

TSG RAN Meeting #17
 Biarritz, France, 3 - 6 September, 2002

RP-020600

Title CRs (R99 and Rel-4/Rel-5 Category A) to TS 25.413
Source TSG RAN WG3
Agenda Item 7.3.3

RAN3 Tdoc	Spec	curr. Vers.	new Vers.	REL	CR	Rev	Cat	Title	Work item
R3-022057	25.413	3.10.0	3.11.0	R99	493	1	F	Codec change during SRNS relocation	TEI
R3-022058	25.413	4.5.0	4.6.0	REL-4	494	1	A	Codec change during SRNS relocation	TEI
R3-022059	25.413	5.1.0	5.2.0	REL-5	495	1	A	Codec change during SRNS relocation	TEI
R3-022060	25.413	3.10.0	3.11.0	R99	507	1	F	Correction to RANAP cause value range	TEI
R3-022061	25.413	4.5.0	4.6.0	REL-4	508	1	A	Correction to RANAP cause value range	TEI
R3-022062	25.413	5.1.0	5.2.0	REL-5	509	1	A	Correction to RANAP cause value range	TEI
R3-022093	25.413	3.10.0	3.11.0	R99	482	2	F	Handling of security at relocation	TEI
R3-022094	25.413	4.5.0	4.6.0	REL-4	483	2	A	Handling of security at relocation	TEI
R3-022095	25.413	5.1.0	5.2.0	REL-5	484	2	A	Handling of security at relocation	TEI

3GPP TSG-RAN3 Meeting #31
Stockholm, Sweden, 19th-23th August 2002

Tdoc # R3-022093

CR-Form-v7

CHANGE REQUEST

25.413 CR 482 # rev 2 # Current version: 3.10.0

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:	# Handling of security information at relocation
Source:	# RAN WG3
Work item code:	# TEI
Date:	# 19/08/2002
Category:	# F
	<p>Use <u>one</u> of the following categories:</p> <p>F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification)</p> <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>
Release:	# R99
	<p>Use <u>one</u> of the following releases:</p> <p>2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)</p>

Reason for change: # The handling of security information at relocation remains undefined.

It has to be defined to secure the interworking between RNC, CN nodes and UE from different vendors. The algorithms and keys are potentially provided from two sources: the source RNC via the "container" and the CN nodes via the "Relocation Request" message. The RNC and CN can be from different vendors. Consistency between these two sources of information must be ensured for the overall system to work properly and prevent IOT issues. As the keys are not exchanged between UE and RNC, consistency must also been ensured with UE when the CN and the RNC agree on the keys.

The main elements that are potential source of interworking issues and need specification for a target RNC are the following:

- the integrity protection key received in the container and in the Integrity Protection Information IE may be different (two potential source of information for target RNC),
- the encryption key currently used for ciphering the signalling data needs to be known at the target side. The encryption key to be considered for ciphering the signalling data must be the one received from the container to ensure continuity with the UE and not one key derived from the Encryption Information IE of a Relocation Request message.
- whenever possible, the target RNC must be in a position to know what is the current algorithm to optimise the radio,
- the same chosen encryption algorithm must be received for the two domains (alignment since RAN3#29) and handover must not be accepted if a discrepancy

	<p>appears.</p> <ul style="list-style-type: none"> - at least one alternative must be supported by the target RNC to complete successfully the relocation, - the target RNC will return the Chosen Encryption Algorithm in the Relocation Request Acknowledge only if Encryption Information has been provided in the Relocation Request. <p>For a source RNC:</p> <ul style="list-style-type: none"> - the “chosen” encryption/integrity protection algorithms and keys are to be given to a target RNC (that might be from another vendor) and are optional: conditions/assumptions for inclusion are to be given. <p>Also, a minimum error handling (i.e. abnormal cases) need to be defined to guide implementations as it has been done with previous specification on security in the Security Mode Control module, without going to overspecification but only to secure IOT as requested by operators.</p>
Summary of change: ⌘	<p>The procedure text in RANAP regarding Relocation Preparation and Relocation Resource Allocation is changed in order to be aligned with the above shown statements.</p> <p><u>Impact assessment towards the previous version of the specification (same release):</u></p> <p>This CR has isolated impact towards the previous version of the specification (same release).</p> <p>This CR has an impact under functional point of view.</p> <p>The impact can be considered isolated because it only affects the procedures Relocation Preparation and Relocation Resource Allocation.</p>
Consequences if not approved: ⌘	<p>There will be no specification of the handling of security information between the different nodes of the network that can be from different vendors leading to serious interworking issues.</p>

Clauses affected: ⌘	3.1,8.6,8.7,9.2.1.28										
Other specs affected:	<table border="1"> <tr> <td>Y</td> <td>N</td> </tr> <tr> <td>X</td> <td></td> </tr> <tr> <td></td> <td>X</td> </tr> <tr> <td></td> <td>X</td> </tr> </table>	Y	N	X			X		X	Other core specifications Test specifications O&M Specifications	⌘ TS 25.413 REL-4 CR 483 TS 25.413 REL-5 CR 484
Y	N										
X											
	X										
	X										
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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Integrity Protection Alternative: defines both the Integrity Protection Status (started/not started) together with the Integrity Protection Algorithm considered altogether.

Ciphering Alternative: defines both the Ciphering Status (started/not started) together with the Ciphering Algorithm considered altogether.

Relocation of SRNS: relocation of SRNS is a UMTS functionality used to relocate the serving RNS role from one RNS to another RNS. This UMTS functionality is realised by several elementary procedures executed in several interfaces and by several protocols and it may involve a change in the radio resources used between UTRAN and UE

It is also possible to relocate the serving RNS role from:

- one RNS within UMTS to another relocation target external to UMTS;
- functionality equivalent to the serving RNS role from another relocation source external to UMTS to another RNS.

Serving RNS (SRNS): role an RNS can take with respect to a specific connection between an UE and UTRAN. There is one serving RNS for each UE that has a connection to UTRAN. The serving RNS is in charge of the radio connection between a UE and the UTRAN. The serving RNS terminates the Iu for this UE

Serving RNC (SRNC): SRNC is the RNC belonging to SRNS

SRNC-ID: See [3] for definition

S-RNTI: See [3] for definition

Source RNS: role, with respect to a specific connection between UTRAN and CN, that RNS takes when it decides to initiate a relocation of SRNS

Source RNC: source RNC is the RNC belonging to source RNS

Target RNS: role an RNS gets with respect to a specific connection between UTRAN and CN when it is being a subject of a relocation of SRNS which is being made towards that RNS

Target RNC: target RNC is the RNC belonging to target RNS

Directed retry: Directed retry is the process of assigning a User Equipment to a radio resource that does not belong to the serving RNC e.g. in situations of congestion. It is triggered by the RAB Assignment procedure and employs relocation procedures.

Elementary Procedure: RANAP protocol consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between the RNS and the CN. These Elementary Procedures are defined separately and are intended to be used to build up complete sequences in a flexible manner. If the independence between some EPs is restricted, it is described under the relevant EP description. Unless otherwise stated by the restrictions, the EPs may be invoked independently of each other as stand alone procedures, which can be active in parallel. Examples on using several RANAP EPs together with each other and EPs from other interfaces can be found in reference [4].

An EP consists of an initiating message and possibly a response message. Three kinds of EPs are used:

- **Class 1:** Elementary Procedures with response (success and/or failure).
- **Class 2:** Elementary Procedures without response.
- **Class 3:** Elementary Procedures with possibility of multiple responses.

For Class 1 EPs, the types of responses can be as follows:

Successful:

- A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.
- On time supervision expiry (i.e. absence of expected response).

Successful and Unsuccessful:

- One signalling message reports both successful and unsuccessful outcome for the different included requests. The response message used is the one defined for successful outcome.

Class 2 EPs are considered always successful.

Class 3 EPs have one or several response messages reporting both successful, unsuccessful outcome of the requests and temporary status information about the requests. This type of EP only terminates through response(s) or EP timer expiry.

8.6 Relocation Preparation

8.6.1 General

The purpose of the Relocation Preparation procedure is to prepare relocation of SRNS either with involving UE or without involving UE. The relocation procedure shall be co-ordinated in all Iu signalling connections existing for the UE in order to allow Relocation co-ordination in the target RNC. The procedure uses connection oriented signalling.

The source RNC shall not initiate the Relocation Preparation procedure for an Iu signalling connection if a Prepared Relocation exists in the RNC for that Iu signalling connection or if a Relocation Preparation procedure is ongoing for that Iu signalling connection.

8.6.2 Successful Operation

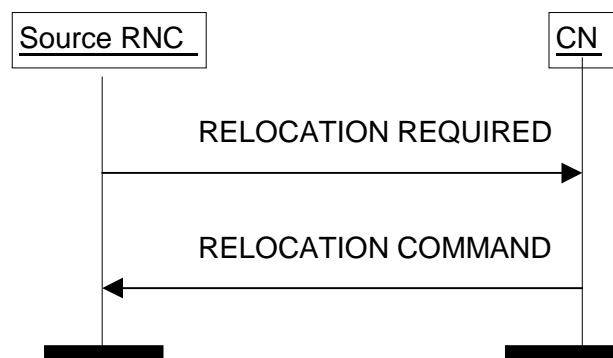


Figure 5: Relocation Preparation procedure. Successful operation.

The source RNC shall initiate the procedure by generating RELOCATION REQUIRED message. The source RNC shall decide whether to initiate the intra-system Relocation or the inter-system handover. In case of intra-system Relocation the source RNC shall indicate in the *Source ID* IE the RNC-ID of the source RNC and in the *Target ID* IE the RNC-ID of the target RNC. In case of inter-system handover the source RNC shall indicate in the *Source ID* IE the Service Area Identifier and in the *Target ID* IE the cell global identity of the cell in the target system. The source RNC shall indicate the appropriate cause value for the Relocation in the *Cause* IE. Typical cause values are "Time critical Relocation", "Resource optimisation relocation", "Relocation desirable for radio reasons", "Directed Retry".

The source RNC shall determine whether the relocation of SRNS shall be executed with or without involvement of UE. The source RNC shall set the *Relocation Type* IE accordingly to "UE involved in relocation of SRNS" or "UE not involved in relocation of SRNS".

In case of intra-system Relocation, the source RNC shall include in the RELOCATION REQUIRED message the *Source RNC to Target RNC Transparent Container* IE. This container shall include the *Relocation Type* IE and the number of Iu signalling connections existing for the UE by setting correctly the *Number of Iu Instances* IE. ~~If available, this container shall further include the *Chosen Integrity Protection Algorithm* IE and the *Integrity Protection Key* IE. If ciphering is active, this container shall include, for ciphering information of signalling data, the *Chosen Encryption Algorithm* IE and the *Ciphering Key* IE, for ciphering information of CS user data the *Chosen Encryption Algorithm CS* IE and for ciphering information of PS user data the *Chosen Encryption Algorithm PS* IE.~~

Only in case of intra-system relocation, the *Source RNC-to-Target RNC transparent container* IE shall include the *Integrity Protection Key* IE from the last received domain on which security mode control procedure has been successfully performed and the associated *Chosen Integrity Protection Algorithm* IE that has been selected for this domain.

Only in case of intra-system relocation, the *Source RNC-to-Target RNC transparent container* IE shall include the *Ciphering Key* IE for the signalling data from the last received domain on which security mode control procedure has been successfully performed and the associated *Chosen Encryption Algorithm* IE that has been selected for this domain.

Only in case of intra-system relocation, for each domain where the security mode control procedure has been successfully performed in the source RNC, the *Source RNC-to-Target RNC transparent container IE* shall include the *Chosen Encryption Algorithm IE* of CS (PS respectively) user data corresponding to the ciphering alternative that has been selected for this domain. If the security mode control procedure had not been successful or performed for one domain or had proposed no ciphering alternative, the *Chosen Encryption Algorithm IE* for the user data of this domain shall not be included. When both the CS and the PS user data *Chosen Encryption Algorithm IEs* are provided, they shall be the same.

This container shall include the *RRC Container IE*. If the *Relocation Type IE* is set to "UE not involved in relocation of SRNS" and the UE is using DCH(s), DSCH(s) or USCH(s), the *Source RNC to Target RNC Transparent Container IE* shall include the mapping between each RAB subflow and transport channel identifier(s), i.e. if the RAB is carried on a DCH(s), the DCH ID(s) shall be included, and when it is carried on DSCH(s) or USCH(s), the DSCH ID(s) or USCH ID(s) respectively shall be included. If the *Relocation Type IE* is set to "UE not involved in relocation of SRNS", the *d-RNTI IE* shall be included in the *Source RNC to Target RNC Transparent Container IE*. If the *Relocation Type IE* is set to "UE involved in relocation of SRNS", the *Target Cell ID IE* shall be included in the *Source RNC to Target RNC Transparent Container IE*.

In case of inter-system handover to GSM the RNC:

- shall include *MS Classmark 2* and *MS Classmark 3* IEs received from the UE in the RELOCATION REQUIRED message to the CN.
- shall include the *Old BSS to New BSS IE* within the RELOCATION REQUIRED message only if the information is available.

The source RNC shall send the RELOCATION REQUIRED message to the CN and the source RNC shall start the timer $T_{\text{RELOCprep}}$.

When the preparation including resource allocation in the target system is ready and the CN has decided to continue the relocation of SRNS, the CN shall send RELOCATION COMMAND message to the source RNC and the CN shall start the timer $T_{\text{RELOCcomplete}}$.

If the *Target RNC To Source RNC Transparent Container IE* or the *L3 information IE* is received by the CN from the relocation target, it shall be included in the RELOCATION COMMAND message.

For each RAB successfully established in the target system and originating from the PS domain, the RELOCATION COMMAND message shall contain Iu transport address and Iu transport association to be used for the forwarding of the DL N-PDU duplicates towards the relocation target. Upon reception of the RELOCATION COMMAND message from the PS domain, the source RNC shall start the timer T_{DATAfwd} .

The Relocation Preparation procedure is terminated in the CN by transmission of RELOCATION COMMAND message.

If the target system (including target CN) does not support all existing RABs, the RELOCATION COMMAND message shall contain a list of RABs indicating all the RABs that are not supported by the target system. This list is contained in the *RABs to Be Released IE*. The source RNC shall use this information to avoid transferring associated contexts where applicable and may use this information e.g. to decide if to cancel the relocation or not. The resources associated with these not supported RABs shall not be released until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

Upon reception of RELOCATION COMMAND message the source RNC shall stop the timer $T_{\text{RELOCprep}}$, RNC shall start the timer $T_{\text{RELOCoverall}}$ and RNC shall terminate the Relocation Preparation procedure. The source RNC is then defined to have a Prepared Relocation for that Iu signalling connection.

When Relocation Preparation procedure is terminated successfully and when the source RNC is ready, the source RNC should trigger the execution of relocation of SRNS.

Interactions with other procedures:

If, after RELOCATION REQUIRED message is sent and before the Relocation Preparation procedure is terminated, the source RNC receives a RANAP message initiating an other connection oriented RANAP class 1 or class 3 procedure

(except IU RELEASE COMMAND message, which shall be handled normally) via the same Iu signalling connection, the source RNC shall either:

1. cancel the Relocation Preparation procedure i.e. execute Relocation Cancel procedure with an appropriate value for the *Cause* IE, e.g. "Interaction with other procedure", and after successful completion of Relocation Cancel procedure, the source RNC shall continue the initiated RANAP procedure;

or

2. terminate the initiated RANAP procedure without any changes in UTRAN by sending appropriate response message with the cause value "Relocation Triggered" to the CN. The source RNC shall then continue the relocation of SRNS.

If during the Relocation Preparation procedure the source RNC receives a DIRECT TRANSFER message it shall be handled normally.

If during the Relocation Preparation procedure the source RNC receives connection oriented RANAP class 2 messages (with the exception of DIRECT TRANSFER message) it shall decide to either execute the procedure immediately or suspend it. In the case the relocation is cancelled the RNC shall resume any suspended procedures (if any).

After Relocation Preparation procedure is terminated successfully, all RANAP messages (except IU RELEASE COMMAND message, which shall be handled normally) received via the same Iu signalling bearer shall be ignored by the source RNC.

8.6.3 Unsuccessful Operation

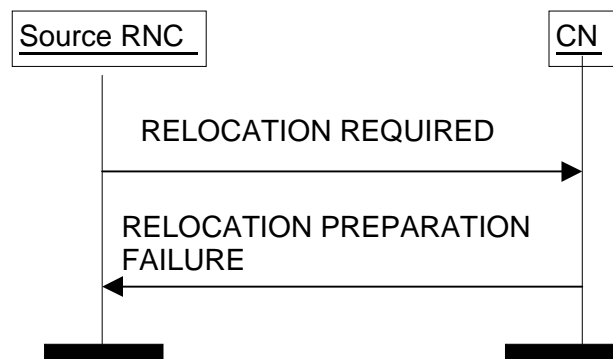


Figure 6: Relocation Preparation procedure. Unsuccessful operation.

If the CN or target system is not able to even partially accept the relocation of SRNS or a failure occurs during the Relocation Preparation procedure in the CN or the CN decides not to continue the relocation of SRNS, the CN shall send RELOCATION PREPARATION FAILURE message to the source RNC.

RELOCATION PREPARATION FAILURE message shall contain appropriate value for the *Cause* IE e.g. " $T_{RELOCalloc}$ expiry", "Relocation Failure in Target CN/RNC or Target System", "Relocation not supported in Target RNC or Target System".

Transmission of RELOCATION PREPARATION FAILURE message terminates the procedure in the CN. Reception of RELOCATION PREPARATION FAILURE message terminates the procedure in UTRAN.

When the Relocation Preparation procedure is unsuccessfully terminated, the existing Iu signalling connection can be used normally.

If the Relocation Preparation procedure is terminated unsuccessfully, the CN shall release the possibly existing Iu signalling connection for the same UE and related to the same relocation of SRNS towards the target RNC by initiating Iu Release procedure towards the target RNC with an appropriate value for the *Cause* IE, e.g. "Relocation Cancelled".

Interactions with Relocation Cancel procedure:

If there is no response from the CN to the RELOCATION REQUIRED message before timer $T_{\text{RELOCprep}}$ expires in the source RNC, the source RNC shall cancel the Relocation Preparation procedure by initiating the Relocation Cancel procedure with appropriate value for the *Cause IE*, e.g. " $T_{\text{RELOCprep}}$ expiry".

8.6.4 Abnormal Conditions

If the target RNC, which was indicated in the RELOCATION REQUIRED message, is not known to the CN:

1. The CN shall reject the relocation of SRNS by sending a RELOCATION PREPARATION FAILURE message to the source RNC with *Cause IE* set to "Unknown target RNC".
2. The CN shall continue to use the existing Iu connection towards the source RNC.

NOTE: In case two CN domains are involved in the SRNS Relocation Preparation procedure and the Source RNC receives the *Target RNC to Source RNC Transparent Container IE* via two CN domains, it may check whether the content of the two *Target RNC to Source RNC Transparent Container IE* is the same. In case the Source RNC receives two different *Target RNC to Source RNC Transparent Container IE*, the RNC behaviour is left implementation specific.

8.6.5 Co-ordination of Two Iu Signalling Connections

If the RNC has decided to initiate Relocation Preparation procedure for a UTRAN to UTRAN relocation, the RNC shall initiate simultaneously Relocation Preparation procedure on all Iu signalling connections existing for the UE. The source RNC shall also include the same *Source RNC to Target RNC Transparent Container IE* in the RELOCATION REQUIRED message towards the two domains.

For intersystem handover to GSM, Relocation Preparation procedure shall be initiated only towards the circuit switched CN.

The source RNC shall not trigger the execution of relocation of SRNS unless it has received RELOCATION COMMAND message from all Iu signalling connections for which the Relocation Preparation procedure has been initiated.

If the source RNC receives RELOCATION PREPARATION FAILURE message from the CN, the RNC shall initiate Relocation Cancel procedure on the other Iu signalling connection for the UE if the other Iu signalling connection exists and if the Relocation Preparation procedure is still ongoing or the procedure has terminated successfully in that Iu signalling connection.

8.7 Relocation Resource Allocation

8.7.1 General

The purpose of the Relocation Resource Allocation procedure is to allocate resources from target RNS for a relocation of SRNS. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.7.2 Successful Operation

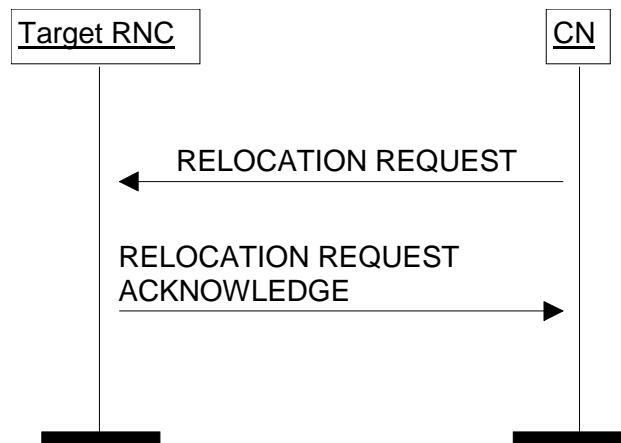


Figure 7: Relocation Resource Allocation procedure. Successful operation.

The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same RAB configuration as existing for the UE before the relocation.

The CN shall transmit the RELOCATION REQUEST message to target RNC and the CN shall start the timer $T_{RELOCalloc}$.

Upon reception of the RELOCATION REQUEST message, the target RNC shall initiate allocation of requested resources.

The RELOCATION REQUEST message shall contain following IEs

- *Permanent NAS UE Identity* (if available)
- *Cause*
- *CN Domain Indicator*
- *Source RNC To Target RNC Transparent Container*
- *Iu Signalling Connection Identifier*
- *Integrity Protection Information* (if available)

For each RAB requested to relocate (or to be created e.g. in the case of inter-system handover), the message shall contain following IEs:

- *RAB-ID*
- *NAS Synchronisation Indicator* (if the relevant NAS information is provided by the CN)
- *RAB parameters*
- *User Plane Information*
- *Transport Layer Address*
- *Iu Transport Association*
- *Data Volume Reporting Indication* (only for PS)
- *PDP Type Information* (only for PS)

The RELOCATION REQUEST message may include following IEs:

- *Encryption Information* (shall not be included if the *Integrity Protection Information* IE is not included)

For each RAB requested to relocate the message may include following IEs:

- *Service Handover*

The following information elements received in RELOCATION REQUEST message require the same special actions in the RNC as specified for the same IEs in the RAB Assignment procedure:

- RAB-ID
- User plane Information
- Priority level, queuing and pre-emption indication
- Service Handover

The *SDU Format Information Parameter IE* in the *RAB Parameters IE* shall be present only if the *User Plane Mode IE* is set to "support mode for pre-defined SDU sizes" and the *Traffic Class IE* is set to either "Conversational" or "Streaming".

If the RELOCATION REQUEST message includes the *PDP Type Information IE*, the UTRAN may use this IE to configure any compression algorithms.

The *Cause IE* shall contain the same value as the one received in the related RELOCATION REQUIRED message.

The *Iu Signalling Connection Identifier IE* contains an Iu signalling connection identifier which is allocated by the CN, and which the RNC is required to store and remember for the duration of the Iu connection.

The algorithms within the *Integrity Protection Information IE* and the *Encryption Information IE* shall be ordered in preferred order with the most preferred first in the list.

The *Permitted Encryption Algorithms IE* within the *Encryption Information IE* may contain "no encryption" within an element of its list in order to allow the RNC not to cipher the respective connection. This can be done either by not starting ciphering or by using the UEA0 algorithm. In the absence of the *Encryption Information IE*, the RNC shall not start ciphering.

In case of intra-system relocation, if no *Integrity Protection Key IE* (*Encryption Key IE* respectively) is provided within the *Source RNC-to-Target RNC transparent container IE*, the target RNC shall not start integrity protection (ciphering respectively).

