

Agenda Item: 10.3

Source: Nokia

Title: **Modifications to RANAP specifications due to the lossless Relocation requirement**

Document for: Decision

1 Introduction

In 3GPP Handover and SRNS Relocation workshop held in Sophia Antipolis 23.8.1999 it was agreed that both lossless and lossy relocation options shall be supported in release 99 of UMTS. This contribution presents the additions that are required for RANAP specifications (TS 25.413) due to this decision.

2 Modifications to RANAP specification

2.1 Relocation Preparation procedure modification

Successful operation

Procedure is initiated by the Serving RNC by sending a RELOCATION REQUIRED message to active CN nodes. Timer T(RELOCATION COMMAND) is started, upon transmitting the message.

RELOCATION REQUIRED message allows a RNC to request that a relocation is to be carried out for a particular UE, having signalling connection via the serving RNC.

The cause of the relocation preparation initiation is indicated to the CN. It is used by the CN to proceed the relocation preparation execution appropriately e.g. considering switching execution timing. As a response to the RELOCATION REQUIRED message the CN sends RELOCATION COMMAND to the source RNC.

For each RAB originating from the PS domain, the RELOCATION COMMAND may contain Iu transport address and Iu transport association to be used for the forwarding of the non acknowledged DL GTP-PDU duplicates.

Upon reception of RELOCATION COMMAND belonging to ongoing procedure the RNC stops the timer T(RELOCATION COMMAND). Depending on the cause of the relocation preparation initiation, hard handover or SRNS relocation, the source RNC either triggers the handover procedure in the air interface or commits the execution of the relocation in the target RNS, respectively. When the execution of relocation is committed via Iur, source RNC stops the air interface data transmission and starts the data duplicate forwarding for the RABs for which Iu transport bearer to be used for the data forwarding is established. A copy of forwarded data shall be stored within the source RNC. When data forwarding is initialised, timer T(Data forwarding) is started.

The signalling flow between the source RNC and the CN is shown in Figure 1.

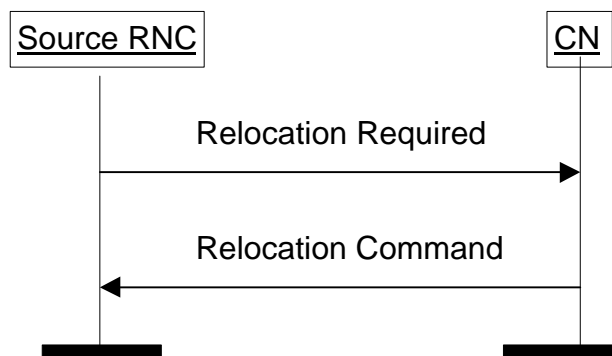


Figure 1. Relocation Preparation procedure between source RNC and CN.

2.2 RELOCATION COMMAND message (modified)

Information element	Reference	Type
Message type		M
Target RNC to source RNC transparent container		O (1)
<u>RABs subject to Data forwarding x n</u>		<u>O (2)</u>
<u>RAB ID</u>		<u>M</u>
<u>Transport address</u>		<u>M</u>
<u>Iu transport association</u>		<u>M</u>

(2) Only for PS domain.

2.3 SRNS CONTEXT TRANSFER procedure (new)

A new procedure used for UMTS to GPRS handovers shall be introduced. This procedure is used to get the air interface transmission status for GTP-PDUs from RNC to CN. This information is to be used for the lossless handover from UMTS to GPRS. The execution of this procedure for the UMTS to GPRS handover is optional.

8.x SRNS CONTEXT TRANSFER

This procedure may be used to trigger the transfer of SRNS contexts from RNC to CN (PS domain) in case of inter system forward handover. Messages belonging to this procedure utilise the connection oriented mode of the Iu signalling bearer. SRNS contexts contain for each concerned RAB the sequence numbers of the GTP-PDUs next to be transmitted in uplink and downlink directions.

CN initialises the procedure by sending SRNS CONTEXT REQUEST message to UTRAN. SRNS CONTEXT REQUEST message includes the list of RABs whose contexts should be transferred.

Upon reception of SRNS CONTEXT REQUEST RNC starts the timer T(Data forwarding).

RNC responds to CN with SRNS CONTEXT RESPONSE message. SRNS CONTEXT RESPONSE message contains the RAB Context information for referenced RABs. For each RAB following information is included

- the sequence number for the next downlink GTP-PDU to be sent to the UE, and
- the sequence number for the next uplink GTP-PDU to be tunnelled to the GGSN.
- the sequence number of the UL RLC-PDU which carried the last segment of the last GTP-PDU forwarded to SGSN.

The transfer of GTP-PDUs from the Source SRNC will start when the RNC receives Iu RELEASE COMMAND.

2.4 Iu Release procedure modification

New cause value "Inter System Forward Handover" for the Iu Release procedure shall be defined.

Following sentences shall be added to the Iu Release procedure specification in TS 25.413.

In case of Inter system forward handover, the Iu RELEASE COMMAND shall contain Iu transport address and Iu transport association for the RABs for which the GTP-PDU forwarding was prepared by SRNS Context Transfer procedure. Upon reception of this message UTRAN should initialise the GTP-PDU forwarding for addressed RABs.

The Iu transport bearers for GTP-PDU forwarding and other UTRAN resources used for the GTP-PDU forwarding process are released by RNC only when the timer T(Data forwarding) expires.

2.5 SRNS CONTEXT REQUEST Message (new)

Information element	Reference	Type
Message type		M
RABs subject to Data forwarding x n		O
RAB ID		M

2.6 SRNS CONTEXT RESPONSE Message (new)

Information element	Reference	Type
Message type		M
Cause		M
RAB Contexts xn		O
RAB ID		M
DL GTP-PDU Sequence Number		M
UL GTP-PDU Sequence Number		M
UL RLC-PDU Sequence Number		M

2.7 IU RELEASE COMMAND MESSAGE (modified)

Information element	Reference	Type
Message type		M
Cause		M
<u>RABs subject to Data forwarding x n</u>		<u>O(1)</u>
<u>RAB ID</u>		<u>M</u>
<u>Transport address</u>		<u>M</u>
<u>Iu transport association</u>		<u>M</u>

(1) only for PS domain.

Definitions for the new Information elements:

DL GTP-PDU Sequence Number

This IE indicates the sequence number of the GTP-PDU which is the next to be sent to the UE.

UL GTP-PDU Sequence Number

This IE indicates the sequence number of the GTP-PDU which is the next to be sent to the SGSN.

UL RLC-PDU Sequence Number

This IE indicates the sequence number of the UL RLC-PDU which carried the last segment of the last GTP-PDU forwarded to SGSN.

3 Proposal

It is proposed that

1. the modifications for Relocation Preparation procedure stated in chapter 2.1 and 2.2. , which are required for the lossless relocation, are included in TS 25.413.
2. the additions and modifications indicated in chapter 2.3 –2.7, which are required for the lossless UMTS to GPRS handover, are included in TS 25.413.