 3GPP TS 24.008 [14]. When SBLP is used the packet filters shall be omitted.

AVP Format:

```
TFT-Packet-Filter-Information ::= < AVP Header: TBD >
                              [ Precedence ]
                              [ TFT-Filter ]
                              [ ToS-Traffic-Class ]
```

### 5.2.19 ToS-Traffic-Class AVP

The ToS-Traffic-Class AVP (AVP code x) is of type OctetString, and it contains the Type-of-Service/Traffic-Class of a TFT packet filter as defined in 3GPP TS 24.008 [14].

## 5.3 Gx re-used AVPs

The table 5.3 lists the Diameter AVPs re-used by the Gx reference point from existing Diameter Applications, reference to their respective specifications and short description of their usage within the Gx reference point. The AVPs from Diameter base protocol are not included. Where 3GPP Radius VSAs are re-used, they shall be translated to Diameter AVPs as described in draft-ietf-aaa-diameter-nasreq-17.txt [12] with the exception that the 'M' flag shall be set and the "P' flag may be set.

**Table 5.3: Gx re-used Diameter AVPs**

| Attribute Name | Reference | Description |
|---|---|---|
| 3GPP-GPRS-Negotiated-QoS-Profile | 3GPP TS 29.061 [11] | For GPRS the QoS of the PDP context |
| 3GPP-SGSN-Address | 3GPP TS 29.061 [11] | For GPRS the IPv4 address of the SGSN |
| 3GPP-SGSN-IPv6-Address | 3GPP TS 29.061 [11] | For GPRS the IPv6 address of the SGSN |
| 3GPP-SGSN-MCC-MNC | 3GPP TS 29.061 [11] | For GPRS the MCC and the MNC of the SGSN |
| AF-Charging-Identifier | 3GPP TS 29.209 [10] | The AF charging identifier that may be used in charging correlation. For IMS the ICID. |
| Called-Station-ID | draft-ietf-aaa-diameter-nasreq-17.txt [12] | The address the user is connected to. For GPRS the APN. |
| CC-Request-Number | draft-ietf-aaa-diameter-cc-06.txt [8] | The number of the request for mapping requests and answers |
| CC-Request-Type | draft-ietf-aaa-diameter-cc-06.txt [8] | The type of the request (initial, update, termination) |
| CC-Sub-Session-Id | draft-ietf-aaa-diameter-cc-06.txt [8] | For GPRS each PDP context maps to a CC-Sub-Session-Id as specified in clause 6. |
| Flow-Description | 3GPP TS 29.209 [10] | Defines the service flow filter parameters for a charging rule |
| Flows | 3GPP TS 29.209 [10] | The flow identifiers of the IP flows related to a charging rule as provided by the AF. May be used in charging correlation together with AF-Charging-Identifier AVP. |
| Rating-Group | draft-ietf-aaa-diameter-cc-06.txt [8] | The charging key for the charging rule used for rating purposes |
| Subscription-Id | draft-ietf-aaa-diameter-cc-06.txt [8] | The identification of the subscription (IMSI, MSISDN, etc) |
| User-Equipment-Info | draft-ietf-aaa-diameter-cc-06.txt [8] | The identification and capabilities of the terminal (IMEISV, etc.) |

## 5.4 Gx specific Experimental-Result-Code AVP values

There are two different types of errors in Diameter; protocol and application errors. A protocol error is one that occurs at the base protocol level, those are covered in the Diameter BASE RFC 3588 [4] specific procedures. Application errors, on the other hand, generally occur due to a problem with a function specified in a Diameter application.

Diameter BASE RFC 3588 [4] defines a number of Result-Code AVP values that are used to report protocol errors and how those are used. Those procedures and values shall apply for the present specification.

Due to the Gx specific AVPs, new applications errors can occur. The Gx specific errors are described by the Experimental-Result-Code AVP in this clause, below. According to RFC 3588 [4], the diameter node reports only the first error encountered and only either one Result-Code AVP or one Experimental-Result AVP is included in the Diameter answer.

### 5.4.1 Success

Result Codes that fall within the Success category are used to inform a peer that a request has been successfully completed.

The Result-Code AVP values defined in Diameter BASE RFC 3588 [4] shall be applied.

### 5.4.2 Permanent Failures

Errors that fall within the Permanent Failures category shall be used to inform the peer that the request failed, and should not be attempted again.