In case of intra-system relocation, when an *Encryption Key IE* is provided within the *Source RNC-to-Target RNC transparent container IE*, the target RNC may select to use a ciphering alternative where an algorithm is used. It shall in this case make use of this key to cipher its signalling data whatever the selected algorithm. The *Encryption Key IE* that is contained within the *Encryption Information IE* of the RELOCATION REQUEST message shall never be considered for ciphering of signalling data.

In case of intra-system relocation, when an *Integrity Protection Key IE* is provided within the *Source RNC-to-Target RNC transparent container IE*, the target RNC shall select one integrity algorithm to start integrity and shall in this case make use of this key whatever the selected algorithm. The integrity protection key that is contained within the *Integrity Protection Information IE* of the RELOCATION REQUEST message shall never be considered.

In case of inter-system relocation, the integrity protection and ciphering information to be considered shall be the ones received in the *Integrity Protection Information IE* and *Encryption Information IE* from the RELOCATION REQUEST messages over the Iu interface.

Following additional actions shall be executed in the target RNC during Relocation Resource Allocation procedure:

If the *Relocation Type IE* is set to "UE involved in relocation of SRNS":

- The target RNC may accept a requested RAB only if the RAB can be supported by the target RNC.
- Other RABs shall be rejected by the target RNC in the RELOCATION REQUEST ACKNOWLEDGE message with an appropriate value for *Cause IE*, e.g. "Unable to Establish During Relocation".
- The target RNC shall include information adapted to the resulting RAB configuration in the target to source RNC transparent container to be included in the RELOCATION REQUEST ACKNOWLEDGE message sent to the

CN. If the target RNC supports triggering of the Relocation Detect procedure via the Iur interface, the RNC shall assign a d-RNTI for the context of the relocation and include it in the container. If two CNs are involved in the relocation of SRNS, the target RNC may, however, decide to send the container to only one CN.

If the *Relocation Type* IE is set to "UE not involved in relocation of SRNS":

- The target RNC may accept a RAB only if the radio bearer(s) for the RAB either exist(s) already, and can be used for the RAB by the target RNC, or does not exist before the relocation but can be established in order to support the RAB in the target RNC.
- If existing radio bearers are not related to any RAB that is accepted by target RNC, the radio bearers shall be ignored during the relocation of SRNS and the radio bearers shall be released by radio interface protocols after completion of relocation of SRNS.

After all necessary resources for accepted RABs including the initialised Iu user plane, are successfully allocated, the target RNC shall send RELOCATION REQUEST ACKNOWLEDGE message to the CN.

For each RAB successfully setup the RNC shall include following IEs:

- *RAB ID*
- *Transport Layer Address* (only for PS)
- *Iu Transport Association* (only for PS)

For each RAB the RNC is not able to setup during Relocation Resource Allocation the RNC shall include the *RAB ID* IE and the *Cause* IE within the *RABs Failed To Setup* IE. The resources associated with the RABs indicated as failed to set up shall not be released in the CN until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

The RELOCATION REQUEST ACKNOWLEDGE message sent to the CN shall, if applicable and if not sent via the other CN domain, include the *Target RNC To Source RNC Transparent Container* IE. This container shall be transferred by CN to the source RNC or the external relocation source while completing the Relocation Preparation procedure.

~~If the *Integrity Protection Information* IE was included in the RELOCATION REQUEST message, the RNC shall include the *Chosen Integrity Protection Algorithm* IE (*Chosen Encryption Algorithm* IE respectively) within the RELOCATION REQUEST ACKNOWLEDGE message, if, and only if the *Integrity Protection Information* IE (*Encryption Information* IE respectively) was included in the RELOCATION REQUEST message, the RNC shall include the *Chosen Encryption Algorithm* IE.~~

If one or more of the RABs that the target RNC has decided to support can not be supported by the CN, then these failed RABs shall not be released towards the target RNC until the relocation is completed.

If the *NAS Synchronisation Indicator* IE is contained in the RELOCATION REQUEST message, the target RNC shall pass it to the source RNC within the *RRC Container* IE contained in the *Target RNC to Source RNC Transparent Container* IE.

Transmission and reception of RELOCATION REQUEST ACKNOWLEDGE message terminates the procedure in the UTRAN and the CN respectively.

8.7.3 Unsuccessful Operation

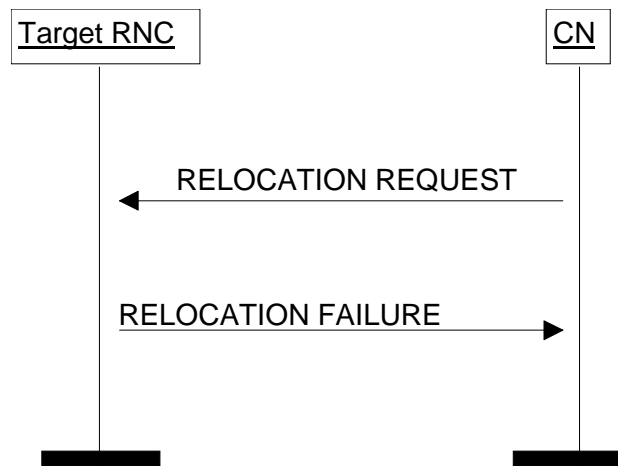


Figure 8: Relocation Resource Allocation procedure: Unsuccessful operation.

If the target RNC can not even partially accept the relocation of SRNS or a failure occurs during the Relocation Resource Allocation procedure in the target RNC, the target RNC shall send RELOCATION FAILURE message to the CN.

If the target RNC cannot support any of the integrity protection (ciphering respectively) alternatives provided in the Integrity Protection Information IE or Encryption Information IE, it shall return a RELOCATION FAILURE message with the cause "Requested Ciphering and/or Integrity Protection algorithms not supported".

Transmission and reception of RELOCATION FAILURE message terminates the procedure in the UTRAN and the CN respectively.

When CN has received RELOCATION FAILURE message from target RNC, CN shall stop timer $T_{RELOCalloc}$ and shall assume possibly allocated resources within target RNC completely released.

8.7.4 Abnormal Conditions

If after reception of the RELOCATION REQUEST message, the target RNC receives another RELOCATION REQUEST message on the same Iu connection, then the target RNC shall discard the latter message and the original Relocation Resource Allocation procedure shall continue normally.

If the target RNC receives a Source RNC -to-Target RNC Transparent Container IE containing Chosen Integrity Protection (Encryption respectively) Algorithm IE without Integrity Protection (Ciphering respectively) Key IE, it shall return RELOCATION FAILURE message with the cause "Conflict with already existing Integrity protection and/or Ciphering information".

NOTE: In case two CN domains are involved in the SRNS Relocation Resource Allocation procedure, the Target RNC may check whether the content of the two Source RNC to Target RNC Transparent Container IE is the same. In case the Target RNC receives two different Source RNC to Target RNC Transparent Container IE, the RNC behaviour is left implementation specific.

Interactions with Iu Release procedure:

If the CN decides to not continue the Relocation Resource Allocation procedure (e.g. due to $T_{RELOCalloc}$ expiry) before the Relocation Resource Allocation procedure is completed, the CN shall stop timer $T_{RELOCalloc}$ (if timer $T_{RELOCalloc}$ has not already expired) and the CN shall, if the Iu signalling connection has been established or later becomes established, initiate the Iu Release procedure towards the target RNC with an appropriate value for the Cause IE, e.g. "Relocation Cancelled".

8.7.5 Co-ordination of Two Iu Signalling Connections

Co-ordination of two Iu signalling connections during Relocation Resource Allocation procedure shall be executed by the target RNC when the *Number of Iu Instances* IE received in the *Source RNC to Target RNC Transparent Container* IE in the RELOCATION REQUEST message indicates that two CN domains are involved in relocation of SRNS.

When both the CS and PS user data *Chosen Encryption Algorithm* IE are received within the *Source RNC-to-Target RNC transparent container* IE and if these two received *Chosen Encryption Algorithm* IE are not the same, the target RNC shall fail the Relocation Resource Allocation procedure by sending back the RELOCATION FAILURE message.

The integrity protection (ciphering respectively) alternatives provided in the *Integrity Protection Information* IE (*Encryption Information* IE respectively) of the RELOCATION REQUEST messages received from both CN domains shall have at least one common alternative, otherwise the Relocation Resource Allocation shall be failed by sending back the RELOCATION FAILURE message.

If two CN domains are involved, the following actions shall be taken by the target RNC:

- The target RNC shall utilise the *Permanent NAS UE Identity* IE, received explicitly by each CN domain within RELOCATION REQUEST message, to co-ordinate both Iu signalling connections.
- The target RNC shall generate and send RELOCATION REQUEST ACKNOWLEDGE message only after all expected RELOCATION REQUEST messages are received and analysed.
- If the target RNC decides to send the *Target RNC to Source RNC Transparent Container* IE via the two CN domains, the target RNC shall ensure that the same *Target RNC to Source RNC Transparent Container* IE is included in RELOCATION REQUEST ACKNOWLEDGE messages transmitted via the two CN domains and related to the same relocation of SRNS.

9.2.1.28 Source RNC to Target RNC Transparent Container

Source RNC to Target RNC Transparent Container IE is an information element that is produced by source RNC and is transmitted to target RNC. In inter-system handover the IE is transmitted from external relocation source to target RNC.

This IE is transparent to CN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC Container	M		OCTET STRING	
Number of Iu Instances	M		INTEGER (1..2)	
Relocation Type	M		9.2.1.23	
Chosen Integrity Protection Algorithm	O		9.2.1.13	Indicates the ^{which} integrity protection algorithm. that has been used by the source RNC.
Integrity Protection Key	O		Bit String (128)	Indicates which integrity protection key that has been used by the source RNC.
Chosen Encryption Algorithm	O		9.2.1.14	Indicates which ^{the} algorithm that has been used by the source RNC for ciphering of signalling data.
Ciphering Key	O		Bit String (128)	Indicates which ciphering key that has been used by the source RNC for ciphering of signalling data.
Chosen Encryption Algorithm	O		9.2.1.14	Indicates the ^{which} algorithm that has been used by the source RNC for ciphering of CS user data.
Chosen Encryption Algorithm	O		9.2.1.14	Indicates the ^{which} algorithm that has been used by the source RNC for ciphering of PS user data.
d-RNTI	C - ifUEnotinvolved		INTEGER (0..1048575)	
Target Cell ID	C - ifUEinvolved		INTEGER (0..268435455)	This information element identifies a cell uniquely within UTRAN and consists of RNC-ID (12 bits) and C-ID (16 bits) as defined in TS 25.401 [3].
RAB TrCH Mapping	O	1 to <maxnoofRABs>		
>RAB ID	M		9.2.1.2	
>RAB Subflow	M	1 to <maxRAB-Subflows>		The RAB Subflows shall be presented in an order that corresponds to the order in which the RBs are presented per RAB in the RRC container included in this IE.
>> Transport Channel IDs				
>>> DCH ID	O		INTEGER (0..255)	The DCH ID is the identifier of an active dedicated transport channel. It is unique for each active DCH among the active DCHs simultaneously allocated for the same UE.
>>> DSCH ID	O		INTEGER (0..255)	The DSCH ID is the identifier of an active downlink shared transport channel. It is unique for each DSCH among the active DSCHs simultaneously allocated for the same UE.
>>> USCH ID	O		INTEGER (0..255)	The USCH ID is the identifier of an active uplink shared transport channel. It is unique for each USCH among the active USCHs simultaneously

				allocated for the same UE.
--	--	--	--	----------------------------

Condition	Explanation
IfUEnotininvolved	This IE shall be present if the <i>Relocation type</i> IE is set to "UE not involved in relocation of SRNS".
IfUEinvolved	This IE shall be present if the <i>Relocation type</i> IE is set to "UE involved in relocation of SRNS".

Range bound	Explanation
maxnoofRABs	Maximum no. of RABs for one UE. Value is 256.
maxRABSubflows	Maximum no. of subflows per RAB. Value is 7.

3GPP TSG-RAN3 Meeting #31
Stockholm, Sweden, 19th-23th August 2002

Tdoc # R3-022094

CR-Form-v7

CHANGE REQUEST

25.413 CR 483 # rev 2 # Current version: 4.5.0

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:	# Handling of security information at relocation
Source:	# Nortel Networks
Work item code:	# TEI
Date:	# 19/08/2002
Category:	# A
	Use <u>one</u> of the following categories:
	F (correction)
	A (corresponds to a correction in an earlier release)
	B (addition of feature),
	C (functional modification of feature)
	D (editorial modification)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900 .
Release:	# REL-4
	Use <u>one</u> of the following releases:
	2 (GSM Phase 2)
	R96 (Release 1996)
	R97 (Release 1997)
	R98 (Release 1998)
	R99 (Release 1999)
	Rel-4 (Release 4)
	Rel-5 (Release 5)
	Rel-6 (Release 6)

Reason for change: # The handling of security information at relocation remains undefined.

It has to be defined to secure the interworking between RNC, CN nodes and UE from different vendors. The algorithms and keys are potentially provided from two sources: the source RNC via the "container" and the CN nodes via the "Relocation Request" message. The RNC and CN can be from different vendors. Consistency between these two sources of information must be ensured for the overall system to work properly and prevent IOT issues. As the keys are not exchanged between UE and RNC, consistency must also be ensured with UE when the CN and the RNC agree on the keys.

The main elements that are potential source of interworking issues and need specification for a target RNC are the following:

- the integrity protection key received in the container and in the Integrity Protection Information IE may be different (two potential source of information for target RNC),
- the encryption key currently used for ciphering the signalling data needs to be known at the target side. The encryption key to be considered for ciphering the signalling data must be the one received from the container to ensure continuity with the UE and not one key derived from the Encryption Information IE of a Relocation Request message.
- whenever possible, the target RNC must be in a position to know what is the current algorithm to optimise the radio,
- the same chosen encryption algorithm must be received for the two domains (alignment since RAN3#29) and handover must not be accepted if a discrepancy

	<p>appears.</p> <ul style="list-style-type: none"> - at least one alternative must be supported by the target RNC to complete successfully the relocation, - the target RNC will return the Chosen Encryption Algorithm in the Relocation Request Acknowledge only if Encryption Information has been provided in the Relocation Request. <p>For a source RNC:</p> <ul style="list-style-type: none"> - the “chosen” encryption/integrity protection algorithms and keys are to be given to a target RNC (that might be from another vendor) and are optional: conditions/asumptuions for inclusion are to be given. <p>Also, a minimum error handling (i.e. abnormal cases) need to be defined to guide implementations as it has been done with previous specification on security in the Security Mode Control module, without going to overspecification but only to secure IOT as requested by operators.</p>
Summary of change: ⌘	<p>The procedure text in RANAP regarding Relocation Preparation and Relocation Resource Allocation is changed in order to be aligned with the above shown statements.</p> <p><u>Impact assessment towards the previous version of the specification (same release):</u></p> <p>This CR has isolated impact towards the previous version of the specification (same release).</p> <p>This CR has an impact under functional point of view.</p> <p>The impact can be considered isolated because it only affects the procedures Relocation Preparation and Relocation Resource Allocation.</p>
Consequences if not approved: ⌘	<p>There will be no specification of the handling of security information between the different nodes of the network that can be from different vendors leading to serious interworking issues.</p>

Clauses affected: ⌘	3.1,8.6,8.7,9.2.1.28										
Other specs affected:	<table border="1" style="display: inline-table;"> <tr> <td>Y</td> <td>N</td> </tr> <tr> <td>X</td> <td></td> </tr> <tr> <td></td> <td>X</td> </tr> <tr> <td></td> <td>X</td> </tr> </table>	Y	N	X			X		X	Other core specifications Test specifications O&M Specifications	⌘ TS 25.413 R99 CR 482 TS 25.413 REL-5 CR 484
Y	N										
X											
	X										
	X										
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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Integrity Protection Alternative: defines both the Integrity Protection Status (started/not started) together with the Integrity Protection Algorithm considered altogether.

Ciphering Alternative: defines both the Ciphering Status (started/not started) together with the Ciphering Algorithm considered altogether.

Default CN node: An RNC has one single permanent default CN node per CN domain. It always initiates the Initial UE Message procedure towards its default CN node.

Relocation of SRNS: relocation of SRNS is a UMTS functionality used to relocate the serving RNS role from one RNS to another RNS. This UMTS functionality is realised by several elementary procedures executed in several interfaces and by several protocols and it may involve a change in the radio resources used between UTRAN and UE

It is also possible to relocate the serving RNS role from:

- one RNS within UMTS to another relocation target external to UMTS;
- functionality equivalent to the serving RNS role from another relocation source external to UMTS to another RNS.

Serving RNS (SRNS): role an RNS can take with respect to a specific connection between an UE and UTRAN. There is one serving RNS for each UE that has a connection to UTRAN. The serving RNS is in charge of the radio connection between a UE and the UTRAN. The serving RNS terminates the Iu for this UE

Serving RNC (SRNC): SRNC is the RNC belonging to SRNS

SRNC-ID: see [3] for definition

S-RNTI: see [3] for definition

Source RNS: role, with respect to a specific connection between UTRAN and CN, that RNS takes when it decides to initiate a relocation of SRNS

Source RNC: source RNC is the RNC belonging to source RNS

Target RNS: role an RNS gets with respect to a specific connection between UTRAN and CN when it is being a subject of a relocation of SRNS which is being made towards that RNS

Target RNC: target RNC is the RNC belonging to target RNS

Directed retry: Directed retry is the process of assigning a User Equipment to a radio resource that does not belong to the serving RNC e.g. in situations of congestion. It is triggered by the RAB Assignment procedure and employs relocation procedures.

Elementary Procedure: RANAP protocol consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between the RNS and the CN. These Elementary Procedures are defined separately and are intended to be used to build up complete sequences in a flexible manner. If the independence between some EPs is restricted, it is described under the relevant EP description. Unless otherwise stated by the restrictions, the EPs may be invoked independently of each other as stand alone procedures, which can be active in parallel. Examples on using several RANAP EPs together with each other and EPs from other interfaces can be found in reference [4].

An EP consists of an initiating message and possibly a response message. Three kinds of EPs are used:

- **Class 1:** Elementary Procedures with response (success and/or failure).
- **Class 2:** Elementary Procedures without response.

- **Class 3:** Elementary Procedures with possibility of multiple responses.

For Class 1 EPs, the types of responses can be as follows:

Successful:

- A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.
- On time supervision expiry (i.e. absence of expected response).

Successful and Unsuccessful:

- One signalling message reports both successful and unsuccessful outcome for the different included requests. The response message used is the one defined for successful outcome.

Class 2 EPs are considered always successful.

Class 3 EPs have one or several response messages reporting both successful, unsuccessful outcome of the requests and temporary status information about the requests. This type of EP only terminates through response(s) or EP timer expiry.

8.6 Relocation Preparation

8.6.1 General

The purpose of the Relocation Preparation procedure is to prepare relocation of SRNS either with involving UE or without involving UE. The relocation procedure shall be co-ordinated in all Iu signalling connections existing for the UE in order to allow Relocation co-ordination in the target RNC. The procedure uses connection oriented signalling.

The source RNC shall not initiate the Relocation Preparation procedure for an Iu signalling connection if a Prepared Relocation exists in the RNC for that Iu signalling connection or if a Relocation Preparation procedure is ongoing for that Iu signalling connection.

8.6.2 Successful Operation

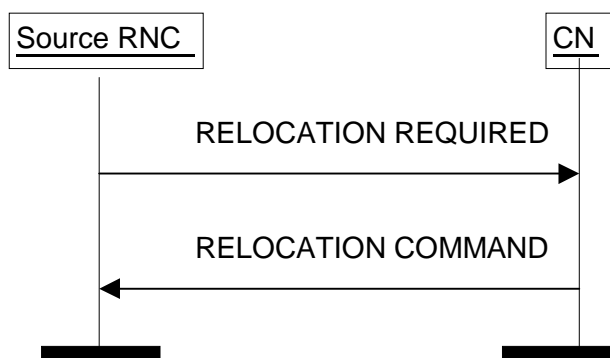


Figure 5: Relocation Preparation procedure. Successful operation.

The source RNC shall initiate the procedure by generating RELOCATION REQUIRED message. The source RNC shall decide whether to initiate the intra-system Relocation or the inter-system handover. In case of intra-system Relocation the source RNC shall indicate in the *Source ID* IE the RNC-ID of the source RNC and in the *Target ID* IE the RNC-ID of the target RNC. In case of inter-system handover the source RNC shall indicate in the *Source ID* IE the Service Area Identifier and in the *Target ID* IE the cell global identity of the cell in the target system. The source RNC shall indicate the appropriate cause value for the Relocation in the *Cause* IE. Typical cause values are "Time critical Relocation", "Resource optimisation relocation", "Relocation desirable for radio reasons" , "Directed Retry".

The source RNC shall determine whether the relocation of SRNS shall be executed with or without involvement of UE. The source RNC shall set the *Relocation Type* IE accordingly to "UE involved in relocation of SRNS " or "UE not involved in relocation of SRNS " .

In case of intra-system Relocation, the source RNC shall include in the RELOCATION REQUIRED message the *Source RNC to Target RNC Transparent Container* IE. This container shall include the *Relocation Type* IE and the number of Iu signalling connections existing for the UE by setting correctly the *Number of Iu Instances* IE . ~~If available, this container shall further include the *Chosen Integrity Protection Algorithm* IE and the *Integrity Protection Key* IE. If ciphering is active, this container shall include, for ciphering information of signalling data, the *Chosen Encryption Algorithm* IE and the *Ciphering Key* IE, for ciphering information of CS user data the *Chosen Encryption Algorithm CS* IE and for ciphering information of PS user data the *Chosen Encryption Algorithm PS* IE.~~

Only in case of intra-system relocation, the *Source RNC-to-Target RNC transparent container* IE shall include the *Integrity Protection Key* IE from the last received domain on which security mode control procedure has been successfully performed and the associated *Chosen Integrity Protection Algorithm* IE that has been selected for this domain.

Only in case of intra-system relocation, the *Source RNC-to-Target RNC transparent container* IE shall include the *Ciphering Key* IE for the signalling data from the last received domain on which security mode control procedure has been successfully performed and the associated *Chosen Encryption Algorithm* IE that has been selected for this domain.

Only in case of intra-system relocation, for each domain where the security mode control procedure has been successfully performed in the source RNC, the *Source RNC-to-Target RNC transparent container* IE shall include the

Chosen Encryption Algorithm IE of CS (PS respectively) user data corresponding to the ciphering alternative that has been selected for this domain. If the security mode control procedure had not been successful or performed for one domain or had proposed no ciphering alternative, the Chosen Encryption Algorithm IE for the user data of this domain shall not be included. When both the CS and the PS user data Chosen Encryption Algorithm IEs are provided, they shall be the same.

This container shall include the *RRC Container IE*. If the *Relocation Type IE* is set to "UE not involved in relocation of SRNS" and the UE is using DCH(s), DSCH(s) or USCH(s), the *Source RNC to Target RNC Transparent Container IE* shall include the mapping between each RAB subflow and transport channel identifier(s), i.e. if the RAB is carried on a DCH(s), the DCH ID(s) shall be included, and when it is carried on DSCH(s) or USCH(s), the DSCH ID(s) or USCH ID(s) respectively shall be included. If the *Relocation Type IE* is set to "UE not involved in relocation of SRNS", the *d-RNTI IE* shall be included in the *Source RNC to Target RNC Transparent Container IE*. If the *Relocation Type IE* is set to "UE involved in relocation of SRNS", the *Target Cell ID IE* shall be included in the *Source RNC to Target RNC Transparent Container IE*.

In case of inter-system handover to GSM the RNC:

- shall include *MS Classmark 2* and *MS Classmark 3* IEs received from the UE in the RELOCATION REQUIRED message to the CN.
- shall include the *Old BSS to New BSS IE* within the RELOCATION REQUIRED message only if the information is available.

The source RNC shall send the RELOCATION REQUIRED message to the CN and the source RNC shall start the timer $T_{\text{RELOCprep}}$.

When the preparation including resource allocation in the target system is ready and the CN has decided to continue the relocation of SRNS, the CN shall send RELOCATION COMMAND message to the source RNC and the CN shall start the timer $T_{\text{RELOCcomplete}}$.

