

TSG-RAN Working Group 3 meeting #7
Sophia Antipolis, France, 20 – 24 September 1999

Agenda Item: 10.3 Procedure specifications (RANAP) (TS 25.413)
10.4 Message contents and parameter range
Source: NTT Software, NTT DoCoMo
Title: Charging related Procedure for RANAP
Document for: Discussion

1. Introduction

This contribution proposes to add the charging related procedure for RANAP based on the agreement in the 7th SA2 meeting.

In contract to GPRS system, UMTS does not have the protocol with the acknowledge data transfer mode between UE and CN, and only RNC can identify the actual packet volume successfully transferred to a UE. Therefore new procedure is need to correct counter in 3G-SGSN.

2. Problems

Some operator perform the volume based charging with the value of the send and receive counters, e.g. PDC-Packet system also adapts the volume based charging. In 2G-system, CN has counted the data volume, which actually reached to MT, by LLC Acknowledge Mode.

In 3G-system, the removal of LLC has been agreed and it is deduced that an acknowledge operation of RLC would be used. However, since the RLC Protocol is terminated by RNC, CN becomes unable to judge whether the data reaches the MT or not. If CN does not have the data from RNC to correct its counter, the user is charged for the data that was never recieved. From the operator's position, only the packet, which was able to take the corroboration of actually having transferred to MT, should be charged in the communication by Acknowledged Mode.

3. Discussion

SA2 member had been studying this issue, and agreed to have the procedure with which 3G-SGSN could be notified the not transferred data volume by RNC. Agreed CR is attached in this contribution.

On this agreement, it is necessary for RANAP to have the report from RNC and the inquiry from SGSN to RNC.

4. Proposal

This contribution proposes to add the annex of this contribution to section 8 of TS25.413. (See Annex.)

ANNEX

8.X Data Volume Report

This procedure is used in order the CN to correct its counter in the case of the volume based charging for IP domain. The RNC indicates the volume of all not transferred down-link data (discarded or forwarded to another entity (2G-CN or target RNC)) to the 3G-CN. Partially transferred packets are handled as not transferred.

8.X.1 RNC initiated Data Volume Report

The Data Volume Report message is sent from the RNC to the CN. It is used to notify of the volume of all not transferred down-link data (discarded or forwarded to another entity) to the CN. The RNC delivers to the CN the discarded or forwarded volume accumulated over an implementation dependent time and not per discarded or forwarded packet. The procedure is connection oriented.

The signaling flow is shown in figure 1.

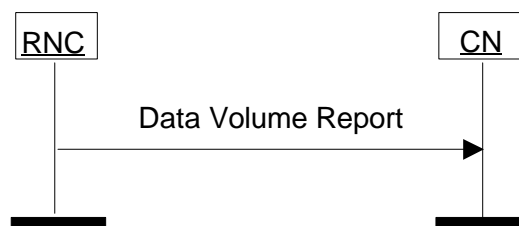


Figure1. RNC initiated Data Volume Report Procedure.

8.X.2 CN initiated Data Volume Report

The Data Volume Request message is sent from the CN to the RNC. The CN asks the RNC to provide the volume of buffered down-link data to correct its counter at any time the CN wants (e.g. deactivation procedure, modification procedure, SRNC relocation procedure, etc.). On receiving the Data Volume Report Request message, the RNC returns Data Volume Report Response message to the CN. The procedure is connection oriented.

The signaling flow is shown in figure2.

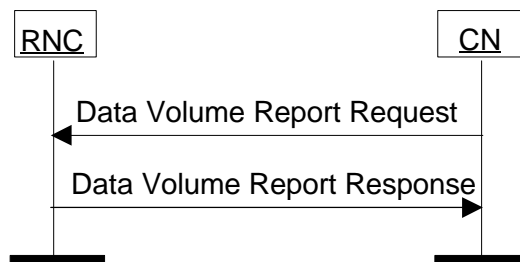


Figure2. CN initiated Data Volume Report Procedure.

9.1.X DATA VOLUME REPORT

Information element	Reference	Type
Message type		M
Beareres x n reported		C1
RAB ID		M
Non-delivery Data Volume		M
Data Collect Time		M

C1 At least one group shall be present.

9.1.X DATA VOLUME REPORT REQUEST

Information element	Reference	Type
Message type		M
Beareres x n to be reported		C1
RAB ID		M

C1 At least one group shall be present.

9.1.X DATA VOLUME REPORT RESPONSE

Information element	Reference	Type
Message type		M
Beareres x n reported		C1
RAB ID		M
Non-delivery Data Volume		M
Data Collect Time		M
Cause		M

C1 At least one group shall be present.

9.2.Y Non-delivery Data Volume

This information shows the volume of buffered down-link data, which is not transferred to UE.

9.2.Y Data Collect Time

This information shows the time to have collected the Data volume.