The Result-Code AVP values defined in Diameter BASE RFC 3588 [4] are applicable. Also the following specific Gx Experimental-Result-Codes values are defined:

DIAMETER_ERROR_INITIAL_PARAMETERS (5xx1)

This error shall be used when the set of bearer information needed in the CRF for rule selection is incomplete or erroneous for the decision to be made. (e.g. QoS, SGSN address, RAT type, TFT…)

DIAMETER_ERROR_TRIGGER_EVENT (5xx2)

This error shall be used when the set of bearer information sent in a CCR originated due to a trigger event been met is incoherent with the previous set of bearer information for the same bearer. (e.g event trigger met was RAT changed, and the RAT notified is the same as before)

# 6 Gx Messages

Gx Messages are carried within the Diameter Application(s) described in the sub-clauses below. These Applications are defined as vendor specific Diameter applications, where the vendor is 3GPP. The vendor identifier assigned by IANA to 3GPP (http://www.iana.org/assignments/enterprise-numbers) is 10415.

The TPF and the CRF shall advertise the support of the 3GPP vendor specific Diameter Application for the Gx Application and/or the Gx over Gy Application by including the value of the appropriate application identifier(s) in the Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands. The Capabilities-Exchange-Request and Capabilities-Exchange-Answer commands are specified in the Diameter Base Protocol.

Existing Diameter command codes from the Diameter base protocol RFC 2588 [4] and the Diameter Credit Control Application (draft-ietf-aaa-diameter-cc-06.txt) [8] are used with the Gx specific AVPs specified in clause 5.2. The Diameter Credit Control Application AVPs and AVPs from other Diameter applications that are re-used are defined in clause 5.3.

In the GPRS case, the association between the PDP sessions and the Diameter Credit Control sessions shall be done in a one-to-one basis (i.e. 1 PDP session = 1 DCC session), and each PDP context (one primary and zero or more secondary PDP contexts) shall map to a Diameter sub-session (i.e. 1 PDP context = 1 DCC sub-session). The release of the last PDP Context shall be indicated by the release of the whole DCC session, whereas release of a single PDP Context, with others remaining, shall be indicated by the release of the sub-session corresponding to that PDP Context.

## 6.1 Gx Application

Gx reference point shall use Diameter Gx Application as described in this chapter when the CRF functionality is implemented in a standalone device. The Auth-Application-Id for the Gx Application is xxx as allocated by IANA.

Editor's note: The application id needs to be allocated from IANA.

A Gx Application specific Auth-Application-Id is used together with the command code to identify the Gx Application messages.

Editor's Note: The current set of messages is not finally agreed.

### 6.1.1 CC-Request (CCR) Command

The CCR command, indicated by the Command-Code field set to xxx (IETF suggested value 272) and the 'R' bit set in the Command Flags field, is sent by the TPF to the CRF in order to request charging rules for a bearer. The CCR command is also sent by the TPF to the CRF in order to indicate the termination of the bearer session.

Message Format:

```
<CC-Request> ::= < Diameter Header: xxx (272), REQ, PXY >
                 < Session-Id >
                 { Auth-Application-Id }
                 { Origin-Host }
                 { Origin-Realm }
                 { Destination-Realm }
                 { CC-Request-Type }
                 { CC-Request-Number }
                 [ Destination-Host ]
                 [ CC-Sub-Session-Id ]
                 [ Origin-State-Id ]
                *[ Subscription-Id ]
```

```
                 [ RAT-Type ]
                 [ Termination-Cause ]
                 [ User-Equipment-Info ]
                 [ 3GPP-GPRS-Negotiated-QoS-Profile ]
                 [ 3GPP-SGSN-MCC-MNC ]
                 [ 3GPP-SGSN-Address ]
                 [ 3GPP-SGSN-IPv6-Address ]
                 [ Called-Station-ID ]
                 [ Bearer-Usage ]
                *[ TFT-Packet-Filter-Information ]
                *[ Proxy-Info ]
                *[ Route-Record ]
                *[ AVP ]
```

## 6.1.2 CC-Answer (CCA) Command

The CCA command, indicated by the Command-Code field set to xxx (IETF suggested value 272) and the 'R' bit cleared in the Command Flags field, is sent by the CRF to the TPF in response to the CCR command. It is used to provision charging rules and event triggers for the bearer. The primary and secondary CCF and/or primary and secondary OSC addresses may be included in the initial provisioning.