If the *Target RNC To Source RNC Transparent Container IE* or the *L3 information IE* is received by the CN from the relocation target, it shall be included in the RELOCATION COMMAND message.

For each RAB successfully established in the target system and originating from the PS domain, the RELOCATION COMMAND message shall contain Iu transport address and Iu transport association to be used for the forwarding of the DL N-PDU duplicates towards the relocation target. Upon reception of the RELOCATION COMMAND message from the PS domain, the source RNC shall start the timer T_{DATAfwd} .

The Relocation Preparation procedure is terminated in the CN by transmission of RELOCATION COMMAND message.

If the target system (including target CN) does not support all existing RABs, the RELOCATION COMMAND message shall contain a list of RABs indicating all the RABs that are not supported by the target system. This list is contained in the *RABs to Be Released IE*. The source RNC shall use this information to avoid transferring associated contexts where applicable and may use this information e.g. to decide if to cancel the relocation or not. The resources associated with these not supported RABs shall not be released until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

Upon reception of RELOCATION COMMAND message the source RNC shall stop the timer $T_{\text{RELOCprep}}$, RNC shall start the timer $T_{\text{RELOCoverall}}$ and RNC shall terminate the Relocation Preparation procedure. The source RNC is then defined to have a Prepared Relocation for that Iu signalling connection.

When Relocation Preparation procedure is terminated successfully and when the source RNC is ready, the source RNC should trigger the execution of relocation of SRNS.

Interactions with other procedures:

If, after RELOCATION REQUIRED message is sent and before the Relocation Preparation procedure is terminated, the source RNC receives a RANAP message initiating an other connection oriented RANAP class 1 or class 3 procedure (except IU RELEASE COMMAND message, which shall be handled normally) via the same Iu signalling connection, the source RNC shall either:

1. cancel the Relocation Preparation procedure i.e. execute Relocation Cancel procedure with an appropriate value for the *Cause* IE, e.g. "Interaction with other procedure", and after successful completion of Relocation Cancel procedure, the source RNC shall continue the initiated RANAP procedure;

or

2. terminate the initiated RANAP procedure without any changes in UTRAN by sending appropriate response message with the cause value "Relocation Triggered" to the CN. The source RNC shall then continue the relocation of SRNS.

If during the Relocation Preparation procedure the source RNC receives a DIRECT TRANSFER message it shall be handled normally.

If during the Relocation Preparation procedure the source RNC receives connection oriented RANAP class 2 messages (with the exception of DIRECT TRANSFER message) it shall decide to either execute the procedure immediately or suspend it. In the case the relocation is cancelled the RNC shall resume any suspended procedures (if any).

After Relocation Preparation procedure is terminated successfully, all RANAP messages (except IU RELEASE COMMAND message, which shall be handled normally) received via the same Iu signalling bearer shall be ignored by the source RNC.

8.6.3 Unsuccessful Operation

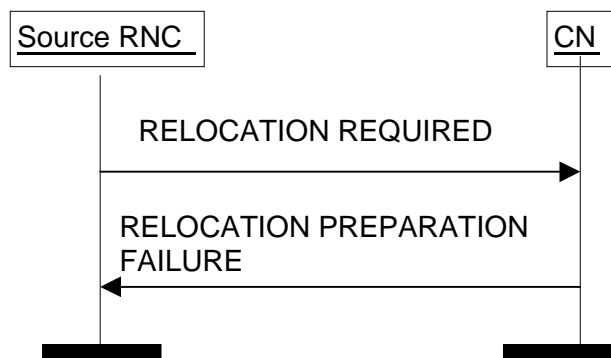


Figure 6: Relocation Preparation procedure. Unsuccessful operation.

If the CN or target system is not able to even partially accept the relocation of SRNS or a failure occurs during the Relocation Preparation procedure in the CN or the CN decides not to continue the relocation of SRNS, the CN shall send RELOCATION PREPARATION FAILURE message to the source RNC.

RELOCATION PREPARATION FAILURE message shall contain appropriate value for the *Cause* IE e.g. "T_{RELOCalloc} expiry", "Relocation Failure in Target CN/RNC or Target System", "Relocation not supported in Target RNC or Target System", "Relocation Target not allowed".

Transmission of RELOCATION PREPARATION FAILURE message terminates the procedure in the CN. Reception of RELOCATION PREPARATION FAILURE message terminates the procedure in UTRAN.

When the Relocation Preparation procedure is unsuccessfully terminated, the existing Iu signalling connection can be used normally.

If the Relocation Preparation procedure is terminated unsuccessfully, the CN shall release the possibly existing Iu signalling connection for the same UE and related to the same relocation of SRNS towards the target RNC by initiating Iu Release procedure towards the target RNC with an appropriate value for the *Cause* IE, e.g. "Relocation Cancelled".

Interactions with Relocation Cancel procedure:

If there is no response from the CN to the RELOCATION REQUIRED message before timer T_{RELOCprep} expires in the source RNC, the source RNC shall cancel the Relocation Preparation procedure by initiating the Relocation Cancel procedure with appropriate value for the *Cause* IE, e.g. "T_{RELOCprep} expiry".

8.6.4 Abnormal Conditions

If the target RNC, which was indicated in the RELOCATION REQUIRED message, is not known to the CN:

1. The CN shall reject the relocation of SRNS by sending a RELOCATION PREPARATION FAILURE message to the source RNC with *Cause IE* set to "Unknown target RNC".
2. The CN shall continue to use the existing Iu connection towards the source RNC.

NOTE: In case two CN domains are involved in the SRNS Relocation Preparation procedure and the Source RNC receives the *Target RNC to Source RNC Transparent Container IE* via two CN domains, it may check whether the content of the two *Target RNC to Source RNC Transparent Container IE* is the same. In case the Source RNC receives two different *Target RNC to Source RNC Transparent Container IE*, the RNC behaviour is left implementation specific.

8.6.5 Co-ordination of Two Iu Signalling Connections

If the RNC has decided to initiate Relocation Preparation procedure for a UTRAN to UTRAN relocation, the RNC shall initiate simultaneously Relocation Preparation procedure on all Iu signalling connections existing for the UE. The source RNC shall also include the same *Source RNC to Target RNC Transparent Container IE* in the RELOCATION REQUIRED message towards the two domains.

For intersystem handover to GSM, Relocation Preparation procedure shall be initiated only towards the circuit switched CN.

The source RNC shall not trigger the execution of relocation of SRNS unless it has received RELOCATION COMMAND message from all Iu signalling connections for which the Relocation Preparation procedure has been initiated.

If the source RNC receives RELOCATION PREPARATION FAILURE message from the CN, the RNC shall initiate Relocation Cancel procedure on the other Iu signalling connection for the UE if the other Iu signalling connection exists and if the Relocation Preparation procedure is still ongoing or the procedure has terminated successfully in that Iu signalling connection.

8.7 Relocation Resource Allocation

8.7.1 General

The purpose of the Relocation Resource Allocation procedure is to allocate resources from target RNS for a relocation of SRNS. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.7.2 Successful Operation

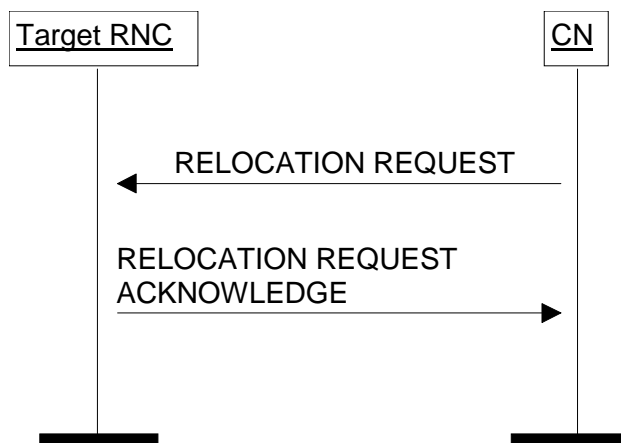


Figure 7: Relocation Resource Allocation procedure. Successful operation.

The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same RAB configuration as existing for the UE before the relocation. The CN may indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

The CN shall transmit the RELOCATION REQUEST message to target RNC and the CN shall start the timer $T_{RELOCalloc}$.

When a RELOCATION REQUEST message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

Upon reception of the RELOCATION REQUEST message, the target RNC shall initiate allocation of requested resources.

The RELOCATION REQUEST message shall contain following IEs

- *Permanent NAS UE Identity* IE (if available)
- *Cause*
- *CN Domain Indicator*
- *Source RNC To Target RNC Transparent Container*
- *Iu Signalling Connection Identifier*
- *Integrity Protection Information* IE (if available)

For each RAB requested to relocate (or to be created e.g. in the case of inter-system handover), the message shall contain following IEs:

- *RAB-ID*
- *NAS Synchronisation Indicator* IE (if the relevant NAS information is provided by the CN)
- *RAB parameters*
- *User Plane Information*
- *Transport Layer Address*
- *Iu Transport Association*
- *Data Volume Reporting Indication* (only for PS)
- *PDP Type Information* (only for PS)

The RELOCATION REQUEST message may include following IEs:

- *Encryption Information* (shall not be included if the *Integrity Protection Information* IE is not included)

For each RAB requested to relocate the message may include following IEs:

- *Service Handover*.
- *Alternative RAB Parameter Values*.

The following information elements received in RELOCATION REQUEST message require the same special actions in the RNC as specified for the same IEs in the RAB Assignment procedure:

- *RAB-ID*
- *User plane Information*(i.e. required User Plane Mode and required User Plane Versions)
- *Priority level, queuing and pre-emption indication*
- *Service Handover*

The *SDU Format Information Parameter* IE in the *RAB Parameters* IE shall be present only if the *User Plane Mode* IE is set to “support mode for pre-defined SDU sizes” and the *Traffic Class* IE is set to either “Conversational” or “Streaming”.

If the RELOCATION REQUEST message includes the *PDP Type Information* IE, the UTRAN may use this IE to configure any compression algorithms.

The *Cause* IE shall contain the same value as the one received in the related RELOCATION REQUIRED message.

The *Iu Signalling Connection Identifier* IE contains an Iu signalling connection identifier which is allocated by the CN, and which the RNC is required to store and remember for the duration of the Iu connection.

The algorithms within the *Integrity Protection Information* IE and the *Encryption Information* IE shall be ordered in preferred order with the most preferred first in the list.

The *Permitted Encryption Algorithms* IE within the *Encryption Information IE* may contain “no encryption” within an element of its list in order to allow the RNC not to cipher the respective connection. This can be done either by not starting ciphering or by using the UEA0 algorithm. In the absence of the *Encryption Information* IE, the RNC shall not start ciphering.

In case of intra-system relocation, if no *Integrity Protection Key* IE (*Encryption Key* IE respectively) is provided within the *Source RNC-to-Target RNC transparent container* IE, the target RNC shall not start integrity protection (ciphering respectively).

In case of intra-system relocation, when an *Encryption Key* IE is provided within the *Source RNC-to-Target RNC transparent container* IE, the target RNC may select to use a ciphering alternative where an algorithm is used. It shall in this case make use of this key to cipher its signalling data whatever the selected algorithm. The *Encryption Key* IE that is contained within the *Encryption Information* IE of the RELOCATION REQUEST message shall never be considered for ciphering of signalling data.

In case of intra-system relocation, when an *Integrity Protection Key* IE is provided within the *Source RNC-to-Target RNC transparent container* IE, the target RNC shall select one integrity algorithm to start integrity and shall in this case make use of this key whatever the selected algorithm. The integrity protection key that is contained within the *Integrity Protection Information* IE of the RELOCATION REQUEST message shall never be considered.

In case of inter-system relocation, the integrity protection and ciphering information to be considered shall be the ones received in the *Integrity Protection Information* IE and *Encryption Information* IE from the RELOCATION REQUEST messages over the Iu interface.

The *Global CN-ID* IE contains the identity of the CN node that sent the RELOCATION REQUEST message, and it shall, if included, be stored together with the Iu signalling connection identifier. If the *Global CN-ID* IE is not included,

the RELOCATION REQUEST message shall be considered as coming from the default CN node for the indicated CN domain.

Following additional actions shall be executed in the target RNC during Relocation Resource Allocation procedure:

If the *Relocation Type* IE is set to "UE involved in relocation of SRNS":

- The target RNC may accept a requested RAB only if the RAB can be supported by the target RNC.
- Other RABs shall be rejected by the target RNC in the RELOCATION REQUEST ACKNOWLEDGE message with an appropriate value for *Cause* IE, e.g. "Unable to Establish During Relocation".
- The target RNC shall include information adapted to the resulting RAB configuration in the target to source RNC transparent container to be included in the RELOCATION REQUEST ACKNOWLEDGE message sent to the CN. If the target RNC supports triggering of the Relocation Detect procedure via the Iur interface, the RNC shall assign a d-RNTI for the context of the relocation and include it in the container. If two CNs are involved in the relocation of SRNS, the target RNC may, however, decide to send the container to only one CN.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values* IE.

If the *Relocation Type* IE is set to "UE not involved in relocation of SRNS":

- The target RNC may accept a RAB only if the radio bearer(s) for the RAB either exist(s) already, and can be used for the RAB by the target RNC, or does not exist before the relocation but can be established in order to support the RAB in the target RNC.
- If existing radio bearers are not related to any RAB that is accepted by target RNC, the radio bearers shall be ignored during the relocation of SRNS and the radio bearers shall be released by radio interface protocols after completion of relocation of SRNS.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values* IE. It should be noted that the usage of alternative RAB parameter values is not applicable to the UTRAN initiated relocation of type "UE not involved in relocation of SRNS".

After all necessary resources for accepted RABs including the initialised Iu user plane, are successfully allocated, the target RNC shall send RELOCATION REQUEST ACKNOWLEDGE message to the CN.

For each RAB successfully setup the RNC shall include following IEs:

- *RAB ID*
- *Transport Layer Address* (only for PS)
- *Iu Transport Association* (only for PS)

For each RAB the RNC is not able to setup during Relocation Resource Allocation the RNC shall include the *RAB ID* IE and the *Cause* IE within the *RABs Failed To Setup* IE. The resources associated with the RABs indicated as failed to set up shall not be released in the CN until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

The RELOCATION REQUEST ACKNOWLEDGE message sent to the CN shall, if applicable and if not sent via the other CN domain, include the *Target RNC To Source RNC Transparent Container* IE. This container shall be transferred by CN to the source RNC or the external relocation source while completing the Relocation Preparation procedure.

~~If the *Integrity Protection Information* IE was included in the RELOCATION REQUEST message, the RNC shall include the *Chosen Integrity Protection Algorithm* IE (*Chosen Encryption Algorithm* IE respectively) within the RELOCATION REQUEST ACKNOWLEDGE message, if, and only if the *Integrity Protection Information* IE (*Encryption Information* IE respectively) was included in the RELOCATION REQUEST message, the RNC shall include the *Chosen Encryption Algorithm* IE.~~

If one or more of the RABs that the target RNC has decided to support can not be supported by the CN, then these failed RABs shall not be released towards the target RNC until the relocation is completed.

If the *NAS Synchronisation Indicator IE* is contained in the RELOCATION REQUEST message, the target RNC shall pass it to the source RNC within the *RRC Container IE* contained in the *Target RNC to Source RNC Transparent Container IE*.

Transmission and reception of RELOCATION REQUEST ACKNOWLEDGE message terminates the procedure in the UTRAN and the CN respectively.

Before reporting the successful outcome of the Relocation Resource allocation procedure, the RNC shall have executed the initialisation of the user plane mode as requested by the CN in the *User Plane Mode IE*. If the RNC can not initialise the requested user plane mode for any of the user plane mode versions in the *UP Mode Versions IE* according to the rules for initialisation of the respective user plane mode versions, as described in [6], the RAB Relocation shall fail with the cause value "RNC unable to establish all RFCs".

8.7.3 Unsuccessful Operation

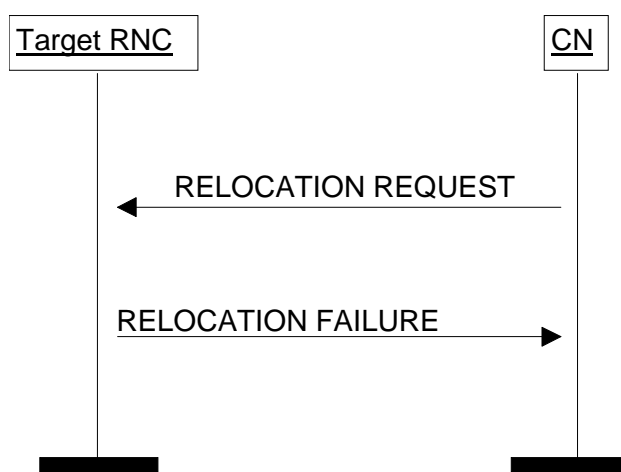


Figure 8: Relocation Resource Allocation procedure: Unsuccessful operation.

If the target RNC can not even partially accept the relocation of SRNS or a failure occurs during the Relocation Resource Allocation procedure in the target RNC, the target RNC shall send RELOCATION FAILURE message to the CN.

If the target RNC cannot support any of the integrity protection (ciphering respectively) alternatives provided in the Integrity Protection Information IE (Encryption Information IE respectively), it shall return a RELOCATION FAILURE message with the cause "Requested Ciphering and/or Integrity Protection algorithms not supported".

Transmission and reception of RELOCATION FAILURE message terminates the procedure in the UTRAN and the CN respectively.

When CN has received RELOCATION FAILURE message from target RNC, CN shall stop timer $T_{RELOCalloc}$ and shall assume possibly allocated resources within target RNC completely released.

8.7.4 Abnormal Conditions

If after reception of the RELOCATION REQUEST message, the target RNC receives another RELOCATION REQUEST message on the same Iu connection, then the target RNC shall discard the latter message and the original Relocation Resource Allocation procedure shall continue normally.

If the target RNC receives a Source RNC -to-Target RNC Transparent Container IE containing Chosen Integrity Protection (Encryption respectively) Algorithm IE without Integrity Protection (Ciphering respectively) Key IE, it shall return RELOCATION FAILURE message with the cause "Conflict with already existing Integrity protection and/or Ciphering information".

NOTE: In case two CN domains are involved in the SRNS Relocation Resource Allocation procedure, the Target RNC may check whether the content of the two *Source RNC to Target RNC Transparent Container IE* is the same. In case the Target RNC receives two different *Source RNC to Target RNC Transparent Container IE*, the RNC behaviour is left implementation specific.

Interactions with Iu Release procedure:

If the CN decides to not continue the Relocation Resource Allocation procedure (e.g. due to $T_{\text{RELOCalloc}}$ expiry) before the Relocation Resource Allocation procedure is completed, the CN shall stop timer $T_{\text{RELOCalloc}}$ (if timer $T_{\text{RELOCalloc}}$ has not already expired) and the CN shall, if the Iu signalling connection has been established or later becomes established, initiate the Iu Release procedure towards the target RNC with an appropriate value for the *Cause IE*, e.g. "Relocation Cancelled".

8.7.5 Co-ordination of Two Iu Signalling Connections

Co-ordination of two Iu signalling connections during Relocation Resource Allocation procedure shall be executed by the target RNC when the *Number of Iu Instances IE* received in the *Source RNC to Target RNC Transparent Container IE* in the RELOCATION REQUEST message indicates that two CN domains are involved in relocation of SRNS.

When both the CS and PS user data *Chosen Encryption Algorithm IE* are received within the *Source RNC-to-Target RNC transparent container IE* and if these two received *Chosen Encryption Algorithm IE* are not the same, the target RNC shall fail the Relocation Resource Allocation procedure by sending back the RELOCATION FAILURE message.

The integrity protection (ciphering respectively) alternatives provided in the *Integrity Protection Information IE* (*Encryption Information IE* respectively) of the RELOCATION REQUEST messages received from both CN domains shall have at least one common alternative, otherwise the Relocation Resource Allocation shall be failed by sending back the RELOCATION FAILURE message.

If two CN domains are involved, the following actions shall be taken by the target RNC:

- The target RNC shall utilise the *Permanent NAS UE Identity IE*, received explicitly by each CN domain within RELOCATION REQUEST message, to co-ordinate both Iu signalling connections.
- The target RNC shall generate and send RELOCATION REQUEST ACKNOWLEDGE message only after all expected RELOCATION REQUEST messages are received and analysed.
- If the target RNC decides to send the *Target RNC to Source RNC Transparent Container IE* via the two CN domains, the target RNC shall ensure that the same *Target RNC to Source RNC Transparent Container IE* is included in RELOCATION REQUEST ACKNOWLEDGE messages transmitted via the two CN domains and related to the same relocation of SRNS.

9.2.1.28 Source RNC to Target RNC Transparent Container

Source RNC to Target RNC Transparent Container IE is an information element that is produced by source RNC and is transmitted to target RNC. In inter-system handover the IE is transmitted from external relocation source to target RNC.

This IE is transparent to CN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC Container	M		OCTET STRING	
Number of Iu Instances	M		INTEGER (1..2)	
Relocation Type	M		9.2.1.23	
Chosen Integrity Protection Algorithm	O		9.2.1.13	Indicates which the integrity protection algorithm that has been used by the source RNC.
Integrity Protection Key	O		Bit String (128)	Indicates which integrity protection key that has been used by the source RNC.
Chosen Encryption Algorithm	O		9.2.1.14	Indicates which the algorithm that has been used by the source RNC for ciphering of signalling data.
Ciphering Key	O		Bit String (128)	Indicates which ciphering key that has been used by the source RNC for ciphering of signalling data.
Chosen Encryption Algorithm	O		9.2.1.14	Indicates which the algorithm that has been used by the source RNC for ciphering of CS user data.
Chosen Encryption Algorithm	O		9.2.1.14	Indicates which the algorithm that has been used by the source RNC for ciphering of PS user data.
d-RNTI	C - ifUEnotinvolved		INTEGER (0..1048575)	
Target Cell ID	C - ifUEinvolved		INTEGER (0..268435455)	This information element identifies a cell uniquely within UTRAN and consists of RNC-ID (12 bits) and C-ID (16 bits) as defined in TS 25.401 [3].
RAB TrCH Mapping	O	1 to <maxnoofRABs>		
>RAB ID	M		9.2.1.2	
>RAB Subflow	M	1 to <maxRAB-Subflows>		The RAB Subflows shall be presented in an order that corresponds to the order in which the RBs are presented per RAB in the RRC container included in this IE.
>> Transport Channel IDs				
>>> DCH ID	O		INTEGER (0..255)	The DCH ID is the identifier of an active dedicated transport channel. It is unique for each active DCH among the active DCHs simultaneously allocated for the same UE.
>>> DSCH ID	O		INTEGER (0..255)	The DSCH ID is the identifier of an active downlink shared transport channel. It is unique for each DSCH among the active DSCHs simultaneously allocated for the same UE.
>>> USCH ID	O		INTEGER (0..255)	The USCH ID is the identifier of an active uplink shared transport channel. It is unique for each USCH among the

				active USCHs simultaneously allocated for the same UE.
--	--	--	--	--

Condition	Explanation
IfUEnotinvolvement	This IE shall be present if the <i>Relocation type</i> IE is set to "UE not involved in relocation of SRNS".
IfUEinvolved	This IE shall be present if the <i>Relocation type</i> IE is set to "UE involved in relocation of SRNS".

Range bound	Explanation
maxnoofRABs	Maximum no. of RABs for one UE. Value is 256.
maxRABSubflows	Maximum no. of subflows per RAB. Value is 7.

3GPP TSG-RAN3 Meeting #31
 Stockholm, Sweden, 19th-23th August 2002

Tdoc # R3-022095

CR-Form-v7

CHANGE REQUEST

25.413 CR 484 # rev 2 # Current version: 5.1.0

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:	# Handling of security information at relocation
Source:	# Nortel Networks
Work item code:	# TEI
Date:	# 19/08/2002
Category:	# A
<p>Use <u>one</u> of the following categories:</p> <p>F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification)</p> <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>	
Release:	# REL-5
<p>Use <u>one</u> of the following releases:</p> <p>2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)</p>	

Reason for change: # The handling of security information at relocation remains undefined.