Sophia Antipolis, France, 24-26 August 1999

3G CHANGE REQUEST*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.***23.121 CR 26**Current Version: **3.0.0**

3G specification number ↑

↑ CR number as allocated by 3G support team

For submission to **SA#5** for approval **X** *(only one box should*
 TSG *list TSG meeting no. here ↑*

For information *be marked with an X)*

Form: 3G CR cover sheet, version 1.0 The latest version of this form is available from: **Error! Reference source not found.****Proposed change affects:***(at least one should be marked with an X)*USIM ME UTRAN Core Network **Source:**

NTT DoCoMo, Siemens

Date:

24/08/1999

Subject:

Procedures for volume based charging

3G Work item:

Architecture Requirements for Release 99

Category:*(only one category
Shall be marked
With an X)*

- F Correction
- A Corresponds to a correction in a 2G specification
- B Addition of feature
- C Functional modification of feature
- D Editorial modification

Reason for change:

Due to the removal of LLC layer, some procedures over Iu interface shall be considered in order for 3G-SGSN to charge only for packet data successfully transferred to a UE. At the previous S2 meeting, two procedures over Iu interface for volume based charging were discussed, but no conclusion can be reached.

After analysing the above two approaches, the source companies can reach a compromised solution which can meet operators' requirements.

From operators' point of view, the following requirements shall be considered.

- The charging shall be based on the packet volume successfully transferred to a UE
- 3G-SGSN shall be able to produce billing information at any time the 3G-SGSN wants.
- Overload signalling due to the charging procedures over Iu shall be avoided.

Currently charging function for down-link packets is located at the 3G-SGSN. On the other hand, only RNC can identify the actual packet volume successfully transferred to a UE. In order for 3G-SGSN to charge only for packet data successfully transferred to a UE, the RNC shall indicate the volume of all not transferred data to the 3G-SGSN.

If RNC sends the unacknowledged volume per error situation, the signalling load over Iu may significantly increase in case of the change of radio environments. Instead, RNC shall be able to send the unacknowledged volume accumulated over an implementation dependent time.

Moreover, since 3G-SGSN is responsible for the charging, 3G-SGSN shall be able to produce billing information at any time when SGSN wants. Therefore, SGSN shall be able to ask the RNC to provide the volume of buffered data to correct its counter. This procedure can be also utilised for supporting real-time billing and pre-paid services.

Clauses affected:

4.2

Other specsOther 3G core specifications → List of CRs:

Affected:

Other 2G core specifications
MS test specifications
BSS test specifications
O&M specifications

	→ List of CRs:
	→ List of CRs:
	→ List of CRs:
	→ List of CRs:



**Other
comments:**



help.doc

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4.2 Iu Interface

- Transport protocol across the Iu interface for UTRAN shall be according to 23.930
- The UTRAN shall support two logically separate signalling flows via Iu to combined or separate network nodes of different types (MSC and SGSN).
- The UTRAN shall contain a "domain distribution function" to route transparent application-level control signalling from the UE to the correct core network domain. The UE shall indicate the type of application being addressed (eg via a protocol discriminator). The UTRAN shall map this on to the correct Iu instance to forward the signalling.
- UTRAN-services (including radio access bearers) shall be independent from the core network domain used to access them. Either core network domain can access any appropriate UTRAN-service (eg it should be possible to access a "speech" radio access bearer from the PS-domain).
- The protocol architecture for the User Plane of the Iu interface towards the IP domain shall be based on the same principles as for the (evolved) Gn interface, i.e. the user plane part of GTP over UDP/IP shall be used for tunneling of end user data packets over the Iu interface
- One or several AAL5/ATM Permanent VCs may be used as the common layer 2 resources between the UTRAN and the 'IP domain' of the CN. The reason for usage of several permanent AAL5/ATM VCs may e.g. be for load sharing and redundancy. It is also possible to use one switched VC per user flow (PDP context or radio access bearer). Switched VCs may be used, however the standardization of the procedures and protocols for use of Switched VCs is outside the scope of the 3GPP. If operators use switched VC, the specification of procedures and protocol for switched VCs are up to operators and out of scope of the UMTS/IMT-2000 specification.

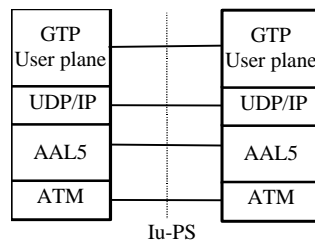


Figure 1: Protocol Architecture for the Iu user plane towards the IP domain

Note: The termination point of the GTP-U tunnel in the IP domain of the Core Network is FFS.

- [Charging functionality is located at the 3G-SGSN. On the other hand, only RNC can identify the actual packet volume successfully transferred to a UE. In order for 3G-SGSN to provide the volume based charging for IP domain, the standard shall support the following procedures over Iu interface.](#)
 - [The RNC indicates the volume of all not transferred downlink data \(discarded or forwarded to another entity \(2G-SGSN or target RNC\)\) to the 3G-SGSN so that the 3G-SGSN can correct its counter. Partially transferred packets are handled as not transferred.](#)
 - [The RNC delivers to the 3G-SGSN the discarded or forwarded volume accumulated over an implementation dependent time and not per discarded or forwarded packet.](#)
 - [The 3G-SGSN can ask the RNC to provide the volume of buffered downlink data to correct its counter at any time the 3G-SGSN wants.](#)