Message Format:

```
<CC-Answer> ::=  < Diameter Header: (272), PXY >
                 < Session-Id >
                 { Auth-Application-Id }
                 { Origin-Host }
                 { Origin-Realm }
                 [ Result-Code ]
                 [ Experimental-Result ]
                 { CC-Request-Type }
                 { CC-Request-Number }
                 [ CC-Sub-Session-Id ]
                *[ Event-Trigger ]
                 [ Origin-State-Id ]
                *[ Charging-Rule-Remove ]
                *[ Charging-Rule-Install ]
                 [ Primary-CCF-Address ]
                 [ Secondary-CCF-Address ]
                 [ Primary-OCS-Address ]
                 [ Secondary-OCS-Address ]
                 [ Error-Message ]
                 [ Error-Reporting-Host ]
                *[ Failed-AVP ]
                *[ Proxy-Info ]
                *[ Route-Record ]
                *[ AVP ]
```

## 6.1.3 Re-Auth-Request (RAR) Command

The RAR command, indicated by the Command-Code field set to 258 and the 'R' bit set in the Command Flags field, is sent by the CRF to the TPF in order to initiate the provision of unsolicited charging rules for an existing bearer. The RAR command shall be followed by a CCR command from the TPF requesting charging rules for the bearer in question.

Message Format:

```
<RA-Request> ::= < Diameter Header: 258, REQ, PXY >
                 < Session-Id >
                 { Auth-Application-Id }
                 { Origin-Host }
                 { Origin-Realm }
                 { Destination-Realm }
                 { Destination-Host }
                 { Re-Auth-Request-Type }
                 [ CC-Sub-Session-Id ]
                 [ Origin-State-Id ]
                *[ Proxy-Info ]
                *[ Route-Record ]
                *[ AVP]
```

### 6.1.4 Re-Auth-Answer (RAA) Command

The RAA command, indicated by the Command-Code field set to 258 and the 'R' bit cleared in the Command Flags field, is sent by the TPF to the CRF in response to the RAR command.

Message Format:

```
<RA-Answer> ::=  < Diameter Header: 258, PXY >
                 < Session-Id >
                 { Auth-Application-Id }
                 { Origin-Host }
                 { Origin-Realm }
                 [ Result-Code ]
                 [ Experimental-Result ]
                 [ CC-Sub-Session-Id ]
                 [ Origin-State-Id ]
                 [ Error-Message ]
                 [ Error-Reporting-Host ]
                *[ Failed-AVP ]
                *[ Proxy-Info ]
                *[ AVP ]
```

## 6.2 Gx over Gy Application

The Gx reference point shall use Diameter Gx over Gy Application as described in this chapter when the CRF functionality is co-located with the Online Charging System (OCS). The Auth-Application-Id for the Gx over Gy Application is xxx as allocated by IANA.

Editor's note: The application id needs to be allocated from IANA.

A Gx over Gy Application specific Auth-Application-Id is used together with the command code to identify the Gx over Gy Application messages.

The Gx over Gy Application is based on the Diameter Credit Control Application. The Gx specific AVPs are used together with the Gy interface messages. The Gx over Gy Application shall use Gx specific AVPs to fulfil the Gx specific requirements (charging rule provision) and, over the same message, Gy functionalities (credit authorization), as follows:

- When only charging rule provision is required the procedures and message content for Gx Application as specified in clause 6.1 shall apply.
- When only credit authorization is required the procedures and message content for Gy as specified in 3GPP TS 32.299 [9] shall apply.
- When credit authorization and charging rule provision are required simultaneously, these shall be executed with a single CCR-CCA message pair (e.g. credit authorization and request for charging rules) or RAR-RAA message pair (e.g. credit re-authorization request and unsolicited charging rule provisioning). The AVPs defined in Gy interface to satisfy the credit authorization requirements and the Gx specific and Gx re-used AVPs shall be both included in the Diameter messages as needed. In any case, the common AVPs shall be included only once within the same message.

### 6.2.1 Simultaneous charging rule provision and credit authorization

Editor's Note: Specific description needs to be added in this clause.