It has to be defined to secure the interworking between RNC, CN nodes and UE from different vendors. The algorithms and keys are potentially provided from two sources: the source RNC via the "container" and the CN nodes via the "Relocation Request" message. The RNC and CN can be from different vendors. Consistency between these two sources of information must be ensured for the overall system to work properly and prevent IOT issues. As the keys are not exchanged between UE and RNC, consistency must also been ensured with UE when the CN and the RNC agree on the keys.

The main elements that are potential source of interworking issues and need specification for a target RNC are the following:

- the integrity protection key received in the container and in the Integrity Protection Information IE may be different (two potential source of information for target RNC),
- the encryption key currently used for ciphering the signalling data needs to be known at the target side. The encryption key to be considered for ciphering the signalling data must be the one received from the container to ensure continuity with the UE and not one key derived from the Encryption Information IE of a Relocation Request message.
- whenever possible, the target RNC must be in a position to know what is the current algorithm to optimise the radio,
- the same chosen encryption algorithm must be received for the two domains (alignment since RAN3#29) and handover must not be accepted if a discrepancy

appears.

- at least one alternative must be supported by the target RNC to complete successfully the relocation,
- the target RNC will return the Chosen Encryption Algorithm in the Relocation Request Acknowledge only if Encryption Information has been provided in the Relocation Request.

For a source RNC:

- the “chosen” encryption/integrity protection algorithms and keys are to be given to a target RNC (that might be from another vendor) and are optional: conditions/asumtuions for inclusion are to be given.

Also, a minimum error handling (i.e. abnormal cases) need to be defined to guide implementations as it has been done with previous specification on security in the Security Mode Control module, without going to overspecification but only to secure IOT as requested by operators.

Summary of change: ⌘ The procedure text in RANAP regarding Relocation Preparation and Relocation Resource Allocation is changed in order to be aligned with the above shown statements.

Impact assessment towards the previous version of the specification (same release):

This CR has isolated impact towards the previous version of the specification (same release).

This CR has an impact under functional point of view.

The impact can be considered isolated because it only affects the procedures Relocation Preparation and Relocation Resource Allocation.

Consequences if not approved: ⌘ There will be no specification of the handling of security information between the different nodes of the network that can be from different vendors leading to serious interworking issues.

Clauses affected: ⌘ 3.1,8.6,8.7, 9.2.1.28

	Y	N	
Other specs affected:	X		Other core specifications
		X	Test specifications
		X	O&M Specifications

⌘ TS 25.413 R99 CR 482
⌘ TS 25.413 REL-4 CR 483

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.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Cell Load-Based Inter-System Handover: This mechanism, which is contained within a UTRAN RNC, consists of three primary functions:

1. The RNC has the capability to generate and send Cell Load Information towards the target/source system.
2. The RNC has the capability to receive Cell Load Information from the target/source system, and is able to interpret this information.
3. The ability of the RNC to make a handover decision by comparing the Cell Load Information that it has received from the target system with the Cell Load Information it has about its own cells.

Integrity Protection Alternative: defines both the Integrity Protection Status (started/not started) together with the Integrity Protection Algorithm considered altogether.

Ciphering Alternative: defines both the Ciphering Status (started/not started) together with the Ciphering Algorithm considered altogether.

Default CN node: An RNC with an inactive or not implemented NAS Node Selection Function [26] has one single permanent default CN node per CN domain. It always initiates the Initial UE Message procedure towards its default CN node. If the NAS Node Selection Function is active, then no Default CN node exists.

Relocation of SRNS: relocation of SRNS is a UMTS functionality used to relocate the serving RNS role from one RNS to another RNS. This UMTS functionality is realised by several elementary procedures executed in several interfaces and by several protocols and it may involve a change in the radio resources used between UTRAN and UE

It is also possible to relocate the serving RNS role from:

- one RNS within UMTS to another relocation target external to UMTS;
- functionality equivalent to the serving RNS role from another relocation source external to UMTS to another RNS.

Serving RNS (SRNS): role an RNS can take with respect to a specific connection between an UE and UTRAN. There is one serving RNS for each UE that has a connection to UTRAN. The serving RNS is in charge of the radio connection between a UE and the UTRAN. The serving RNS terminates the Iu for this UE

Serving RNC (SRNC): SRNC is the RNC belonging to SRNS

SRNC-ID: see [3] for definition

S-RNTI: see [3] for definition

Source RNS: role, with respect to a specific connection between UTRAN and CN, that RNS takes when it decides to initiate a relocation of SRNS

Source RNC: source RNC is the RNC belonging to source RNS

Target RNS: role an RNS gets with respect to a specific connection between UTRAN and CN when it is being a subject of a relocation of SRNS which is being made towards that RNS

Target RNC: target RNC is the RNC belonging to target RNS

Directed retry: Directed retry is the process of assigning a User Equipment to a radio resource that does not belong to the serving RNC e.g. in situations of congestion. It is triggered by the RAB Assignment procedure and employs relocation procedures.

Elementary Procedure: RANAP protocol consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between the RNS and the CN. These Elementary Procedures are defined separately and are intended to be used to build up complete sequences in a flexible manner. If the independence between some EPs is restricted, it is described under the relevant EP description. Unless otherwise stated by the restrictions, the EPs may be invoked independently of each other as stand alone procedures, which can be active in parallel. Examples on using several RANAP EPs together with each other and EPs from other interfaces can be found in reference [4].

An EP consists of an initiating message and possibly a response message. Three kinds of EPs are used:

- **Class 1:** Elementary Procedures with response (success and/or failure).
- **Class 2:** Elementary Procedures without response.
- **Class 3:** Elementary Procedures with possibility of multiple responses.

For Class 1 EPs, the types of responses can be as follows:

Successful:

- A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.
- On time supervision expiry (i.e. absence of expected response).

Successful and Unsuccessful:

- One signalling message reports both successful and unsuccessful outcome for the different included requests. The response message used is the one defined for successful outcome.

Class 2 EPs are considered always successful.

Class 3 EPs have one or several response messages reporting both successful, unsuccessful outcome of the requests and temporary status information about the requests. This type of EP only terminates through response(s) or EP timer expiry.

8.6 Relocation Preparation

8.6.1 General

The purpose of the Relocation Preparation procedure is to prepare relocation of SRNS either with involving UE or without involving UE. The relocation procedure shall be co-ordinated in all Iu signalling connections existing for the UE in order to allow Relocation co-ordination in the target RNC. The procedure uses connection oriented signalling.

The source RNC shall not initiate the Relocation Preparation procedure for an Iu signalling connection if a Prepared Relocation exists in the RNC for that Iu signalling connection or if a Relocation Preparation procedure is ongoing for that Iu signalling connection.

8.6.2 Successful Operation

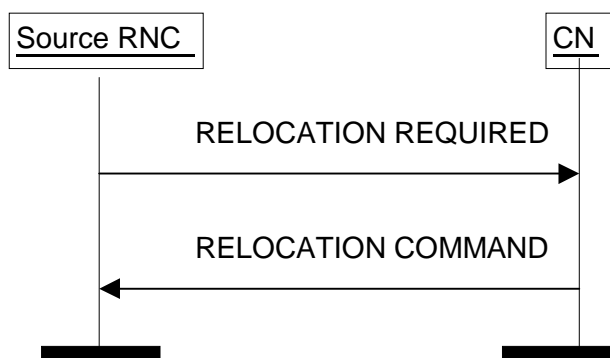


Figure 5: Relocation Preparation procedure. Successful operation.

The source RNC shall initiate the procedure by generating RELOCATION REQUIRED message. The source RNC shall decide whether to initiate the intra-system Relocation or the inter-system handover. In case of intra-system Relocation the source RNC shall indicate in the *Source ID* IE the RNC-ID of the source RNC and in the *Target ID* IE the RNC-ID of the target RNC. In case of inter-system handover the source RNC shall indicate in the *Source ID* IE the Service Area Identifier and in the *Target ID* IE the cell global identity of the cell in the target system. The source RNC shall indicate the appropriate cause value for the Relocation in the *Cause* IE. Typical cause values are "Time critical Relocation", "Resource optimisation relocation", "Relocation desirable for radio reasons", "Directed Retry", "Reduce Load in Serving Cell".

The source RNC shall determine whether the relocation of SRNS shall be executed with or without involvement of UE. The source RNC shall set the *Relocation Type* IE accordingly to "UE involved in relocation of SRNS" or "UE not involved in relocation of SRNS".

In case of intra-system Relocation, the source RNC shall include in the RELOCATION REQUIRED message the *Source RNC to Target RNC Transparent Container* IE. This container shall include the *Relocation Type* IE and the number of Iu signalling connections existing for the UE by setting correctly the *Number of Iu Instances* IE. If available, this container shall further include the *Chosen Integrity Protection Algorithm* IE and the *Integrity Protection Key* IE. ~~If ciphering is active, this container shall include, for ciphering information of signalling data, the *Chosen Encryption Algorithm* IE and the *Ciphering Key* IE, for ciphering information of CS user data the *Chosen Encryption Algorithm CS* IE and for ciphering information of PS user data the *Chosen Encryption Algorithm PS* IE.~~

Only in case of intra-system relocation, the *Source RNC-to-Target RNC transparent container* IE shall include the *Integrity Protection Key* IE from the last received domain on which security mode control procedure has been successfully performed and the associated *Chosen Integrity Protection Algorithm* IE that has been selected for this domain.

Only in case of intra-system relocation, the *Source RNC-to-Target RNC transparent container* IE shall include the *Ciphering Key* IE for the signalling data from the last received domain on which security mode control procedure has been successfully performed and the associated *Chosen Encryption Algorithm* IE that has been selected for this domain.

Only in case of intra-system relocation, for each domain where the security mode control procedure has been successfully performed in the source RNC, the *Source RNC-to-Target RNC transparent container IE* shall include the *Chosen Encryption Algorithm IE* of CS (PS respectively) user data corresponding to the ciphering alternative that has been selected for this domain. If the security mode control procedure had not been successful or performed for one domain or had proposed no ciphering alternative, the *Chosen Encryption Algorithm IE* for the user data of this domain shall not be included. When both the CS and the PS user data *Chosen Encryption Algorithm IEs* are provided, they shall be the same.

This container shall include the *RRC Container IE*. If the *Relocation Type IE* is set to "UE not involved in relocation of SRNS" and the UE is using DCH(s), DSCH(s) or USCH(s), the *Source RNC to Target RNC Transparent Container IE* shall include the mapping between each RAB subflow and transport channel identifier(s), i.e. if the RAB is carried on a DCH(s), the DCH ID(s) shall be included, and when it is carried on DSCH(s) or USCH(s), the DSCH ID(s) or USCH ID(s) respectively shall be included. If the *Relocation Type IE* is set to "UE not involved in relocation of SRNS", the *d-RNTI IE* shall be included in the *Source RNC to Target RNC Transparent Container IE*. If the *Relocation Type IE* is set to "UE involved in relocation of SRNS", the *Target Cell ID IE* shall be included in the *Source RNC to Target RNC Transparent Container IE*.

In case of inter-system handover to GSM the RNC:

- shall include *MS Classmark 2* and *MS Classmark 3* IEs received from the UE in the RELOCATION REQUIRED message to the CN.
- shall include the *Old BSS to New BSS IE* within the RELOCATION REQUIRED message only if the information is available.

The source RNC shall send the RELOCATION REQUIRED message to the CN and the source RNC shall start the timer $T_{\text{RELOCprep}}$.

When the preparation including resource allocation in the target system is ready and the CN has decided to continue the relocation of SRNS, the CN shall send RELOCATION COMMAND message to the source RNC and the CN shall start the timer $T_{\text{RELOCcomplete}}$.

If the *Target RNC To Source RNC Transparent Container IE* or the *L3 information IE* is received by the CN from the relocation target, it shall be included in the RELOCATION COMMAND message.

The RELOCATION COMMAND message may also contain the *Inter-System Information Transparent Container IE*.

For each RAB successfully established in the target system and originating from the PS domain, the RELOCATION COMMAND message shall contain at least one pair of Iu transport address and Iu transport association to be used for the forwarding of the DL N-PDU duplicates towards the relocation target. If more than one pair of Iu transport address and Iu transport association is included, the source RNC shall select one of the pairs to be used for the forwarding of the DL N-PDU duplicates towards the relocation target. Upon reception of the RELOCATION COMMAND message from the PS domain, the source RNC shall start the timer T_{DATAfwd} .

The Relocation Preparation procedure is terminated in the CN by transmission of RELOCATION COMMAND message.

If the target system (including target CN) does not support all existing RABs, the RELOCATION COMMAND message shall contain a list of RABs indicating all the RABs that are not supported by the target system. This list is contained in the *RABs to Be Released IE*. The source RNC shall use this information to avoid transferring associated contexts where applicable and may use this information e.g. to decide if to cancel the relocation or not. The resources associated with these not supported RABs shall not be released until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

Upon reception of RELOCATION COMMAND message the source RNC shall stop the timer $T_{\text{RELOCprep}}$, RNC shall start the timer $T_{\text{RELOCoverall}}$ and RNC shall terminate the Relocation Preparation procedure. The source RNC is then defined to have a Prepared Relocation for that Iu signalling connection.

When Relocation Preparation procedure is terminated successfully and when the source RNC is ready, the source RNC should trigger the execution of relocation of SRNS.

Interactions with other procedures:

If, after RELOCATION REQUIRED message is sent and before the Relocation Preparation procedure is terminated, the source RNC receives a RANAP message initiating an other connection oriented RANAP class 1 or class 3 procedure (except IU RELEASE COMMAND message, which shall be handled normally) via the same Iu signalling connection, the source RNC shall either:

1. cancel the Relocation Preparation procedure i.e. execute Relocation Cancel procedure with an appropriate value for the *Cause* IE, e.g. "Interaction with other procedure", and after successful completion of Relocation Cancel procedure, the source RNC shall continue the initiated RANAP procedure;
- or
2. terminate the initiated RANAP procedure without any changes in UTRAN by sending appropriate response message with the cause value "Relocation Triggered" to the CN. The source RNC shall then continue the relocation of SRNS.

If during the Relocation Preparation procedure the source RNC receives a DIRECT TRANSFER message it shall be handled normally.

If during the Relocation Preparation procedure the source RNC receives connection oriented RANAP class 2 messages (with the exception of DIRECT TRANSFER message) it shall decide to either execute the procedure immediately or suspend it. In the case the relocation is cancelled the RNC shall resume any suspended procedures (if any).

After Relocation Preparation procedure is terminated successfully, all RANAP messages (except IU RELEASE COMMAND message, which shall be handled normally) received via the same Iu signalling bearer shall be ignored by the source RNC.

8.6.3 Unsuccessful Operation

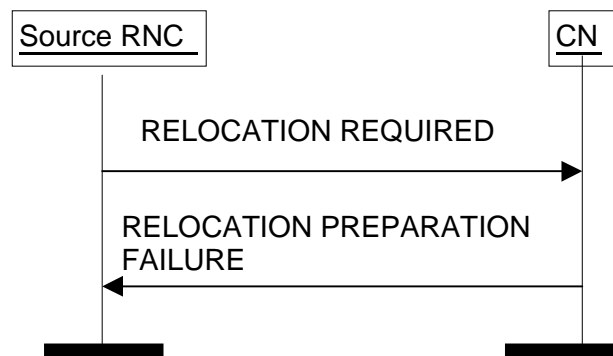


Figure 6: Relocation Preparation procedure. Unsuccessful operation.

If the CN or target system is not able to even partially accept the relocation of SRNS or a failure occurs during the Relocation Preparation procedure in the CN or the CN decides not to continue the relocation of SRNS, the CN shall send RELOCATION PREPARATION FAILURE message to the source RNC.

RELOCATION PREPARATION FAILURE message shall contain appropriate value for the *Cause* IE e.g. " $T_{RELOCalloc}$ expiry", "Relocation Failure in Target CN/RNC or Target System", "Relocation not supported in Target RNC or Target System", "Relocation Target not allowed", "No Radio Resources Available in Target Cell".

Transmission of RELOCATION PREPARATION FAILURE message terminates the procedure in the CN. Reception of RELOCATION PREPARATION FAILURE message terminates the procedure in UTRAN.

When the Relocation Preparation procedure is unsuccessfully terminated, the existing Iu signalling connection can be used normally.

If the Relocation Preparation procedure is terminated unsuccessfully, the CN shall release the possibly existing Iu signalling connection for the same UE and related to the same relocation of SRNS towards the target RNC by initiating Iu Release procedure towards the target RNC with an appropriate value for the *Cause* IE, e.g. "Relocation Cancelled".

The RELOCATION PREPARATION FAILURE message may contain the *Inter-System Information Transparent Container* IE.

Interactions with Relocation Cancel procedure:

If there is no response from the CN to the RELOCATION REQUIRED message before timer $T_{\text{RELOCprep}}$ expires in the source RNC, the source RNC shall cancel the Relocation Preparation procedure by initiating the Relocation Cancel procedure with appropriate value for the *Cause IE*, e.g. " $T_{\text{RELOCprep}}$ expiry".

8.6.4 Abnormal Conditions

If the target RNC, which was indicated in the RELOCATION REQUIRED message, is not known to the CN:

1. The CN shall reject the relocation of SRNS by sending a RELOCATION PREPARATION FAILURE message to the source RNC with *Cause IE* set to "Unknown target RNC".
2. The CN shall continue to use the existing Iu connection towards the source RNC.

NOTE: In case two CN domains are involved in the SRNS Relocation Preparation procedure and the Source RNC receives the *Target RNC to Source RNC Transparent Container IE* via two CN domains, it may check whether the content of the two *Target RNC to Source RNC Transparent Container IE* is the same. In case the Source RNC receives two different *Target RNC to Source RNC Transparent Container IE*, the RNC behaviour is left implementation specific.

8.6.5 Co-ordination of Two Iu Signalling Connections

If the RNC has decided to initiate Relocation Preparation procedure for a UTRAN to UTRAN relocation, the RNC shall initiate simultaneously Relocation Preparation procedure on all Iu signalling connections existing for the UE. The source RNC shall also include the same *Source RNC to Target RNC Transparent Container IE* in the RELOCATION REQUIRED message towards the two domains.

For intersystem handover to GSM, Relocation Preparation procedure shall be initiated only towards the circuit switched CN.

The source RNC shall not trigger the execution of relocation of SRNS unless it has received RELOCATION COMMAND message from all Iu signalling connections for which the Relocation Preparation procedure has been initiated.

If the source RNC receives RELOCATION PREPARATION FAILURE message from the CN, the RNC shall initiate Relocation Cancel procedure on the other Iu signalling connection for the UE if the other Iu signalling connection exists and if the Relocation Preparation procedure is still ongoing or the procedure has terminated successfully in that Iu signalling connection.

8.7 Relocation Resource Allocation

8.7.1 General

The purpose of the Relocation Resource Allocation procedure is to allocate resources from target RNS for a relocation of SRNS. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.7.2 Successful Operation

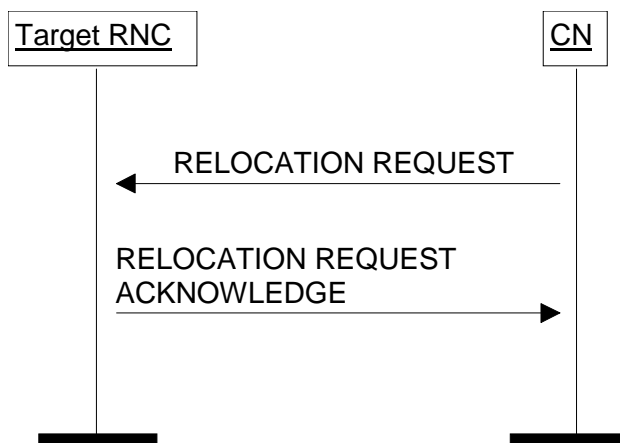


Figure 7: Relocation Resource Allocation procedure. Successful operation.

The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same RAB configuration as existing for the UE before the relocation. The CN may indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

The CN shall transmit the RELOCATION REQUEST message to target RNC and the CN shall start the timer $T_{RELOCalloc}$.

When a RELOCATION REQUEST message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

Upon reception of the RELOCATION REQUEST message, the target RNC shall initiate allocation of requested resources.

The RELOCATION REQUEST message shall contain following IEs

- *Permanent NAS UE Identity* IE (if available)
- *Cause*
- *CN Domain Indicator*
- *Source RNC To Target RNC Transparent Container*
- *Iu Signalling Connection Identifier*
- *Integrity Protection Information* IE (if available)

For each RAB requested to relocate (or to be created e.g. in the case of inter-system handover), the message shall contain following IEs:

- *RAB-ID*
- *NAS Synchronisation Indicator* IE (if the relevant NAS information is provided by the CN)
- *RAB parameters*
- *User Plane Information*
- *Transport Layer Address*
- *Iu Transport Association*
- *Data Volume Reporting Indication* (only for PS)
- *PDP Type Information* (only for PS)

The RELOCATION REQUEST message may include following IEs:

- *Encryption Information* (shall not be included if the *Integrity Protection Information* IE is not included)

For each RAB requested to relocate the message may include following IEs:

- *Service Handover*.
- *Alternative RAB Parameter Values*.

The following information elements received in RELOCATION REQUEST message require the same special actions in the RNC as specified for the same IEs in the RAB Assignment procedure:

- *RAB-ID*
- *User plane Information*(i.e. required User Plane Mode and required User Plane Versions)
- *Priority level, queuing and pre-emption indication*
- *Service Handover*

The *SDU Format Information Parameter* IE in the *RAB Parameters* IE shall be present only if the *User Plane Mode* IE is set to “support mode for pre-defined SDU sizes” and the *Traffic Class* IE is set to either “Conversational” or “Streaming”.

If the RELOCATION REQUEST message includes the *PDP Type Information* IE, the UTRAN may use this IE to configure any compression algorithms.

The *Cause* IE shall contain the same value as the one received in the related RELOCATION REQUIRED message.

The *Iu Signalling Connection Identifier* IE contains an Iu signalling connection identifier which is allocated by the CN, and which the RNC is required to store and remember for the duration of the Iu connection.

The algorithms within the *Integrity Protection Information* IE and the *Encryption Information* IE shall be ordered in preferred order with the most preferred first in the list.

The *Permitted Encryption Algorithms* IE within the *Encryption Information IE* may contain “no encryption” within an element of its list in order to allow the RNC not to cipher the respective connection. This can be done either by not starting ciphering or by using the UEA0 algorithm. In the absence of the *Encryption Information IE*, the RNC shall not start ciphering.

In case of intra-system relocation, if no *Integrity Protection Key* IE (*Encryption Key* IE respectively) is provided within the *Source RNC-to-Target RNC transparent container* IE, the target RNC shall not start integrity protection (ciphering respectively).

In case of intra-system relocation, when an *Encryption Key* IE is provided within the *Source RNC-to-Target RNC transparent container* IE, the target RNC may select to use a ciphering alternative where an algorithm is used. It shall in this case make use of this key to cipher its signalling data whatever the selected algorithm. The *Encryption Key* IE that is contained within the *Encryption Information* IE of the RELOCATION REQUEST message shall never be considered for ciphering of signalling data.

In case of intra-system relocation, when an *Integrity Protection Key* IE is provided within the *Source RNC-to-Target RNC transparent container* IE, the target RNC shall select one integrity algorithm to start integrity and shall in this case make use of this key whatever the selected algorithm. The integrity protection key that is contained within the *Integrity Protection Information* IE of the RELOCATION REQUEST message shall never be considered.

In case of inter-system relocation, the integrity protection and ciphering information to be considered shall be the ones received in the *Integrity Protection Information* IE and *Encryption Information* IE from the RELOCATION REQUEST messages over the Iu interface.

The *Global CN-ID* IE contains the identity of the CN node that sent the RELOCATION REQUEST message, and it shall, if included, be stored together with the Iu signalling connection identifier. If the *Global CN-ID* IE is not included,

the RELOCATION REQUEST message shall be considered as coming from the default CN node for the indicated CN domain.

Following additional actions shall be executed in the target RNC during Relocation Resource Allocation procedure:

If the *Relocation Type* IE is set to "UE involved in relocation of SRNS":

- The target RNC may accept a requested RAB only if the RAB can be supported by the target RNC.
- Other RABs shall be rejected by the target RNC in the RELOCATION REQUEST ACKNOWLEDGE message with an appropriate value for *Cause* IE, e.g. "Unable to Establish During Relocation".
- The target RNC shall include information adapted to the resulting RAB configuration in the target to source RNC transparent container to be included in the RELOCATION REQUEST ACKNOWLEDGE message sent to the CN. If the target RNC supports triggering of the Relocation Detect procedure via the Iur interface, the RNC shall assign a d-RNTI for the context of the relocation and include it in the container. If two CNs are involved in the relocation of SRNS, the target RNC may, however, decide to send the container to only one CN.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values* IE.

If the *Relocation Type* IE is set to "UE not involved in relocation of SRNS":

- The target RNC may accept a RAB only if the radio bearer(s) for the RAB either exist(s) already, and can be used for the RAB by the target RNC, or does not exist before the relocation but can be established in order to support the RAB in the target RNC.
- If existing radio bearers are not related to any RAB that is accepted by target RNC, the radio bearers shall be ignored during the relocation of SRNS and the radio bearers shall be released by radio interface protocols after completion of relocation of SRNS.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values* IE. It should be noted that the usage of alternative RAB parameter values is not applicable to the UTRAN initiated relocation of type "UE not involved in relocation of SRNS".

After all necessary resources for accepted RABs including the initialised Iu user plane, are successfully allocated, the target RNC shall send RELOCATION REQUEST ACKNOWLEDGE message to the CN.

For each RAB successfully setup the RNC shall include following IEs:

- *RAB ID*
- *Transport Layer Address* (when no ALCAP has been used)
- *Iu Transport Association* (when no ALCAP has been used)

Two pairs of *Transport Layer Address* IE and *Iu Transport Association* IE may be included for RABs established towards the PS domain.

For each RAB the RNC is not able to setup during Relocation Resource Allocation the RNC shall include the *RAB ID* IE and the *Cause* IE within the *RABs Failed To Setup* IE. The resources associated with the RABs indicated as failed to set up shall not be released in the CN until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

The RELOCATION REQUEST ACKNOWLEDGE message sent to the CN shall, if applicable and if not sent via the other CN domain, include the *Target RNC To Source RNC Transparent Container* IE. This container shall be transferred by CN to the source RNC or the external relocation source while completing the Relocation Preparation procedure.

If the target RNC supports cell load-based inter-system handover, then in the case of inter-system handover, the *New BSS to Old BSS Information* IE may be included in the RELOCATION REQUEST ACKNOWLEDGE message.

~~If the *Integrity Protection Information IE* was included in the RELOCATION REQUEST message, the RNC shall include the *Chosen Integrity Protection Algorithm IE* (*Chosen Encryption Algorithm IE* respectively) within the RELOCATION REQUEST ACKNOWLEDGE message, if, and only if the *Integrity Protection Information IE* (*Encryption Information IE* respectively) was included in the RELOCATION REQUEST message, the RNC shall include the *Chosen Encryption Algorithm IE*.~~

If one or more of the RABs that the target RNC has decided to support can not be supported by the CN, then these failed RABs shall not be released towards the target RNC until the relocation is completed.

If the *NAS Synchronisation Indicator IE* is contained in the RELOCATION REQUEST message, the target RNC shall pass it to the source RNC within the *RRC Container IE* contained in the *Target RNC to Source RNC Transparent Container IE*.

Transmission and reception of RELOCATION REQUEST ACKNOWLEDGE message terminates the procedure in the UTRAN and the CN respectively.

Before reporting the successful outcome of the Relocation Resource allocation procedure, the RNC shall have executed the initialisation of the user plane mode as requested by the CN in the *User Plane Mode IE*. If the RNC can not initialise the requested user plane mode for any of the user plane mode versions in the *UP Mode Versions IE* according to the rules for initialisation of the respective user plane mode versions, as described in [6], the RAB Relocation shall fail with the cause value "RNC unable to establish all RFCs".

8.7.3 Unsuccessful Operation

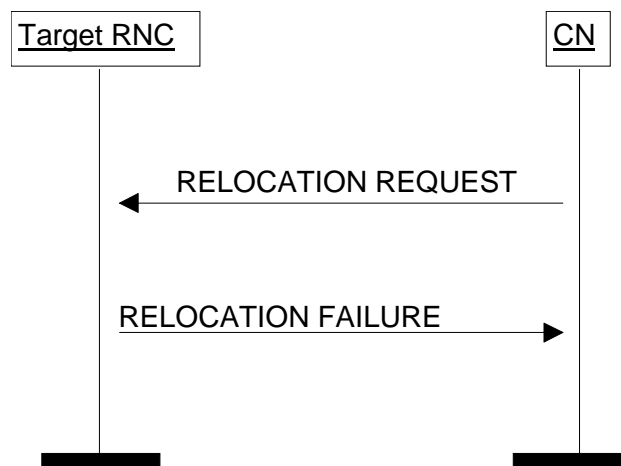


Figure 8: Relocation Resource Allocation procedure: Unsuccessful operation.

If the target RNC can not even partially accept the relocation of SRNS or a failure occurs during the Relocation Resource Allocation procedure in the target RNC, the target RNC shall send RELOCATION FAILURE message to the CN.

If the target RNC cannot support any of the integrity protection (ciphering respectively) alternatives provided in the *Integrity Protection Information IE* or *Encryption Information IE*, it shall return a RELOCATION FAILURE message with the cause "Requested Ciphering and/or Integrity Protection algorithms not supported".

Transmission and reception of RELOCATION FAILURE message terminates the procedure in the UTRAN and the CN respectively.

When CN has received RELOCATION FAILURE message from target RNC, CN shall stop timer $T_{RELOCalloc}$ and shall assume possibly allocated resources within target RNC completely released.

In the case of inter-system handover, and if the target RNC supports cell load-based inter-system handover, then

- the *NewBSS to Old BSS Information IE* may be included in the RELOCATION FAILURE message.

- the RELOCATION FAILURE message may contain the appropriate value in the *Cause* IE, e.g. "No Radio Resources Available in Target Cell".

8.7.4 Abnormal Conditions

If after reception of the RELOCATION REQUEST message, the target RNC receives another RELOCATION REQUEST message on the same Iu connection, then the target RNC shall discard the latter message and the original Relocation Resource Allocation procedure shall continue normally.

If the target RNC receives a *Source RNC -to-Target RNC Transparent Container IE* containing *Chosen Integrity Protection (Encryption respectively) Algorithm IE* without *Integrity Protection (Ciphering respectively) Key IE*, it shall return RELOCATION FAILURE message with the cause "Conflict with already existing Integrity protection and/or Ciphering information".

Interactions with Iu Release procedure:

If the CN decides to not continue the Relocation Resource Allocation procedure (e.g. due to $T_{\text{RELOCalloc}}$ expiry) before the Relocation Resource Allocation procedure is completed, the CN shall stop timer $T_{\text{RELOCalloc}}$ (if timer $T_{\text{RELOCalloc}}$ has not already expired) and the CN shall, if the Iu signalling connection has been established or later becomes established, initiate the Iu Release procedure towards the target RNC with an appropriate value for the *Cause* IE, e.g. "Relocation Cancelled".

NOTE: In case two CN domains are involved in the SRNS Relocation Resource Allocation procedure, the Target RNC may check whether the content of the two *Source RNC to Target RNC Transparent Container IE* is the same. In case the Target RNC receives two different *Source RNC to Target RNC Transparent Container IE*, the RNC behaviour is left implementation specific.

8.7.5 Co-ordination of Two Iu Signalling Connections

Co-ordination of two Iu signalling connections during Relocation Resource Allocation procedure shall be executed by the target RNC when the *Number of Iu Instances IE* received in the *Source RNC to Target RNC Transparent Container IE* in the RELOCATION REQUEST message indicates that two CN domains are involved in relocation of SRNS.

When both the CS and PS user data *Chosen Encryption Algorithm IE* are received within the *Source RNC-to-Target RNC transparent container IE* and if these two received *Chosen Encryption Algorithm IE* are not the same, the target RNC shall fail the Relocation Resource Allocation procedure by sending back the RELOCATION FAILURE message.

The integrity protection (ciphering respectively) alternatives provided in the *Integrity Protection Information IE (Encryption Information IE respectively)* of the RELOCATION REQUEST messages received from both CN domains shall have at least one common alternative, otherwise the Relocation Resource Allocation shall be failed by sending back the RELOCATION FAILURE message.

If two CN domains are involved, the following actions shall be taken by the target RNC:

- The target RNC shall utilise the *Permanent NAS UE Identity IE*, received explicitly by each CN domain within RELOCATION REQUEST message, to co-ordinate both Iu signalling connections.
- The target RNC shall generate and send RELOCATION REQUEST ACKNOWLEDGE message only after all expected RELOCATION REQUEST messages are received and analysed.
- If the target RNC decides to send the *Target RNC to Source RNC Transparent Container IE* via the two CN domains, the target RNC shall ensure that the same *Target RNC to Source RNC Transparent Container IE* is included in RELOCATION REQUEST ACKNOWLEDGE messages transmitted via the two CN domains and related to the same relocation of SRNS.

9.2.1.28 Source RNC to Target RNC Transparent Container

Source RNC to Target RNC Transparent Container IE is an information element that is produced by source RNC and is transmitted to target RNC. In inter-system handover the IE is transmitted from external relocation source to target RNC.

This IE is transparent to CN.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
RRC Container	M		OCTET STRING	
Number of Iu Instances	M		INTEGER (1..2)	
Relocation Type	M		9.2.1.23	
Chosen Integrity Protection Algorithm	O		9.2.1.13	Indicates which the integrity protection algorithm. that has been used by the source RNC.
Integrity Protection Key	O		Bit String (128)	Indicates which integrity protection key that has been used by the source RNC.
Chosen Encryption Algorithm	O		9.2.1.14	Indicates which the algorithm that has been used by the source RNC for ciphering of signalling data.
Ciphering Key	O		Bit String (128)	Indicates which ciphering key that has been used by the source RNC for ciphering of signalling data.
Chosen Encryption Algorithm	O		9.2.1.14	Indicates which the algorithm that has been used by the source RNC for ciphering of CS user data.
Chosen Encryption Algorithm	O		9.2.1.14	Indicates which the algorithm that has been used by the source RNC for ciphering of PS user data.
d-RNTI	C - ifUEnotinvolved		INTEGER (0..1048575)	
Target Cell ID	C - ifUEinvolved		INTEGER (0..268435455)	This information element identifies a cell uniquely within UTRAN and consists of RNC-ID (12 bits) and C-ID (16 bits) as defined in TS 25.401 [3].
Downlink Cell Load Information	O		Cell Load Information 9.2.1.49	For the Downlink
Uplink Cell Load Information	O		Cell Load Information 9.2.1.49	For the Uplink
RAB TrCH Mapping	O	1 to <maxnoofRABs>		
>RAB ID	M		9.2.1.2	
>RAB Subflow	M	1 to <maxRAB-Subflows>		The RAB Subflows shall be presented in an order that corresponds to the order in which the RBs are presented per RAB in the RRC container included in this IE.
>> Transport Channel IDs				
>>> DCH ID	O		INTEGER (0..255)	The DCH ID is the identifier of an active dedicated transport channel. It is unique for each active DCH among the active DCHs simultaneously allocated for the same UE.
>>> DSCH ID	O		INTEGER (0..255)	The DSCH ID is the identifier of an active downlink shared transport channel. It is unique for each DSCH among the active DSCHs simultaneously

				allocated for the same UE.
>>> USCH ID	0		INTEGER (0..255)	The USCH ID is the identifier of an active uplink shared transport channel. It is unique for each USCH among the active USCHs simultaneously allocated for the same UE.

Condition	Explanation
IfUEnotinvolved	This IE shall be present if the <i>Relocation type</i> IE is set to "UE not involved in relocation of SRNS".
IfUEinvolved	This IE shall be present if the <i>Relocation type</i> IE is set to "UE involved in relocation of SRNS".

Range bound	Explanation
maxnoofRABs	Maximum no. of RABs for one UE. Value is 256.
maxRABSubflows	Maximum no. of subflows per RAB. Value is 7.

CHANGE REQUEST

¶ **25.413 CR 493** ¶ rev **1** ¶ Current version: **3.10.0** ¶

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

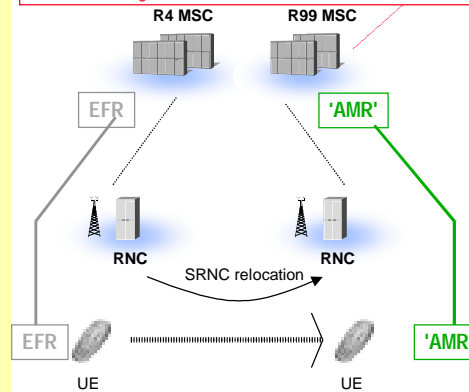
Proposed change affects: UICC apps¶ ME Radio Access Network Core Network

Title:	¶ Codec change during SRNS relocation		
Source:	¶ RAN WG3		
Work item code:	¶ TEI	Date:	¶ 21/08/2002
Category:	¶ F	Release:	¶ R99
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change: ¶ In Release 4 more than one codec is supported e.g. only AMR is required in R99, but AMR2 and EFR are also supported in R4. In case of inter MSC handover, the MSC-B is responsible of providing transcoding resources. CN1/CN4 decided that R4 MSC-A will always send to MSC-B RAB parameters according to the default UMTS codec and subsequently to target RNC. Thus, codec may change if the codec used in MSC-A was different than the default codec. Default codec is determined by the rules stated in 24.008 chapter 5.2.1.11. The default codec is AMR for R99 and for R4 it depends on UE's capabilities. If the codec change, the MSC-B has to generate the associated RAB parameters too and send them to target RNC in RANAP:RELOCATION REQUEST message. Therefore RAB configuration change has to be allowed in SRNC relocation and the new codec has to be indicated to the UE.

The following figure illustrates the basic problem in SRNC relocation when the target MSC either does not support or does not have transcoding resources available for the currently used codec.

Target R99 MSC does not support the currently used codec, EFR. MSC is not allowed to send RAB parameters for AMR codec according to TS 25.413 => relocation will fail!



In the above figure, EFR codec is in use between MSC and UE. Serving RNC initiates SRNC relocation and the target RNC is controlled by another MSC. However, the target MSC does not support or there are no available transcoding resources for the currently used codec. Thus the relocation will fail because according 3GPP 25.413 CN shall not change the RAB configuration in SRNC relocation.

Summary of change: ☞ CN is allowed to change the RAB configuration in SRNC relocation and therefore the statement “In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same RAB configuration as existing for the UE before the relocation” is replaced by the following statement according to the original intention coming from the CR126rev1 in Tdoc R3-001928 of RAN3#14:

“The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same set of RABs as existing for the UE before the relocation”.

If the NAS Synchronisation Indicator IE is contained in the RELOCATION REQUEST message i.e. the codec has changed, the target RNC shall pass it to the UE.

Impact assessment towards the previous version of the specification (same release):

This CR has isolated impact with the previous version of the specification (same release) because of change in the understanding of *NAS Synchronisation Indicator* IE handling during SRNC relocation. This would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

The CR has an impact under functional point of view.

The impact can be considered isolated because the change affects the Relocation Resource Allocation function.

Consequences if not approved: ☞ The UTRAN to UTRAN relocation will fail each time there is a codec change. This implies Release 99 as well because of the interworking case when changing codec in a UTRAN to UTRAN relocation from Rel-4 source system to R99 target system, as explained above. Furthermore, If we don't solve this problem now, it does not make sense to introduce any new codecs in later releases because in practice they cannot be used and any relocation from Rel-X source system to R99 target system will fail.

Clauses affected: ☞ 8.7

Other specs ☞

Y	N
X	

 Other core specifications ☞ 23.009 R99 CR078, 23.009 R99 CR079, 29.002 R99 CR073,

affected:

	X
	X

Test specifications

O&M Specifications

25.413 Rel-4 CR494 and Rel-5 CR495
(mirror CRs)

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.

8.7 Relocation Resource Allocation

8.7.1 General

The purpose of the Relocation Resource Allocation procedure is to allocate resources from target RNS for a relocation of SRNS. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.7.2 Successful Operation

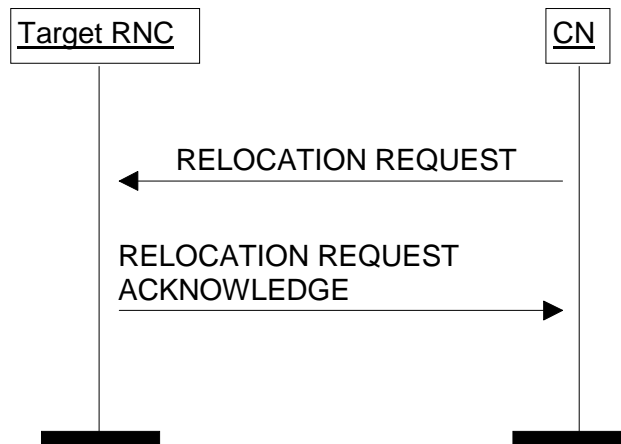


Figure 1: Relocation Resource Allocation procedure. Successful operation.

The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same set of RABs configuration as existing for the UE before the relocation.

The CN shall transmit the RELOCATION REQUEST message to target RNC and the CN shall start the timer $T_{RELOCalloc}$.

Upon reception of the RELOCATION REQUEST message, the target RNC shall initiate allocation of requested resources.

The RELOCATION REQUEST message shall contain following IEs

- *Permanent NAS UE Identity* (if available)
- *Cause*
- *CN Domain Indicator*
- *Source RNC To Target RNC Transparent Container*
- *Iu Signalling Connection Identifier*
- *Integrity Protection Information* (if available)

For each RAB requested to relocate (or to be created e.g. in the case of inter-system handover), the message shall contain following IEs:

- *RAB-ID*
- *NAS Synchronisation Indicator* (if the relevant NAS information is provided by the CN)
- *RAB parameters*
- *User Plane Information*

- *Transport Layer Address*
- *Iu Transport Association*
- *Data Volume Reporting Indication* (only for PS)
- *PDP Type Information* (only for PS)

The RELOCATION REQUEST message may include following IEs:

- *Encryption Information* (shall not be included if the *Integrity Protection Information IE* is not included)

For each RAB requested to relocate the message may include following IEs:

- *Service Handover*

The following information elements received in RELOCATION REQUEST message require the same special actions in the RNC as specified for the same IEs in the RAB Assignment procedure:

- RAB-ID
- User plane Information
- Priority level, queuing and pre-emption indication
- Service Handover

The *SDU Format Information Parameter IE* in the *RAB Parameters IE* shall be present only if the *User Plane Mode IE* is set to "support mode for pre-defined SDU sizes" and the *Traffic Class IE* is set to either "Conversational" or "Streaming".

If the RELOCATION REQUEST message includes the *PDP Type Information IE*, the UTRAN may use this IE to configure any compression algorithms.

The *Cause IE* shall contain the same value as the one received in the related RELOCATION REQUIRED message.

The *Iu Signalling Connection Identifier IE* contains an Iu signalling connection identifier which is allocated by the CN, and which the RNC is required to store and remember for the duration of the Iu connection.

The algorithms within the *Integrity Protection Information IE* and the *Encryption Information IE* shall be ordered in preferred order with the most preferred first in the list.

The *Permitted Encryption Algorithms IE* within the *Encryption Information IE* may contain "no encryption" within an element of its list in order to allow the RNC not to cipher the respective connection. This can be done either by not starting ciphering or by using the UEA0 algorithm. In the absence of the *Encryption Information IE*, the RNC shall not start ciphering.

Following additional actions shall be executed in the target RNC during Relocation Resource Allocation procedure:

If the *Relocation Type IE* is set to "UE involved in relocation of SRNS":

- The target RNC may accept a requested RAB only if the RAB can be supported by the target RNC.
- Other RABs shall be rejected by the target RNC in the RELOCATION REQUEST ACKNOWLEDGE message with an appropriate value for *Cause IE*, e.g. "Unable to Establish During Relocation".
- The target RNC shall include information adapted to the resulting RAB configuration in the target to source RNC transparent container to be included in the RELOCATION REQUEST ACKNOWLEDGE message sent to the CN. If the target RNC supports triggering of the Relocation Detect procedure via the Iur interface, the RNC shall assign a d-RNTI for the context of the relocation and include it in the container. If two CNs are involved in the relocation of SRNS, the target RNC may, however, decide to send the container to only one CN.

If the *Relocation Type IE* is set to "UE not involved in relocation of SRNS":

- The target RNC may accept a RAB only if the radio bearer(s) for the RAB either exist(s) already, and can be used for the RAB by the target RNC, or does not exist before the relocation but can be established in order to support the RAB in the target RNC.

- If existing radio bearers are not related to any RAB that is accepted by target RNC, the radio bearers shall be ignored during the relocation of SRNS and the radio bearers shall be released by radio interface protocols after completion of relocation of SRNS.

After all necessary resources for accepted RABs including the initialised Iu user plane, are successfully allocated, the target RNC shall send RELOCATION REQUEST ACKNOWLEDGE message to the CN.

For each RAB successfully setup the RNC shall include following IEs:

- *RAB ID*
- *Transport Layer Address* (only for PS)
- *Iu Transport Association* (only for PS)

For each RAB the RNC is not able to setup during Relocation Resource Allocation the RNC shall include the *RAB ID* IE and the *Cause* IE within the *RABs Failed To Setup* IE. The resources associated with the RABs indicated as failed to set up shall not be released in the CN until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

The RELOCATION REQUEST ACKNOWLEDGE message sent to the CN shall, if applicable and if not sent via the other CN domain, include the *Target RNC To Source RNC Transparent Container* IE. This container shall be transferred by CN to the source RNC or the external relocation source while completing the Relocation Preparation procedure.

If the *Integrity Protection Information* IE was included in the RELOCATION REQUEST message, the RNC shall include the *Chosen Integrity Protection Algorithm* IE within the RELOCATION REQUEST ACKNOWLEDGE message, if the *Encryption Information* IE was included, the RNC shall include the *Chosen Encryption Algorithm* IE.

If one or more of the RABs that the target RNC has decided to support can not be supported by the CN, then these failed RABs shall not be released towards the target RNC until the relocation is completed.

If the *NAS Synchronisation Indicator* IE is contained in the RELOCATION REQUEST message, the target RNC shall pass it to the UE source RNC within the *RRC Container* IE contained in the *Target RNC to Source RNC Transparent Container* IE.

Transmission and reception of RELOCATION REQUEST ACKNOWLEDGE message terminates the procedure in the UTRAN and the CN respectively.

8.7.3 Unsuccessful Operation

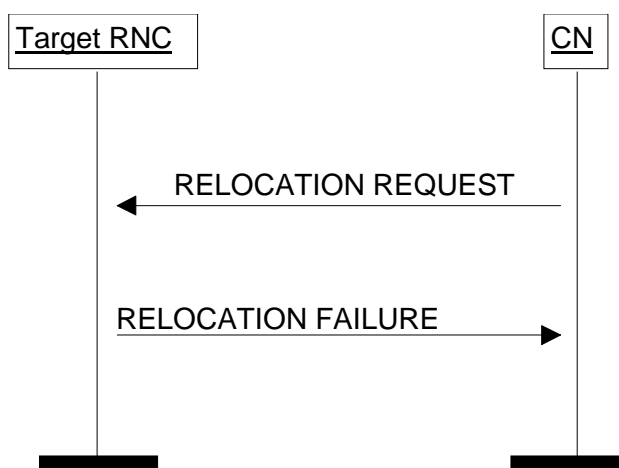


Figure 2: Relocation Resource Allocation procedure: Unsuccessful operation.

If the target RNC can not even partially accept the relocation of SRNS or a failure occurs during the Relocation Resource Allocation procedure in the target RNC, the target RNC shall send RELOCATION FAILURE message to the CN.

Transmission and reception of RELOCATION FAILURE message terminates the procedure in the UTRAN and the CN respectively.