The Gx over Gy Application allows to combine in a single message exchange (e.g. CCR-CCA) the Gx functionality of charging rule provisioning, and the Gy functionality of credit control for service data flow based online charging. This allows creating synergies and signalling savings in case the CRF and the OCS are collocated.

The Gy interface is defined as online charging application in TS 32.299 [9] and TS 32.251 [13], and the messages definitions and call flows apply in the Gx over Gy Application. The Gx over Gy Application shall use the Gx specific AVPs and Gx re-used AVP whenever they are needed to fulfil the Gx requirements for charging rules provisioning. The common AVPs shall be included only once within the same message.

The Experimental-Result-Code AVP specific values of both the Gy Application and Gx Application apply.

# Annex A (informative): Change history

| Change history | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Date** | **TSG #** | **TSG Doc.** | **CR** | **Rev** | **Subject/Comment** | **Old** | **New** |
| 2004-03 | | | | | Presented to CN3#31bis for information | - | 0.0.1 |
| 2004-04 | | | | | Updated to be used as a basis for email work | 0.0.1 | 0.1.0 |
| 2004-04 | | | | | Submitted for email work | 0.2.0 | 0.1.0 |
| 2004-05 | | | | | Submitted for CN3 meeting | 0.2.0 | 0.3.0 |
| 2004-05 | | | | | TS number 29.910 reserved, version for email discussion after CN3#32 | 0.3.0 | 0.4.0 |
| 2004-08 | | | | | Erroneous TS number corrected to 29.210. Tdocs N3-040458, N3-040597, N3-040566, N3-040504, N3-040605 are agreed at CN3#33 and incorporated. To be presented to NP#25 for information | 0.4.0 | 1.0.0 |
| 2004-08 | | | | | Editorial Corrctions made by MCC to align with 3GPP drafting rules | 1.0.0 | 1.0.1 |
| 2004-10 | | | | | Several Tdocs agreed at CN3#33Bis incorporated | 1.0.1 | 1.1.0 |

# 3GPP TSG CN WG3 Meeting #32 N3-040725
# Seoul, Korea. 15th – 19th November 2004

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**Title:** LS on Assignment of the Diameter codes and identifiers for the Rel-6 Gx interface
**Response to:**
**Release:** Rel-6

**Source:** CN3
**To:** CN4
**Cc:**

**Contact Person:**
**Name: Jarkko Ansamaa**
**Tel. Number: +358 50 482 1711**
**E-mail Address: jarkko.ansamaa@nokia.com**

**Attachments:** TS 29.210 V1.1.0

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**1. Overall Description:**

CN3 would like to kindly inform CN4 about the need for two new application identifiers, a range of new AVPs and another of new result codes for the Rel-6 Gx Diameter interface.

**2. Actions:**

**To CN4**

**ACTION:**

CN3 would like to kindly ask CN4 to allocate for the Rel-6 Gx interface purposes, see TS 29.210, the following:

- A new Application identifier (to be requested from IANA) to identify the Rel-6 Gx application;
- A new Application identifier (to be requested from IANA) to identify the Rel-6 Gx over Gy application;
- A range of 100 3GPP specific AVPs; and
- A range of 20 3GPP specific Experimental-Result-Codes of type Permanent failure (5xxx).

If possible, CN3 would kindly ask CN4 to response during the November meeting.

**3. Date of Next CN3 Meeting:**

CN3#35 14-18 February 2005, Sydney, Australia

**3GPP TSG-CN WG3 Meeting #34** **N3-040884**
**Seoul, KOREA. 15th to 19th November 2004.**

**Title:** **LS on CN3 impacts on Early IMS Security mechanisms**

**Source:** **CN3**
**To:** **SA3**
**Cc:** **CN**

**Contact Person:**
**Name:** Nico Gabriele, Vodafone
**Tel. Number:** +44 7717 781832
**E-mail Address:** nico.gabriele@vodafone.com

**Attachments:** N3-040881 – Account Request for Early IMS security, N3-040882 – Disconnect Request for Early IMS security.

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**1. Overall Description:**

CN3 discussed and considered as technically correct 2 CRs on aspects of early IMS systems. CN3 has identified a number of impacts on the GGSN inter-actions defined in 3GPP TS 29.061. These have been documented in the attached contributions, N3-040881 and N3-040882.

CN3 was not able to decide where best to document the information included in the above documents. Whilst the information is relevant to GGSN inter-actions as part of the IMS clause of TS 29.061and so could be incorporated in this specification, it seemed inappropriate to do this when the intention of Early IMS Security is to be something that is used early in IMS deployment, whilst TS 29.061 is a normative specification. Alternatively, the information could be included in TR 33.878. This may seem appropriate and would result in the full detail of the Early IMS Security implementation being held in a single document, if a similar approach were adopted by other groups handling stage 3 details.

CN3 has a preference for the inclusion of this information in TR33.878, but asks SA3 to decide where the documentation of GGSN inter-action impacts as a result of Early IMS Security is best addressed.

**2. Actions:**

**To SA3 group.**

**ACTION:** CN3 asks SA3 to consider the information within N3-040881 and N3-040882 and either to include it within TR33.878 or inform CN3 that the content of N3-040881, N3-040882 should be added to TS 29.061.

**3. Date of Next CN4 Meetings:**

| | | |
|---|---|---|
| CN3#35 | 14th - 18th February 2004 | Sydney, AUSTRALIA |
| CN3#36 | 25th - 29th April 2004 | Cancun, MEXICO |

**3GPP TSG-CN WG3 Meeting #34** ***Tdoc N3-040881***

**Seoul, Korea. 15th - 19th November 2004.**

*CR-Form-v7.1*

# CHANGE REQUEST

⌘ **TS 29.061** **CR** **135** ⌘ **rev** **3** ⌘ 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 ☒

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Account request for early IMS security. |
| ***Source:*** | ⌘ | mmO2 |
| ***Work item code:*** | ⌘ | TEI6 |
| ***Date:*** | ⌘ | 15/11/2004 |
| ***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:*

| | |
|---|---|
| *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:*** | ⌘ | SA3 is currently defining procedures for Early IMS security. This requires specific usage of the Radius Accounting Requests for inter-action with the IMS core. Currently most of the parameters are optional, the information to be passed as part of the Radius requests needs to be clarified. |
| ***Summary of change:*** | ⌘ | A sub section to the IMS specific procedures is added to define GGSN behaviour for early IMS authentIcation. |
| ***Consequences if not approved:*** | ⌘ | Information to be passed to IMS core will not be defined and stage 3 will not be aligned to stage 2. |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | Section 13.a2.2 |

| ***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:**
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.

### 13bba.2.2.4 Radius Accounting requests for Early IMS authentication.

When receiving an Activate PDP Context Request message, based on operator policy, a GGSN supporting early IMS security shall send an “Accounting-Request START” message to a AAA server attached to the HSS. The message shall include the mandatory fields defined in section 16.4.3 and the UE’s IP address, MSISDN, IMSI.

**3GPP TSG-CN WG3 Meeting #34** ***Tdoc N3-040882***

**– Seoul, Korea. 15th - 19th November 2004.**

*CR-Form-v7.1*

# CHANGE REQUEST

⌘ **TS 29.061** **CR** **136** ⌘ **rev** **3** ⌘ 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 ☒

| | | |
|---|---|---|
| ***Title:*** | ⌘ | Disconnect request for early IMS security. |
| ***Source:*** | ⌘ | mmO2 |
| ***Work item code:*** | ⌘ | TEI6 |
| ***Date:*** | ⌘ | 15/11/2004 |
| ***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:*

| | |
|---|---|
| *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:*** | ⌘ | SA3 is currently defining procedures for Early IMS security. This requires specific usage of the Radius Disconnect Request for inter-action with the IMS core. Radius disconnect could be used by operators to tear down PDP contexts when the user is de-registered. |
| ***Summary of change:*** | ⌘ | A sub clause to the IMS specific procedures is added to define the GGSN behaviour for early IMS authentication. |
| ***Consequences if not approved:*** | ⌘ | The HSS will not be able to tear down the PDP context if the user is de-registered. |

| | | |
|---|---|---|
| ***Clauses affected:*** | ⌘ | Section 13.a2.2 |

| | | 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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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.

### 13a.2.2.5 Radius Disconnect requests for Early IMS authentication.

When receiving a Radius Disconnect Request, as defined in section 16.4.9, from the AAA server attached to the HSS, a GGSN with Early IMS security enabled by operator configuration shall follow the AAA inititated PDP context termination procedure described in section 16.3.4.choosing the option of deleting the PDP context.