When CN has received RELOCATION FAILURE message from target RNC, CN shall stop timer $T_{\text{RELOCalloc}}$ and shall assume possibly allocated resources within target RNC completely released.

8.7.4 Abnormal Conditions

If after reception of the RELOCATION REQUEST message, the target RNC receives another RELOCATION REQUEST message on the same Iu connection, then the target RNC shall discard the latter message and the original Relocation Resource Allocation procedure shall continue normally.

NOTE: In case two CN domains are involved in the SRNS Relocation Resource Allocation procedure, the Target RNC may check whether the content of the two *Source RNC to Target RNC Transparent Container IE* is the same. In case the Target RNC receives two different *Source RNC to Target RNC Transparent Container IE*, the RNC behaviour is left implementation specific.

Interactions with Iu Release procedure:

If the CN decides to not continue the Relocation Resource Allocation procedure (e.g. due to $T_{\text{RELOCalloc}}$ expiry) before the Relocation Resource Allocation procedure is completed, the CN shall stop timer $T_{\text{RELOCalloc}}$ (if timer $T_{\text{RELOCalloc}}$ has not already expired) and the CN shall, if the Iu signalling connection has been established or later becomes established, initiate the Iu Release procedure towards the target RNC with an appropriate value for the *Cause IE*, e.g. "Relocation Cancelled".

8.7.5 Co-ordination of Two Iu Signalling Connections

Co-ordination of two Iu signalling connections during Relocation Resource Allocation procedure shall be executed by the target RNC when the *Number of Iu Instances IE* received in the *Source RNC to Target RNC Transparent Container IE* in the RELOCATION REQUEST message indicates that two CN domains are involved in relocation of SRNS.

If two CN domains are involved, the following actions shall be taken by the target RNC:

- The target RNC shall utilise the *Permanent NAS UE Identity IE*, received explicitly by each CN domain within RELOCATION REQUEST message, to co-ordinate both Iu signalling connections.
- The target RNC shall generate and send RELOCATION REQUEST ACKNOWLEDGE message only after all expected RELOCATION REQUEST messages are received and analysed.
- If the target RNC decides to send the *Target RNC to Source RNC Transparent Container IE* via the two CN domains, the target RNC shall ensure that the same *Target RNC to Source RNC Transparent Container IE* is included in RELOCATION REQUEST ACKNOWLEDGE messages transmitted via the two CN domains and related to the same relocation of SRNS.

CR-Form-v7

CHANGE REQUEST

¶ **25.413 CR 494** ¶ rev **1** ¶ Current version: **4.5.0** ¶

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

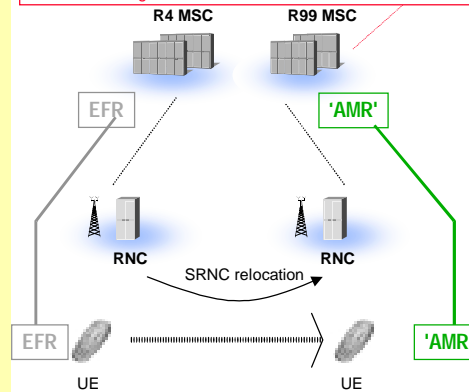
Proposed change affects: UICC apps¶ ME Radio Access Network Core Network

Title:	¶ Codec change during SRNS relocation		
Source:	¶ RAN WG3		
Work item code:	¶ TEI	Date:	¶ 21/08/2002
Category:	¶ A	Release:	¶ Rel-4
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change: ¶ In Release 4 more than one codec is supported e.g. only AMR is required in R99, but AMR2 and EFR are also supported in R4. In case of inter MSC handover, the MSC-B is responsible of providing transcoding resources. CN1/CN4 decided that R4 MSC-A will always send to MSC-B RAB parameters according to the default UMTS codec and subsequently to target RNC. Thus, codec may change if the codec used in MSC-A was different than the default codec. Default codec is determined by the rules stated in 24.008 chapter 5.2.1.11. The default codec is AMR for R99 and for R4 it depends on UE's capabilities. If the codec change, the MSC-B has to generate the associated RAB parameters too and send them to target RNC in RANAP:RELOCATION REQUEST message. Therefore RAB configuration change has to be allowed in SRNC relocation and the new codec has to be indicated to the UE.

The following figure illustrates the basic problem in SRNC relocation when the target MSC either does not support or does not have transcoding resources available for the currently used codec.

Target R99 MSC does not support the currently used codec, EFR. MSC is not allowed to send RAB parameters for AMR codec according to TS 25.413 => relocation will fail!



In the above figure, EFR codec is in use between MSC and UE. Serving RNC initiates SRNC relocation and the target RNC is controlled by another MSC. However, the target MSC does not support or there are no available transcoding resources for the currently used codec. Thus the relocation will fail because according 3GPP 25.413 CN shall not change the RAB configuration in SRNC relocation.

Summary of change: ☞ CN is allowed to change the RAB configuration in SRNC relocation and therefore the statement “In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same RAB configuration as existing for the UE before the relocation” is replaced by the following statement according to the original intention coming from the CR126rev1 in Tdoc R3-001928 of RAN3#14:
 “In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same set of RABs as existing for the UE before the relocation”.

If the NAS Synchronisation Indicator IE is contained in the RELOCATION REQUEST message i.e. the codec has changed, the target RNC shall pass it to the UE.

Impact assessment towards the previous version of the specification (same release):
 This CR has isolated impact with the previous version of the specification (same release) because of change in the understanding of *NAS Synchronisation Indicator* IE handling during SRNC relocation. This would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
 The CR has an impact under functional point of view.
 The impact can be considered isolated because the change affects the Relocation Resource Allocation function.

Consequences if not approved: ☞ The UTRAN to UTRAN relocation will fail each time there is a codec change. This implies Release 99 as well because of the interworking case when changing codec in a UTRAN to UTRAN relocation from Rel-4 source system to R99 target system, as explained above.
 Furthermore, If we don't solve this problem now, it does not make sense to introduce any new codecs in later releases because in practice they cannot be used and any relocation from Rel-X source system to R99 target system will fail.

Clauses affected: ☞ 8.7

		Y	N		
Other specs	☞	X		Other core specifications	☞ 23.009 R99 CR078, 23.009 R99 CR079, 29.002 R99 CR073, 25.413 R99 CR493 and Rel-5 CR495

affected:	<input type="checkbox"/>	<input type="checkbox"/>	(mirror CR)	
	<input checked="" type="checkbox"/>	X		Test specifications
	<input checked="" type="checkbox"/>	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.

8.7 Relocation Resource Allocation

8.7.1 General

The purpose of the Relocation Resource Allocation procedure is to allocate resources from target RNS for a relocation of SRNS. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.7.2 Successful Operation

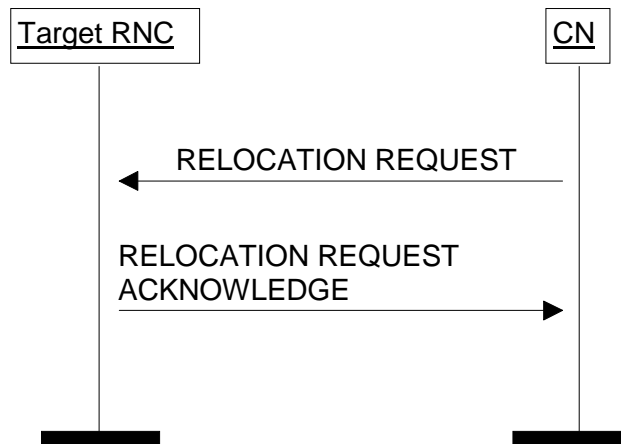


Figure 1: Relocation Resource Allocation procedure. Successful operation.

The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same set of RABs configuration as existing for the UE before the relocation. The CN may indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

The CN shall transmit the RELOCATION REQUEST message to target RNC and the CN shall start the timer $T_{RELOCalloc}$.

When a RELOCATION REQUEST message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

Upon reception of the RELOCATION REQUEST message, the target RNC shall initiate allocation of requested resources.

The RELOCATION REQUEST message shall contain following IEs

- *Permanent NAS UE Identity* IE (if available)
- *Cause*
- *CN Domain Indicator*
- *Source RNC To Target RNC Transparent Container*
- *Iu Signalling Connection Identifier*
- *Integrity Protection Information* IE (if available)

For each RAB requested to relocate (or to be created e.g. in the case of inter-system handover), the message shall contain following IEs:

- *RAB-ID*
- *NAS Synchronisation Indicator* IE (if the relevant NAS information is provided by the CN)

- *RAB parameters*
- *User Plane Information*
- *Transport Layer Address*
- *Iu Transport Association*
- *Data Volume Reporting Indication* (only for PS)
- *PDP Type Information* (only for PS)

The RELOCATION REQUEST message may include following IEs:

- *Encryption Information* (shall not be included if the *Integrity Protection Information IE* is not included)

For each RAB requested to relocate the message may include following IEs:

- *Service Handover*.
- *Alternative RAB Parameter Values*.

The following information elements received in RELOCATION REQUEST message require the same special actions in the RNC as specified for the same IEs in the RAB Assignment procedure:

- *RAB-ID*
- *User plane Information*(i.e. required User Plane Mode and required User Plane Versions)
- *Priority level, queuing and pre-emption indication*
- *Service Handover*

The *SDU Format Information Parameter IE* in the *RAB Parameters IE* shall be present only if the *User Plane Mode IE* is set to "support mode for pre-defined SDU sizes" and the *Traffic Class IE* is set to either "Conversational" or "Streaming".

If the RELOCATION REQUEST message includes the *PDP Type Information IE*, the UTRAN may use this IE to configure any compression algorithms.

The *Cause IE* shall contain the same value as the one received in the related RELOCATION REQUIRED message.

The *Iu Signalling Connection Identifier IE* contains an Iu signalling connection identifier which is allocated by the CN, and which the RNC is required to store and remember for the duration of the Iu connection.

The algorithms within the *Integrity Protection Information IE* and the *Encryption Information IE* shall be ordered in preferred order with the most preferred first in the list.

The *Permitted Encryption Algorithms IE* within the *Encryption Information IE* may contain "no encryption" within an element of its list in order to allow the RNC not to cipher the respective connection. This can be done either by not starting ciphering or by using the UEA0 algorithm. In the absence of the *Encryption Information IE*, the RNC shall not start ciphering.

The *Global CN-ID IE* contains the identity of the CN node that sent the RELOCATION REQUEST message, and it shall, if included, be stored together with the Iu signalling connection identifier. If the *Global CN-ID IE* is not included, the RELOCATION REQUEST message shall be considered as coming from the default CN node for the indicated CN domain.

Following additional actions shall be executed in the target RNC during Relocation Resource Allocation procedure:

If the *Relocation Type IE* is set to "UE involved in relocation of SRNS":

- The target RNC may accept a requested RAB only if the RAB can be supported by the target RNC.
- Other RABs shall be rejected by the target RNC in the RELOCATION REQUEST ACKNOWLEDGE message with an appropriate value for *Cause IE*, e.g. "Unable to Establish During Relocation".

- The target RNC shall include information adapted to the resulting RAB configuration in the target to source RNC transparent container to be included in the RELOCATION REQUEST ACKNOWLEDGE message sent to the CN. If the target RNC supports triggering of the Relocation Detect procedure via the Iur interface, the RNC shall assign a d-RNTI for the context of the relocation and include it in the container. If two CNs are involved in the relocation of SRNS, the target RNC may, however, decide to send the container to only one CN.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values* IE.

If the *Relocation Type* IE is set to "UE not involved in relocation of SRNS":

- The target RNC may accept a RAB only if the radio bearer(s) for the RAB either exist(s) already, and can be used for the RAB by the target RNC, or does not exist before the relocation but can be established in order to support the RAB in the target RNC.
- If existing radio bearers are not related to any RAB that is accepted by target RNC, the radio bearers shall be ignored during the relocation of SRNS and the radio bearers shall be released by radio interface protocols after completion of relocation of SRNS.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values* IE. It should be noted that the usage of alternative RAB parameter values is not applicable to the UTRAN initiated relocation of type "UE not involved in relocation of SRNS".

After all necessary resources for accepted RABs including the initialised Iu user plane, are successfully allocated, the target RNC shall send RELOCATION REQUEST ACKNOWLEDGE message to the CN.

For each RAB successfully setup the RNC shall include following IEs:

- *RAB ID*
- *Transport Layer Address* (only for PS)
- *Iu Transport Association* (only for PS)

For each RAB the RNC is not able to setup during Relocation Resource Allocation the RNC shall include the *RAB ID* IE and the *Cause* IE within the *RABs Failed To Setup* IE. The resources associated with the RABs indicated as failed to set up shall not be released in the CN until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

The RELOCATION REQUEST ACKNOWLEDGE message sent to the CN shall, if applicable and if not sent via the other CN domain, include the *Target RNC To Source RNC Transparent Container* IE. This container shall be transferred by CN to the source RNC or the external relocation source while completing the Relocation Preparation procedure.

If the *Integrity Protection Information* IE was included in the RELOCATION REQUEST message, the RNC shall include the *Chosen Integrity Protection Algorithm* IE within the RELOCATION REQUEST ACKNOWLEDGE message, if the *Encryption Information* IE was included, the RNC shall include the *Chosen Encryption Algorithm* IE.

If one or more of the RABs that the target RNC has decided to support can not be supported by the CN, then these failed RABs shall not be released towards the target RNC until the relocation is completed.

If the *NAS Synchronisation Indicator* IE is contained in the RELOCATION REQUEST message, the target RNC shall pass it to the ~~UE source RNC within the RRC Container IE contained in the Target RNC to Source RNC Transparent Container IE.~~

Transmission and reception of RELOCATION REQUEST ACKNOWLEDGE message terminates the procedure in the UTRAN and the CN respectively.

Before reporting the successful outcome of the Relocation Resource allocation procedure, the RNC shall have executed the initialisation of the user plane mode as requested by the CN in the *User Plane Mode* IE. If the RNC can not initialise the requested user plane mode for any of the user plane mode versions in the *UP Mode Versions* IE according to the rules for initialisation of the respective user plane mode versions, as described in [6], the RAB Relocation shall fail with the cause value "RNC unable to establish all RFCs".

8.7.3 Unsuccessful Operation

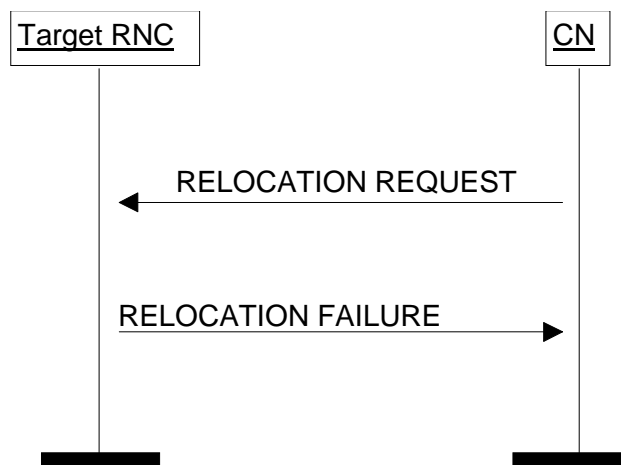


Figure 2: Relocation Resource Allocation procedure: Unsuccessful operation.

If the target RNC can not even partially accept the relocation of SRNS or a failure occurs during the Relocation Resource Allocation procedure in the target RNC, the target RNC shall send RELOCATION FAILURE message to the CN.

Transmission and reception of RELOCATION FAILURE message terminates the procedure in the UTRAN and the CN respectively.

When CN has received RELOCATION FAILURE message from target RNC, CN shall stop timer $T_{\text{RELOCalloc}}$ and shall assume possibly allocated resources within target RNC completely released.

8.7.4 Abnormal Conditions

If after reception of the RELOCATION REQUEST message, the target RNC receives another RELOCATION REQUEST message on the same Iu connection, then the target RNC shall discard the latter message and the original Relocation Resource Allocation procedure shall continue normally.

NOTE: In case two CN domains are involved in the SRNS Relocation Resource Allocation procedure, the Target RNC may check whether the content of the two *Source RNC to Target RNC Transparent Container* IE is the same. In case the Target RNC receives two different *Source RNC to Target RNC Transparent Container* IE, the RNC behaviour is left implementation specific.

Interactions with Iu Release procedure:

If the CN decides to not continue the Relocation Resource Allocation procedure (e.g. due to $T_{\text{RELOCalloc}}$ expiry) before the Relocation Resource Allocation procedure is completed, the CN shall stop timer $T_{\text{RELOCalloc}}$ (if timer $T_{\text{RELOCalloc}}$ has not already expired) and the CN shall, if the Iu signalling connection has been established or later becomes established, initiate the Iu Release procedure towards the target RNC with an appropriate value for the *Cause* IE, e.g. "Relocation Cancelled".

8.7.5 Co-ordination of Two Iu Signalling Connections

Co-ordination of two Iu signalling connections during Relocation Resource Allocation procedure shall be executed by the target RNC when the *Number of Iu Instances* IE received in the *Source RNC to Target RNC Transparent Container* IE in the RELOCATION REQUEST message indicates that two CN domains are involved in relocation of SRNS.

If two CN domains are involved, the following actions shall be taken by the target RNC:

- The target RNC shall utilise the *Permanent NAS UE Identity* IE, received explicitly by each CN domain within RELOCATION REQUEST message, to co-ordinate both Iu signalling connections.
- The target RNC shall generate and send RELOCATION REQUEST ACKNOWLEDGE message only after all expected RELOCATION REQUEST messages are received and analysed.

- If the target RNC decides to send the *Target RNC to Source RNC Transparent Container IE* via the two CN domains, the target RNC shall ensure that the same *Target RNC to Source RNC Transparent Container IE* is included in RELOCATION REQUEST ACKNOWLEDGE messages transmitted via the two CN domains and related to the same relocation of SRNS.

CHANGE REQUEST

¶ **25.413 CR 495** ¶ rev **1** ¶ Current version: **5.1.0** ¶

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

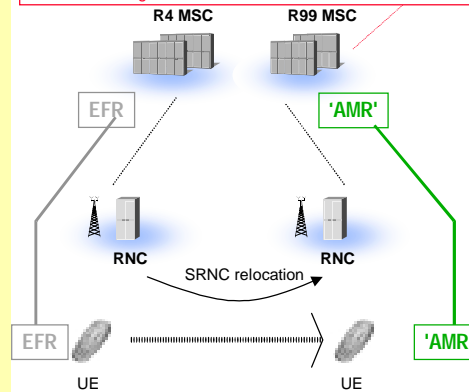
Proposed change affects: UICC apps¶ ME Radio Access Network Core Network

Title:	¶ Codec change during SRNS relocation		
Source:	¶ RAN WG3		
Work item code:	¶ TEI	Date:	¶ 21/08/2002
Category:	¶ A	Release:	¶ Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)		2 (GSM Phase 2)
	A (corresponds to a correction in an earlier release)		R96 (Release 1996)
	B (addition of feature),		R97 (Release 1997)
	C (functional modification of feature)		R98 (Release 1998)
	D (editorial modification)		R99 (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change: ¶ In Release 4 more than one codec is supported e.g. only AMR is required in R99, but AMR2 and EFR are also supported in R4. In case of inter MSC handover, the MSC-B is responsible of providing transcoding resources. CN1/CN4 decided that R4 MSC-A will always send to MSC-B RAB parameters according to the default UMTS codec and subsequently to target RNC. Thus, codec may change if the codec used in MSC-A was different than the default codec. Default codec is determined by the rules stated in 24.008 chapter 5.2.1.11. The default codec is AMR for R99 and for R4 it depends on UE's capabilities. If the codec change, the MSC-B has to generate the associated RAB parameters too and send them to target RNC in RANAP:RELOCATION REQUEST message. Therefore RAB configuration change has to be allowed in SRNC relocation and the new codec has to be indicated to the UE.

The following figure illustrates the basic problem in SRNC relocation when the target MSC either does not support or does not have transcoding resources available for the currently used codec.

Target R99 MSC does not support the currently used codec, EFR. MSC is not allowed to send RAB parameters for AMR codec according to TS 25.413 => relocation will fail!



In the above figure, EFR codec is in use between MSC and UE. Serving RNC initiates SRNC relocation and the target RNC is controlled by another MSC. However, the target MSC does not support or there are no available transcoding resources for the currently used codec. Thus the relocation will fail because according 3GPP 25.413 CN shall not change the RAB configuration in SRNC relocation.

Summary of change: ☞ CN is allowed to change the RAB configuration in SRNC relocation and therefore the statement “In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same RAB configuration as existing for the UE before the relocation” is replaced by the following statement according to the original intention coming from the CR126rev1 in Tdoc R3-001928 of RAN3#14:
 “In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same set of RABs as existing for the UE before the relocation”.
 If the NAS Synchronisation Indicator IE is contained in the RELOCATION REQUEST message i.e. the codec has changed, the target RNC shall pass it to the UE.

Consequences if not approved: ☞ The UTRAN to UTRAN relocation will fail each time there is a codec change. This implies Release 99 as well because of the interworking case when changing codec in a UTRAN to UTRAN relocation from Rel-4 source system to R99 target system, as explained above. Furthermore, If we don't solve this problem now, it does not make sense to introduce any new codecs in later releases because in practice they cannot be used and any relocation from Rel-X source system to R99 target system will fail.

Clauses affected:	☞	8.7
Other specs	☞	Other core specifications ☞ 23.009 R99 CR078, 23.009 R99 CR079, 29.002 R99 CR073, 25.413 R99 CR493 and Rel-4 CR494 (mirror CR)
affected:		Test specifications
		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.

8.7 Relocation Resource Allocation

8.7.1 General

The purpose of the Relocation Resource Allocation procedure is to allocate resources from target RNS for a relocation of SRNS. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.7.2 Successful Operation

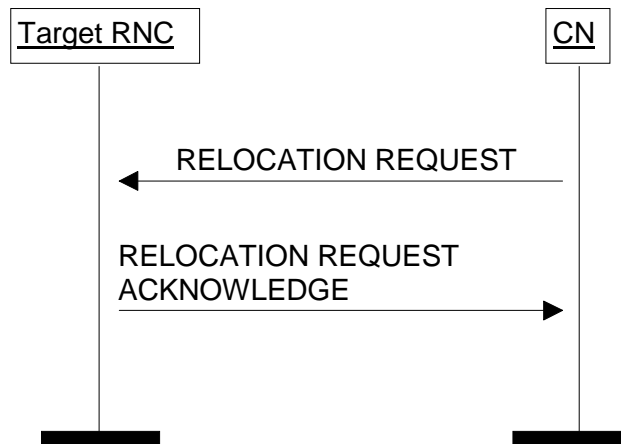


Figure 1: Relocation Resource Allocation procedure. Successful operation.

The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same set of RABs configuration as existing for the UE before the relocation. The CN may indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

The CN shall transmit the RELOCATION REQUEST message to target RNC and the CN shall start the timer $T_{RELOCalloc}$.

When a RELOCATION REQUEST message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

Upon reception of the RELOCATION REQUEST message, the target RNC shall initiate allocation of requested resources.

The RELOCATION REQUEST message shall contain following IEs

- *Permanent NAS UE Identity* IE (if available)
- *Cause*
- *CN Domain Indicator*
- *Source RNC To Target RNC Transparent Container*
- *Iu Signalling Connection Identifier*
- *Integrity Protection Information* IE (if available)

For each RAB requested to relocate (or to be created e.g. in the case of inter-system handover), the message shall contain following IEs:

- *RAB-ID*
- *NAS Synchronisation Indicator* IE (if the relevant NAS information is provided by the CN)

- *RAB parameters*
- *User Plane Information*
- *Transport Layer Address*
- *Iu Transport Association*
- *Data Volume Reporting Indication* (only for PS)
- *PDP Type Information* (only for PS)

The RELOCATION REQUEST message may include following IEs:

- *Encryption Information* (shall not be included if the *Integrity Protection Information IE* is not included)

For each RAB requested to relocate the message may include following IEs:

- *Service Handover*.
- *Alternative RAB Parameter Values*.

The following information elements received in RELOCATION REQUEST message require the same special actions in the RNC as specified for the same IEs in the RAB Assignment procedure:

- *RAB-ID*
- *User plane Information*(i.e. required User Plane Mode and required User Plane Versions)
- *Priority level, queuing and pre-emption indication*
- *Service Handover*

The *SDU Format Information Parameter IE* in the *RAB Parameters IE* shall be present only if the *User Plane Mode IE* is set to "support mode for pre-defined SDU sizes" and the *Traffic Class IE* is set to either "Conversational" or "Streaming".

If the RELOCATION REQUEST message includes the *PDP Type Information IE*, the UTRAN may use this IE to configure any compression algorithms.

The *Cause IE* shall contain the same value as the one received in the related RELOCATION REQUIRED message.

The *Iu Signalling Connection Identifier IE* contains an Iu signalling connection identifier which is allocated by the CN, and which the RNC is required to store and remember for the duration of the Iu connection.

The algorithms within the *Integrity Protection Information IE* and the *Encryption Information IE* shall be ordered in preferred order with the most preferred first in the list.

The *Permitted Encryption Algorithms IE* within the *Encryption Information IE* may contain "no encryption" within an element of its list in order to allow the RNC not to cipher the respective connection. This can be done either by not starting ciphering or by using the UEA0 algorithm. In the absence of the *Encryption Information IE*, the RNC shall not start ciphering.

The *Global CN-ID IE* contains the identity of the CN node that sent the RELOCATION REQUEST message, and it shall, if included, be stored together with the Iu signalling connection identifier. If the *Global CN-ID IE* is not included, the RELOCATION REQUEST message shall be considered as coming from the default CN node for the indicated CN domain.

Following additional actions shall be executed in the target RNC during Relocation Resource Allocation procedure:

If the *Relocation Type IE* is set to "UE involved in relocation of SRNS":

- The target RNC may accept a requested RAB only if the RAB can be supported by the target RNC.
- Other RABs shall be rejected by the target RNC in the RELOCATION REQUEST ACKNOWLEDGE message with an appropriate value for *Cause IE*, e.g. "Unable to Establish During Relocation".

- The target RNC shall include information adapted to the resulting RAB configuration in the target to source RNC transparent container to be included in the RELOCATION REQUEST ACKNOWLEDGE message sent to the CN. If the target RNC supports triggering of the Relocation Detect procedure via the Iur interface, the RNC shall assign a d-RNTI for the context of the relocation and include it in the container. If two CNs are involved in the relocation of SRNS, the target RNC may, however, decide to send the container to only one CN.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values* IE.

If the *Relocation Type* IE is set to "UE not involved in relocation of SRNS":

- The target RNC may accept a RAB only if the radio bearer(s) for the RAB either exist(s) already, and can be used for the RAB by the target RNC, or does not exist before the relocation but can be established in order to support the RAB in the target RNC.
- If existing radio bearers are not related to any RAB that is accepted by target RNC, the radio bearers shall be ignored during the relocation of SRNS and the radio bearers shall be released by radio interface protocols after completion of relocation of SRNS.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message within the *Assigned RAB Parameter Values* IE. It should be noted that the usage of alternative RAB parameter values is not applicable to the UTRAN initiated relocation of type "UE not involved in relocation of SRNS".

After all necessary resources for accepted RABs including the initialised Iu user plane, are successfully allocated, the target RNC shall send RELOCATION REQUEST ACKNOWLEDGE message to the CN.

For each RAB successfully setup the RNC shall include following IEs:

- *RAB ID*
- *Transport Layer Address* (when no ALCAP has been used)
- *Iu Transport Association* (when no ALCAP has been used)

Two pairs of *Transport Layer Address* IE and *Iu Transport Association* IE may be included for RABs established towards the PS domain.

For each RAB the RNC is not able to setup during Relocation Resource Allocation the RNC shall include the *RAB ID* IE and the *Cause* IE within the *RABs Failed To Setup* IE. The resources associated with the RABs indicated as failed to set up shall not be released in the CN until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

The RELOCATION REQUEST ACKNOWLEDGE message sent to the CN shall, if applicable and if not sent via the other CN domain, include the *Target RNC To Source RNC Transparent Container* IE. This container shall be transferred by CN to the source RNC or the external relocation source while completing the Relocation Preparation procedure.

If the target RNC supports cell load-based inter-system handover, then in the case of inter-system handover, the *New BSS to Old BSS Information* IE may be included in the RELOCATION REQUEST ACKNOWLEDGE message.

If the *Integrity Protection Information* IE was included in the RELOCATION REQUEST message, the RNC shall include the *Chosen Integrity Protection Algorithm* IE within the RELOCATION REQUEST ACKNOWLEDGE message, if the *Encryption Information* IE was included, the RNC shall include the *Chosen Encryption Algorithm* IE.

If one or more of the RABs that the target RNC has decided to support can not be supported by the CN, then these failed RABs shall not be released towards the target RNC until the relocation is completed.

If the *NAS Synchronisation Indicator* IE is contained in the RELOCATION REQUEST message, the target RNC shall pass it to the UE source RNC within the ~~*RRC Container* IE contained in the *Target RNC to Source RNC Transparent Container* IE.~~

Transmission and reception of RELOCATION REQUEST ACKNOWLEDGE message terminates the procedure in the UTRAN and the CN respectively.

Before reporting the successful outcome of the Relocation Resource allocation procedure, the RNC shall have executed the initialisation of the user plane mode as requested by the CN in the *User Plane Mode IE*. If the RNC can not initialise the requested user plane mode for any of the user plane mode versions in the *UP Mode Versions IE* according to the rules for initialisation of the respective user plane mode versions, as described in [6], the RAB Relocation shall fail with the cause value "RNC unable to establish all RFCs".

8.7.3 Unsuccessful Operation

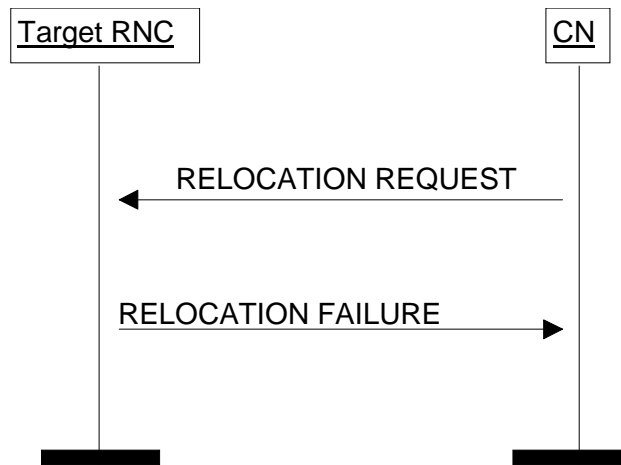


Figure 2: Relocation Resource Allocation procedure: Unsuccessful operation.

If the target RNC can not even partially accept the relocation of SRNS or a failure occurs during the Relocation Resource Allocation procedure in the target RNC, the target RNC shall send RELOCATION FAILURE message to the CN.

Transmission and reception of RELOCATION FAILURE message terminates the procedure in the UTRAN and the CN respectively.

When CN has received RELOCATION FAILURE message from target RNC, CN shall stop timer $T_{RELOCalloc}$ and shall assume possibly allocated resources within target RNC completely released.

In the case of inter-system handover, and if the target RNC supports cell load-based inter-system handover, then

- the *NewBSS to Old BSS Information IE* may be included in the RELOCATION FAILURE message.
- the RELOCATION FAILURE message may contain the appropriate value in the *Cause IE*, e.g. "No Radio Resources Available in Target Cell".

8.7.4 Abnormal Conditions

If after reception of the RELOCATION REQUEST message, the target RNC receives another RELOCATION REQUEST message on the same Iu connection, then the target RNC shall discard the latter message and the original Relocation Resource Allocation procedure shall continue normally.

Interactions with Iu Release procedure:

If the CN decides to not continue the Relocation Resource Allocation procedure (e.g. due to $T_{RELOCalloc}$ expiry) before the Relocation Resource Allocation procedure is completed, the CN shall stop timer $T_{RELOCalloc}$ (if timer $T_{RELOCalloc}$ has not already expired) and the CN shall, if the Iu signalling connection has been established or later becomes established, initiate the Iu Release procedure towards the target RNC with an appropriate value for the *Cause IE*, e.g. "Relocation Cancelled".

NOTE: In case two CN domains are involved in the SRNS Relocation Resource Allocation procedure, the Target RNC may check whether the content of the two *Source RNC to Target RNC Transparent Container IE* is the same. In case the Target RNC receives two different *Source RNC to Target RNC Transparent Container IE*, the RNC behaviour is left implementation specific.

8.7.5 Co-ordination of Two Iu Signalling Connections

Co-ordination of two Iu signalling connections during Relocation Resource Allocation procedure shall be executed by the target RNC when the *Number of Iu Instances* IE received in the *Source RNC to Target RNC Transparent Container* IE in the RELOCATION REQUEST message indicates that two CN domains are involved in relocation of SRNS.

If two CN domains are involved, the following actions shall be taken by the target RNC:

- The target RNC shall utilise the *Permanent NAS UE Identity* IE, received explicitly by each CN domain within RELOCATION REQUEST message, to co-ordinate both Iu signalling connections.
- The target RNC shall generate and send RELOCATION REQUEST ACKNOWLEDGE message only after all expected RELOCATION REQUEST messages are received and analysed.
- If the target RNC decides to send the *Target RNC to Source RNC Transparent Container* IE via the two CN domains, the target RNC shall ensure that the same *Target RNC to Source RNC Transparent Container* IE is included in RELOCATION REQUEST ACKNOWLEDGE messages transmitted via the two CN domains and related to the same relocation of SRNS.

CR-Form-v7

CHANGE REQUEST

25.413 CR 507 # rev **1** # Current version: **3.10.0**

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:	# Correction to RANAP cause value range		
Source:	# RAN WG3		
Work item code:	# TEI	Date:	# 20/08/2002
Category:	# F	Release:	# R99
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6)

Reason for change:	# According to LS from CN4 (R3-021995) TS29.060 uses RANAP cause value coded as an octet, so with the range 0..255, whereas TS25.413 uses cause value as an integer 1...256. The use of value 256, which is already a "non-standard cause" in RANAP would cause interoperability problem.
Summary of change:	# In order to avoid backwards compatibility problems, it is just proposed to forbid cause value 256 without changing ASN-1. This cause value is not used today. <u>Impact Analysis:</u> Impact assessment towards the previous version of the specification (same release): This CR has isolated impact with the previous version of the specification because this CR corrects the cause value range for which the specification is not compatible with 29.060. This CR has no impact on a functional point of view. This CR has no impact under ASN.1 point of view. The impact can be considered isolated because the change only affects RANAP.
Consequences if not approved:	# If this CR is not approved, the use of value 256 by RANAP will cause interoperability problems in the CN.

Clauses affected:	# 9.2.1.4				
Other specs	#				
	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;"></td> </tr> </table> Other core specifications # CR508 25.413 v4.5.0 CR509 25.413 v5.1.0 CR326r1 29.060 v3.13.0 CR327r1 29.060 v4.4.0 CR328r1 29.060 v5.2.0	Y	N	X	
Y	N				
X					
affected:	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">X</td> <td style="width: 20px; text-align: center;">X</td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;">X</td> </tr> </table> Test specifications O&M Specifications	X	X		X
X	X				
	X				

Other comments: ☹

[Redacted area]

9.2.1.4 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the RANAP protocol.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause >Radio Network Layer Cause			INTEGER (RAB pre-empted(1), Trelocoverall Expiry(2), Trelocprep Expiry(3), Treloccomplete Expiry(4), Tqueing Expiry(5), Relocation Triggered(6), Unable to Establish During Relocation(8), Unknown Target RNC(9), Relocation Cancelled(10), Successful Relocation(11), Requested Ciphering and/or Integrity Protection Algorithms not Supported(12), Conflict with already existing Integrity protection and/or Ciphering information (13), Failure in the Radio Interface Procedure(14), Release due to UTRAN Generated Reason(15), User Inactivity(16), Time Critical Relocation(17), Requested Traffic Class not Available(18), Invalid RAB Parameters Value(19), Requested	Value range is 1 – 64.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			Maximum Bit Rate not Available(20), Requested Maximum Bit Rate for DL not Available(33), Requested Maximum Bit Rate for UL not Available(34), Requested Guaranteed Bit Rate not Available(21), Requested Guaranteed Bit Rate for DL not Available(35), Requested Guaranteed Bit Rate for UL not Available(36), Requested Transfer Delay not Achievable(22), Invalid RAB Parameters Combination(23), Condition Violation for SDU Parameters(24), Condition Violation for Traffic Handling Priority(25), Condition Violation for Guaranteed Bit Rate(26), User Plane Versions not Supported(27), Iu UP Failure(28), TRELOCalloc Expiry (7), Relocation Failure in Target CN/RNC or Target System (29), Invalid RAB ID(30),	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause			No remaining RAB(31), Interaction with other procedure(32), Repeated Integrity Checking Failure(37), Requested Request Type not supported(38), Request superseded(39), Release due to UE generated signalling connection release(40), Resource Optimisation Relocation(41), Requested Information Not Available(42), Relocation desirable for radio reasons (43), Relocation not supported in Target RNC or Target system(44), Directed Retry (45), Radio Connection With UE Lost(46) ...)	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
>Transport Layer Cause			INTEGER (Signalling Transport Resource Failure(65), lu Transport Connection Failed to Establish(66), ...)	Value range is 65 – 80.
>NAS Cause			INTEGER (User Restriction Start Indication(81), User Restriction End Indication(82), Normal Release(83), ...)	Value range is 81 – 96.
>Protocol Cause			INTEGER (Transfer Syntax Error(97), Semantic Error (98), Message not compatible with receiver state (99), Abstract Syntax Error (Reject) (100), Abstract Syntax Error (Ignore and Notify) (101), Abstract Syntax Error (Falsely Constructed Message) (102), ...)	Value range is 97 – 112.
>Miscellaneous Cause			INTEGER (O&M Intervention(113), No Resource Available(114), Unspecified Failure(115), Network Optimisation(116), ...)	Value range is 113 – 128.
>Non-standard Cause			INTEGER	Value range is 129 – 256. Cause value 256 shall not be

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			(...)	used.

The meaning of the different cause values is described in the following table. In general, "not supported" cause values indicate that the concerning capability is missing. On the other hand, "not available" cause values indicate that the concerning capability is present, but insufficient resources were available to perform the requested action.

Radio Network Layer cause	Meaning
Conflict with already existing Integrity protection and/or Ciphering information	The action was not performed due to that the requested security mode configuration was in conflict with the already existing security mode configuration.
Condition Violation For Guaranteed Bit Rate	The action was not performed due to condition violation for guaranteed bit rate.
Condition Violation For SDU Parameters	The action was not performed due to condition violation for SDU parameters.
Condition Violation For Traffic Handling Priority	The action was not performed due to condition violation for traffic handling priority.
Directed Retry	The reason for action is Directed Retry
Failure In The Radio Interface Procedure	Radio interface procedure has failed.
Interaction With Other Procedure	Relocation was cancelled due to interaction with other procedure.
Invalid RAB ID	The action failed because the RAB ID is unknown in the RNC.
Invalid RAB Parameters Combination	The action failed due to invalid RAB parameters combination.
Invalid RAB Parameters Value	The action failed due to invalid RAB parameters value.
Iu UP Failure	The action failed due to Iu UP failure.
No remaining RAB	The reason for the action is no remaining RAB.
RAB Pre-empted	The reason for the action is that RAB is pre-empted.
Radio Connection With UE Lost	The action is requested due to losing radio connection to the UE
Release Due To UE Generated Signalling Connection Release	Release requested due to UE generated signalling connection release.
Release Due To UTRAN Generated Reason	Release is initiated due to UTRAN generated reason.
Relocation Cancelled	The reason for the action is relocation cancellation.
Relocation Desirable for Radio Reasons	The reason for requesting relocation is radio related.
Relocation Failure In Target CN/RNC Or Target System	Relocation failed due to a failure in target CN/RNC or target system.
Relocation Not Supported In Target RNC Or Target System	Relocation failed because relocation was not supported in target RNC or target system.
Relocation Triggered	The action failed due to relocation.
Repeated Integrity Checking Failure	The action is requested due to repeated failure in integrity checking.
Request Superseded	The action failed because there was a second request on the same RAB.
Requested Ciphering And/Or Integrity Protection Algorithms Not Supported	The UTRAN or the UE is unable to support the requested ciphering and/or integrity protection algorithms.
Requested Guaranteed Bit Rate For DL Not Available	The action failed because requested guaranteed bit rate for DL is not available.
Requested Guaranteed Bit Rate For UL Not Available	The action failed because requested guaranteed bit rate for UL is not available.
Requested Guaranteed Bit Rate Not Available	The action failed because requested guaranteed bit rate is not available.
Requested Information Not Available	The action failed because requested information is not available.
Requested Maximum Bit Rate For DL Not Available	The action failed because requested maximum bit rate for DL is not available.
Requested Maximum Bit Rate For UL Not Available	The action failed because requested maximum bit rate for UL is not available.
Requested Maximum Bit Rate Not Available	The action failed because requested maximum bit rate is not available.
Requested Request Type Not Supported	The RNC is not supporting the requested location request type either because it doesn't support the requested event or it doesn't support the requested report area.
Requested Traffic Class Not Available	The action failed because requested traffic class is not available.
Requested Transfer Delay Not Achievable	The action failed because requested transfer delay is not achievable.
Resource Optimisation Relocation	The reason for requesting relocation is resource optimisation.
Successful Relocation	The reason for the action is completion of successful relocation.

Time Critical Relocation	Relocation is requested for time critical reason.
T _{QUEUING} Expiry	The action failed due to expiry of the timer T _{QUEUING} .
T _{RELOCalloc} Expiry	Relocation Resource Allocation procedure failed due to expiry of the timer T _{RELOCalloc} .
T _{RELOCcomplete} Expiry	The reason for the action is expiry of timer T _{RELOCcomplete} .
T _{RELOCoverall} Expiry	The reason for the action is expiry of timer T _{RELOCoverall} .
T _{RELOCprep} Expiry	Relocation Preparation procedure is cancelled when timer T _{RELOCprep} expires.
Unable To Establish During Relocation	RAB failed to establish during relocation because it cannot be supported in the target RNC.
Unknown Target RNC	Relocation rejected because the target RNC is not known to the CN.
User Inactivity	The action is requested due to user inactivity.
User Plane Versions Not Supported	The action failed because requested user plane versions were not supported.

Transport Layer cause	Meaning
Iu Transport Connection Failed to Establish	The action failed because the Iu Transport Network Layer connection could not be established.
Signalling Transport Resource Failure	Signalling transport resources have failed (<i>e.g. processor reset</i>).

NAS cause	Meaning
Normal Release	The release is normal.
User Restriction Start Indication	A location report is generated due to entering a classified area set by O&M.
User Restriction End Indication	A location report is generated due to leaving a classified area set by O&M.

Protocol cause	Meaning
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerning criticality indicated "reject".
Abstract Syntax Error (Ignore And Notify)	The received message included an abstract syntax error and the concerning criticality indicated "ignore and notify".
Abstract Syntax Error (Falsely Constructed Message)	The received message contained IEs or IE groups in wrong order or with too many occurrences.
Message Not Compatible With Receiver State	The received message was not compatible with the receiver state.
Semantic Error	The received message included a semantic error.
Transfer Syntax Error	The received message included a transfer syntax error.

Miscellaneous cause	Meaning
Network Optimisation	The action is performed for network optimisation.
No Resource Available	No requested resource is available.
O&M Intervention	The action is due to O&M intervention.
Unspecified Failure	Sent when none of the specified cause values applies.

9.3.4 Information Element Definitions

```
-- *****
--
-- Information Element Definitions
--
-- *****

RANAP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=
BEGIN
```

*** unaffected ASN.1 definitions ***

```
-- C
```

```
Cause ::= CHOICE {
  radioNetwork          CauseRadioNetwork,
  transmissionNetwork  CauseTransmissionNetwork,
  nAS                   CauseNAS,
  protocol              CauseProtocol,
  misc                  CauseMisc,
  non-Standard         CauseNon-Standard,
  ...
}

CauseMisc ::= INTEGER {
  om-intervention (113),
  no-resource-available (114),
  unspecified-failure (115),
  network-optimisation (116)
} (113..128)

CauseNAS ::= INTEGER {
  user-restriction-start-indication (81),
  user-restriction-end-indication (82),
  normal-release (83)
} (81..96)

CauseProtocol ::= INTEGER {
  transfer-syntax-error (97),
  semantic-error (98),
  message-not-compatible-with-receiver-state (99),
  abstract-syntax-error-reject (100),
  abstract-syntax-error-ignore-and-notify (101),
  abstract-syntax-error-falsely-constructed-message (102)
} (97..112)

CauseRadioNetwork ::= INTEGER {
  rab-pre-empted (1),
  trelocoverall-expiry (2),
  trelocprep-expiry (3),
  treloccomplete-expiry (4),
  tqueing-expiry (5),
  relocation-triggered (6),
  trellocalloc-expiry(7),
  unable-to-establish-during-relocation (8),
  unknown-target-rnc (9),
  relocation-cancelled (10),
  successful-relocation (11),
  requested-ciphering-and-or-integrity-protection-algorithms-not-supported (12),
  conflict-with-already-existing-integrity-protection-and-or-ciphering-information (13),
  failure-in-the-radio-interface-procedure (14),
  release-due-to-utran-generated-reason (15),
  user-inactivity (16),
  time-critical-relocation (17),
  requested-traffic-class-not-available (18),
  invalid-rab-parameters-value (19),
  requested-maximum-bit-rate-not-available (20),
  requested-guaranteed-bit-rate-not-available (21),
  requested-transfer-delay-not-achievable (22),
  invalid-rab-parameters-combination (23),
  condition-violation-for-sdu-parameters (24),
  condition-violation-for-traffic-handling-priority (25),
  condition-violation-for-guaranteed-bit-rate (26),
  user-plane-versions-not-supported (27),
  iu-up-failure (28),
  relocation-failure-in-target-CN-RNC-or-target-system(29),
  invalid-RAB-ID (30),
  no-remaining-rab (31),
  interaction-with-other-procedure (32),
  requested-maximum-bit-rate-for-dl-not-available (33),
  requested-maximum-bit-rate-for-ul-not-available (34),
  requested-guaranteed-bit-rate-for-dl-not-available (35),
  requested-guaranteed-bit-rate-for-ul-not-available (36),
  repeated-integrity-checking-failure (37),
  requested-request-type-not-supported (38),
  request-superseded (39),

```

```
release-due-to-UE-generated-signalling-connection-release (40),
resource-optimisation-relocation (41),
requested-information-not-available (42),
relocation-desirable-for-radio-reasons (43),
relocation-not-supported-in-target-RNC-or-target-system (44),
directed-retry (45),
radio-connection-with-UE-Lost (46)
} (1..64)
```

```
CauseNon-Standard ::= INTEGER (129..256)
```

```
-- Cause value 256 shall not be used --
```

```
CauseTransmissionNetwork ::= INTEGER {
    signalling-transport-resource-failure (65),
    iu-transport-connection-failed-to-establish (66)
} (65..80)
```

*** unaffected ASN.1 definitions ***

CR-Form-v7

CHANGE REQUEST

25.413 CR 508 # rev **1** # Current version: **4.5.0**

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:	# Correction to RANAP cause value range		
Source:	# RAN WG3		
Work item code:	# TEI	Date:	# 20/08/2002
Category:	# A	Release:	# Rel-4
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)		2 (GSM Phase 2)
	A (corresponds to a correction in an earlier release)	R96	(Release 1996)
	B (addition of feature),	R97	(Release 1997)
	C (functional modification of feature)	R98	(Release 1998)
	D (editorial modification)	R99	(Release 1999)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900.	Rel-4	(Release 4)
		Rel-5	(Release 5)
		Rel-6	(Release 6)

Reason for change:	# According to LS from CN4 (R3-021995) TS29.060 uses RANAP cause value coded as an octet, so with the range 0..255, whereas TS25.413 uses cause value as an integer 1...256. The use of value 256, which is already a "non-standard cause" in RANAP would cause interoperability problem.
Summary of change:	# In order to avoid backwards compatibility problems, it is just proposed to forbid cause value 256 without changing ASN-1. This cause value is not used today. <u>Impact Analysis:</u> Impact assessment towards the previous version of the specification (same release): This CR has isolated impact with the previous version of the specification because this CR corrects the cause value range for which the specification is not compatible with 29.060. This CR has no impact on a functional point of view. This CR has no impact under ASN.1 point of view. The impact can be considered isolated because the change only affects RANAP.
Consequences if not approved:	# If this CR is not approved, the use of value 256 by RANAP will cause interoperability problems in the CN.

Clauses affected:	# 9.2.1.4				
Other specs	#				
	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> </tr> </table>	Y	N	X	
Y	N				
X					
	Other core specifications # CR507 25.413 v3.10.0 CR509 25.413 v5.1.0 CR326r1 29.060 v3.13.0 CR327r1 29.060 v4.4.0 CR328r1 29.060 v5.2.0				
affected:	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">X</td> <td>Test specifications</td> </tr> <tr> <td style="width: 20px; text-align: center;">X</td> <td>O&M Specifications</td> </tr> </table>	X	Test specifications	X	O&M Specifications
X	Test specifications				
X	O&M Specifications				

Other comments: ☹

[Redacted area]

9.2.1.4 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the RANAP protocol.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause >Radio Network Layer Cause			INTEGER (RAB pre-empted(1), Trelocoverall Expiry(2), Trelocprep Expiry(3), Treloccomplete Expiry(4), Tqueing Expiry(5), Relocation Triggered(6), Unable to Establish During Relocation(8), Unknown Target RNC(9), Relocation Cancelled(10), Successful Relocation(11), Requested Ciphering and/or Integrity Protection Algorithms not Supported(12), Conflict with already existing Integrity protection and/or Ciphering information (13), Failure in the Radio Interface Procedure(14), Release due to UTRAN Generated Reason(15), User Inactivity(16), Time Critical Relocation(17), Requested Traffic Class not Available(18), Invalid RAB Parameters Value(19), Requested	Value range is 1 – 64.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			Maximum Bit Rate not Available(20), Requested Maximum Bit Rate for DL not Available(33), Requested Maximum Bit Rate for UL not Available(34), Requested Guaranteed Bit Rate not Available(21), Requested Guaranteed Bit Rate for DL not Available(35), Requested Guaranteed Bit Rate for UL not Available(36), Requested Transfer Delay not Achievable(22), Invalid RAB Parameters Combination(23), Condition Violation for SDU Parameters(24), Condition Violation for Traffic Handling Priority(25), Condition Violation for Guaranteed Bit Rate(26), User Plane Versions not Supported(27), Iu UP Failure(28), TRELOCalloc Expiry (7), Relocation Failure in Target CN/RNC or Target System (29), Invalid RAB ID(30),	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			No remaining RAB(31), Interaction with other procedure(32), Repeated Integrity Checking Failure(37), Requested Request Type not supported(38), Request superseded(39), Release due to UE generated signalling connection release(40), Resource Optimisation Relocation(41), Requested Information Not Available(42), Relocation desirable for radio reasons (43), Relocation not supported in Target RNC or Target system(44), Directed Retry (45), Radio Connection With UE Lost(46) RNC unable to establish all RFCs (47) , Deciphering Keys Not Available(48), Dedicated Assistance data Not Available(49), Relocation Target not allowed(50)	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
>Transport Layer Cause			INTEGER (Signalling Transport Resource Failure(65), lu Transport Connection Failed to Establish(66), ...)	Value range is 65 – 80.
>NAS Cause			INTEGER (User Restriction Start Indication(81), User Restriction End Indication(82), Normal Release(83), ...)	Value range is 81 – 96.
>Protocol Cause			INTEGER (Transfer Syntax Error(97), Semantic Error (98), Message not compatible with receiver state (99), Abstract Syntax Error (Reject) (100), Abstract Syntax Error (Ignore and Notify) (101), Abstract Syntax Error (Falsely Constructed Message) (102), ...)	Value range is 97 – 112.
>Miscellaneous Cause			INTEGER (O&M Intervention(113), No Resource Available(114), Unspecified Failure(115), Network Optimisation(116), ...)	Value range is 113 – 128.
>Non-standard Cause			INTEGER	Value range is 129 – 256. Cause value 256 shall not be

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			(...)	used.

The meaning of the different cause values is described in the following table. In general, "not supported" cause values indicate that the concerning capability is missing. On the other hand, "not available" cause values indicate that the concerning capability is present, but insufficient resources were available to perform the requested action.

Radio Network Layer cause	Meaning
Deciphering Keys Not Available	The action failed because RNC is not able to provide requested deciphering keys.
Conflict with already existing Integrity protection and/or Ciphering information	The action was not performed due to that the requested security mode configuration was in conflict with the already existing security mode configuration.
Condition Violation For Guaranteed Bit Rate	The action was not performed due to condition violation for guaranteed bit rate.
Condition Violation For SDU Parameters	The action was not performed due to condition violation for SDU parameters.
Condition Violation For Traffic Handling Priority	The action was not performed due to condition violation for traffic handling priority.
Dedicated Assistance data Not Available	The action failed because RNC is not able to successfully deliver the requested dedicated assistance data to the UE.
Directed Retry	The reason for action is Directed Retry
Failure In The Radio Interface Procedure	Radio interface procedure has failed.
Interaction With Other Procedure	Relocation was cancelled due to interaction with other procedure.
Invalid RAB ID	The action failed because the RAB ID is unknown in the RNC.
Invalid RAB Parameters Combination	The action failed due to invalid RAB parameters combination.
Invalid RAB Parameters Value	The action failed due to invalid RAB parameters value.
Iu UP Failure	The action failed due to Iu UP failure.
No remaining RAB	The reason for the action is no remaining RAB.
RAB Pre-empted	The reason for the action is that RAB is pre-empted.
Radio Connection With UE Lost	The action is requested due to losing radio connection to the UE
Release Due To UE Generated Signalling Connection Release	Release requested due to UE generated signalling connection release.
Release Due To UTRAN Generated Reason	Release is initiated due to UTRAN generated reason.
Relocation Cancelled	The reason for the action is relocation cancellation.
Relocation Desirable for Radio Reasons	The reason for requesting relocation is radio related.
Relocation Failure In Target CN/RNC Or Target System	Relocation failed due to a failure in target CN/RNC or target system.
Relocation Not Supported In Target RNC Or Target System	Relocation failed because relocation was not supported in target RNC or target system.
Relocation Target not allowed	Relocation to the indicated target cell is not allowed for the UE in question.
Relocation Triggered	The action failed due to relocation.
Repeated Integrity Checking Failure	The action is requested due to repeated failure in integrity checking.
Request Superseded	The action failed because there was a second request on the same RAB.
Requested Ciphering And/Or Integrity Protection Algorithms Not Supported	The UTRAN or the UE is unable to support the requested ciphering and/or integrity protection algorithms.
Requested Guaranteed Bit Rate For DL Not Available	The action failed because requested guaranteed bit rate for DL is not available.
Requested Guaranteed Bit Rate For UL Not Available	The action failed because requested guaranteed bit rate for UL is not available.
Requested Guaranteed Bit Rate Not Available	The action failed because requested guaranteed bit rate is not available.
Requested Information Not Available	The action failed because requested information is not available.
Requested Maximum Bit Rate For DL Not Available	The action failed because requested maximum bit rate for DL is not available.
Requested Maximum Bit Rate For UL Not Available	The action failed because requested maximum bit rate for UL is not available.
Requested Maximum Bit Rate Not Available	The action failed because requested maximum bit rate is not available.
Requested Request Type Not Supported	The RNC is not supporting the requested location request type either because it doesn't support the requested event or it doesn't support the requested report area.
Requested Traffic Class Not	The action failed because requested traffic class is not

Available	available.
Requested Transfer Delay Not Achievable	The action failed because requested transfer delay is not achievable.
Resource Optimisation Relocation	The reason for requesting relocation is resource optimisation.
Successful Relocation	The reason for the action is completion of successful relocation.
Time Critical Relocation	Relocation is requested for time critical reason.
T _{QUEUING} Expiry	The action failed due to expiry of the timer T _{QUEUING} .
T _{RELOCalloc} Expiry	Relocation Resource Allocation procedure failed due to expiry of the timer T _{RELOCalloc} .
T _{RELOCcomplete} Expiry	The reason for the action is expiry of timer T _{RELOCcomplete} .
T _{RELOCoverall} Expiry	The reason for the action is expiry of timer T _{RELOCoverall} .
T _{RELOCprep} Expiry	Relocation Preparation procedure is cancelled when timer T _{RELOCprep} expires.
Unable To Establish During Relocation	RAB failed to establish during relocation because it cannot be supported in the target RNC.
Unknown Target RNC	Relocation rejected because the target RNC is not known to the CN.
User Inactivity	The action is requested due to user inactivity.
User Plane Versions Not Supported	The action failed because requested user plane versions were not supported.
RNC unable to establish all RFCs	RNC couldn't establish all RAB subflow combinations indicated within the <i>RAB Parameters</i> IE.

Transport Layer cause	Meaning
Iu Transport Connection Failed to Establish	The action failed because the Iu Transport Network Layer connection could not be established.
Signalling Transport Resource Failure	Signalling transport resources have failed (<i>e.g. processor reset</i>).

NAS cause	Meaning
Normal Release	The release is normal.
User Restriction Start Indication	A location report is generated due to entering a classified area set by O&M.
User Restriction End Indication	A location report is generated due to leaving a classified area set by O&M.

Protocol cause	Meaning
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerning criticality indicated "reject".
Abstract Syntax Error (Ignore And Notify)	The received message included an abstract syntax error and the concerning criticality indicated "ignore and notify".
Abstract Syntax Error (Falsely Constructed Message)	The received message contained IEs or IE groups in wrong order or with too many occurrences.
Message Not Compatible With Receiver State	The received message was not compatible with the receiver state.
Semantic Error	The received message included a semantic error.
Transfer Syntax Error	The received message included a transfer syntax error.

Miscellaneous cause	Meaning
Network Optimisation	The action is performed for network optimisation.
No Resource Available	No requested resource is available.
O&M Intervention	The action is due to O&M intervention.
Unspecified Failure	Sent when none of the specified cause values applies.

9.3.4 Information Element Definitions

```
-- *****
--
-- Information Element Definitions
--
-- *****
```

```
RANAP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-IEs (2) }
```

```
DEFINITIONS AUTOMATIC TAGS ::=
```

```
BEGIN
```

*** unaffected ASN.1 definitions ***

```
-- C
```

```
Cause ::= CHOICE {
  radioNetwork          CauseRadioNetwork,
  transmissionNetwork  CauseTransmissionNetwork,
  nAS                   CauseNAS,
  protocol              CauseProtocol,
  misc                  CauseMisc,
  non-Standard         CauseNon-Standard,
  ...
}
```

```
CauseMisc ::= INTEGER {
  om-intervention (113),
  no-resource-available (114),
  unspecified-failure (115),
  network-optimisation (116)
} (113..128)
```

```
CauseNAS ::= INTEGER {
  user-restriction-start-indication (81),
  user-restriction-end-indication (82),
  normal-release (83)
} (81..96)
```

```
CauseProtocol ::= INTEGER {
  transfer-syntax-error (97),
  semantic-error (98),
  message-not-compatible-with-receiver-state (99),
  abstract-syntax-error-reject (100),
  abstract-syntax-error-ignore-and-notify (101),
  abstract-syntax-error-falsely-constructed-message (102)
} (97..112)
```

```
CauseRadioNetwork ::= INTEGER {
  rab-pre-empted (1),
  trelocoverall-expiry (2),
  trelocprep-expiry (3),
  treloccomplete-expiry (4),
  tqueing-expiry (5),
  relocation-triggered (6),
  trrellocalloc-expiry(7),
  unable-to-establish-during-relocation (8),
  unknown-target-rnc (9),
  relocation-cancelled (10),
  successful-relocation (11),
  requested-ciphering-and-or-integrity-protection-algorithms-not-supported (12),
  conflict-with-already-existing-integrity-protection-and-or-ciphering-information (13),
  failure-in-the-radio-interface-procedure (14),
  release-due-to-utran-generated-reason (15),
  user-inactivity (16),
  time-critical-relocation (17),
  requested-traffic-class-not-available (18),
  invalid-rab-parameters-value (19),
  requested-maximum-bit-rate-not-available (20),
  requested-guaranteed-bit-rate-not-available (21),
  requested-transfer-delay-not-achievable (22),
  invalid-rab-parameters-combination (23),
  condition-violation-for-sdu-parameters (24),
  condition-violation-for-traffic-handling-priority (25),
  condition-violation-for-guaranteed-bit-rate (26),
  user-plane-versions-not-supported (27),
  iu-up-failure (28),
  relocation-failure-in-target-CN-RNC-or-target-system(29),
  invalid-RAB-ID (30),
```

```

no-remaining-rab (31),
interaction-with-other-procedure (32),
requested-maximum-bit-rate-for-dl-not-available (33),
requested-maximum-bit-rate-for-ul-not-available (34),
requested-guaranteed-bit-rate-for-dl-not-available (35),
requested-guaranteed-bit-rate-for-ul-not-available (36),
repeated-integrity-checking-failure (37),
requested-request-type-not-supported (38),
request-superseded (39),
release-due-to-UE-generated-signalling-connection-release (40),
resource-optimisation-relocation (41),
requested-information-not-available (42),
relocation-desirable-for-radio-reasons (43),
relocation-not-supported-in-target-RNC-or-target-system (44),
directed-retry (45),
radio-connection-with-UE-Lost (46),
rNC-unable-to-establish-all-RFCs (47),
deciphering-keys-not-available(48),
dedicated-assistance-data-not-available(49),
relocation-target-not-allowed (50)
} (1..64)

```

```
CauseNon-Standard ::= INTEGER (129..256)
```

```
-- Cause value 256 shall not be used --
```

```

CauseTransmissionNetwork ::= INTEGER {
    signalling-transport-resource-failure (65),
    iu-transport-connection-failed-to-establish (66)
} (65..80)

```

*** unaffected ASN.1 definitions ***

CR-Form-v7

CHANGE REQUEST

25.413 CR 509 # rev **1** # Current version: **5.1.0**

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:	# Correction to RANAP cause value range		
Source:	# RAN WG3		
Work item code:	# TEI	Date:	# 20/08/2002
Category:	# A	Release:	# Rel-5
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:
	F (correction)		2 (GSM Phase 2)
	A (corresponds to a correction in an earlier release)		R96 (Release 1996)
	B (addition of feature),		R97 (Release 1997)
	C (functional modification of feature)		R98 (Release 1998)
	D (editorial modification)		R99 (Release 1999)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Rel-4 (Release 4)
			Rel-5 (Release 5)
			Rel-6 (Release 6)

Reason for change:	# According to LS from CN4 (R3-021995) TS29.060 uses RANAP cause value coded as an octet, so with the range 0..255, whereas TS25.413 uses cause value as an integer 1...256. The use of value 256, which is already a "non-standard cause" in RANAP would cause interoperability problem.
Summary of change:	# In order to avoid backwards compatibility problems, it is just proposed to forbid cause value 256 without changing ASN-1. This cause value is not used today. <u>Impact Analysis:</u> Impact assessment towards the previous version of the specification (same release): This CR has isolated impact with the previous version of the specification because this CR corrects the cause value range for which the specification is not compatible with 29.060. This CR has no impact on a functional point of view. This CR has no impact under ASN.1 point of view. The impact can be considered isolated because the change only affects RANAP.
Consequences if not approved:	# If this CR is not approved, the use of value 256 by RANAP will cause interoperability problems in the CN.

Clauses affected:	# 9.2.1.4				
Other specs	#				
	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td></td> </tr> </table>	Y	N	X	
Y	N				
X					
	Other core specifications # CR507 25.413 v3.10.0 CR508 25.413 v4.5.0 CR326r1 29.060 v3.13.0 CR327r1 29.060 v4.4.0 CR328r1 29.060 v5.2.0				
affected:	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">X</td> <td>Test specifications</td> </tr> <tr> <td style="width: 20px; text-align: center;">X</td> <td>O&M Specifications</td> </tr> </table>	X	Test specifications	X	O&M Specifications
X	Test specifications				
X	O&M Specifications				

Other comments: ☹

[Redacted area]

9.2.1.4 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the RANAP protocol.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause >Radio Network Layer Cause			INTEGER (RAB pre-empted(1), Trelocoverall Expiry(2), Trelocprep Expiry(3), Treloccomplete Expiry(4), Tqueing Expiry(5), Relocation Triggered(6), Unable to Establish During Relocation(8), Unknown Target RNC(9), Relocation Cancelled(10), Successful Relocation(11), Requested Ciphering and/or Integrity Protection Algorithms not Supported(12), Conflict with already existing Integrity protection and/or Ciphering information (13), Failure in the Radio Interface Procedure(14), Release due to UTRAN Generated Reason(15), User Inactivity(16), Time Critical Relocation(17), Requested Traffic Class not Available(18), Invalid RAB Parameters Value(19), Requested	Value range is 1 – 64.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			Maximum Bit Rate not Available(20), Requested Maximum Bit Rate for DL not Available(33), Requested Maximum Bit Rate for UL not Available(34), Requested Guaranteed Bit Rate not Available(21), Requested Guaranteed Bit Rate for DL not Available(35), Requested Guaranteed Bit Rate for UL not Available(36), Requested Transfer Delay not Achievable(22), Invalid RAB Parameters Combination(23), Condition Violation for SDU Parameters(24), Condition Violation for Traffic Handling Priority(25), Condition Violation for Guaranteed Bit Rate(26), User Plane Versions not Supported(27), Iu UP Failure(28), TRELOCalloc Expiry (7), Relocation Failure in Target CN/RNC or Target System (29), Invalid RAB ID(30),	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			No remaining RAB(31), Interaction with other procedure(32), Repeated Integrity Checking Failure(37), Requested Request Type not supported(38), Request superseded(39), Release due to UE generated signalling connection release(40), Resource Optimisation Relocation(41), Requested Information Not Available(42), Relocation desirable for radio reasons (43), Relocation not supported in Target RNC or Target system(44), Directed Retry (45), Radio Connection With UE Lost(46) RNC unable to establish all RFCs (47) , Deciphering Keys Not Available(48), Dedicated Assistance data Not Available(49), Relocation Target not allowed(50), Reduce Load in Serving Cell (51), No Radio	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			Resources Available in Target cell (52)	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
>Transport Layer Cause			INTEGER (Signalling Transport Resource Failure(65), lu Transport Connection Failed to Establish(66), ...)	Value range is 65 – 80.
>NAS Cause			INTEGER (User Restriction Start Indication(81), User Restriction End Indication(82), Normal Release(83), ...)	Value range is 81 – 96.
>Protocol Cause			INTEGER (Transfer Syntax Error(97), Semantic Error (98), Message not compatible with receiver state (99), Abstract Syntax Error (Reject) (100), Abstract Syntax Error (Ignore and Notify) (101), Abstract Syntax Error (Falsely Constructed Message) (102), ...)	Value range is 97 – 112.
>Miscellaneous Cause			INTEGER (O&M Intervention(113), No Resource Available(114), Unspecified Failure(115), Network Optimisation(116), ...)	Value range is 113 – 128.
>Non-standard Cause			INTEGER	Value range is 129 – 256. Cause value 256 shall not be

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			(...)	used.

The meaning of the different cause values is described in the following table. In general, "not supported" cause values indicate that the concerning capability is missing. On the other hand, "not available" cause values indicate that the concerning capability is present, but insufficient resources were available to perform the requested action.

Radio Network Layer cause	Meaning
Deciphering Keys Not Available	The action failed because RNC is not able to provide requested deciphering keys.
Conflict with already existing Integrity protection and/or Ciphering information	The action was not performed due to that the requested security mode configuration was in conflict with the already existing security mode configuration.
Condition Violation For Guaranteed Bit Rate	The action was not performed due to condition violation for guaranteed bit rate.
Condition Violation For SDU Parameters	The action was not performed due to condition violation for SDU parameters.
Condition Violation For Traffic Handling Priority	The action was not performed due to condition violation for traffic handling priority.
Dedicated Assistance data Not Available	The action failed because RNC is not able to successfully deliver the requested dedicated assistance data to the UE.
Directed Retry	The reason for action is Directed Retry
Failure In The Radio Interface Procedure	Radio interface procedure has failed.
Interaction With Other Procedure	Relocation was cancelled due to interaction with other procedure.
Invalid RAB ID	The action failed because the RAB ID is unknown in the RNC.
Invalid RAB Parameters Combination	The action failed due to invalid RAB parameters combination.
Invalid RAB Parameters Value	The action failed due to invalid RAB parameters value.
Iu UP Failure	The action failed due to Iu UP failure.
No remaining RAB	The reason for the action is no remaining RAB.
RAB Pre-empted	The reason for the action is that RAB is pre-empted.
Radio Connection With UE Lost	The action is requested due to losing radio connection to the UE
Release Due To UE Generated Signalling Connection Release	Release requested due to UE generated signalling connection release.
Release Due To UTRAN Generated Reason	Release is initiated due to UTRAN generated reason.
Relocation Cancelled	The reason for the action is relocation cancellation.
Relocation Desirable for Radio Reasons	The reason for requesting relocation is radio related.
Relocation Failure In Target CN/RNC Or Target System	Relocation failed due to a failure in target CN/RNC or target system.
Relocation Not Supported In Target RNC Or Target System	Relocation failed because relocation was not supported in target RNC or target system.
Relocation Target not allowed	Relocation to the indicated target cell is not allowed for the UE in question.
Relocation Triggered	The action failed due to relocation.
Repeated Integrity Checking Failure	The action is requested due to repeated failure in integrity checking.
Request Superseded	The action failed because there was a second request on the same RAB.
Requested Ciphering And/Or Integrity Protection Algorithms Not Supported	The UTRAN or the UE is unable to support the requested ciphering and/or integrity protection algorithms.
Requested Guaranteed Bit Rate For DL Not Available	The action failed because requested guaranteed bit rate for DL is not available.
Requested Guaranteed Bit Rate For UL Not Available	The action failed because requested guaranteed bit rate for UL is not available.
Requested Guaranteed Bit Rate Not Available	The action failed because requested guaranteed bit rate is not available.
Requested Information Not Available	The action failed because requested information is not available.
Requested Maximum Bit Rate For DL Not Available	The action failed because requested maximum bit rate for DL is not available.
Requested Maximum Bit Rate For UL Not Available	The action failed because requested maximum bit rate for UL is not available.
Requested Maximum Bit Rate Not Available	The action failed because requested maximum bit rate is not available.
Requested Request Type Not Supported	The RNC is not supporting the requested location request type either because it doesn't support the requested event or it doesn't support the requested report area.
Requested Traffic Class Not	The action failed because requested traffic class is not

Available	available.
Requested Transfer Delay Not Achievable	The action failed because requested transfer delay is not achievable.
Resource Optimisation Relocation	The reason for requesting relocation is resource optimisation.
Successful Relocation	The reason for the action is completion of successful relocation.
Time Critical Relocation	Relocation is requested for time critical reason.
T _{QUEUING} Expiry	The action failed due to expiry of the timer T _{QUEUING} .
T _{RELOCalloc} Expiry	Relocation Resource Allocation procedure failed due to expiry of the timer T _{RELOCalloc} .
T _{RELOCcomplete} Expiry	The reason for the action is expiry of timer T _{RELOCcomplete} .
T _{RELOCoverall} Expiry	The reason for the action is expiry of timer T _{RELOCoverall} .
T _{RELOCprep} Expiry	Relocation Preparation procedure is cancelled when timer T _{RELOCprep} expires.
Unable To Establish During Relocation	RAB failed to establish during relocation because it cannot be supported in the target RNC.
Unknown Target RNC	Relocation rejected because the target RNC is not known to the CN.
User Inactivity	The action is requested due to user inactivity.
User Plane Versions Not Supported	The action failed because requested user plane versions were not supported.
RNC unable to establish all RFCs	RNC couldn't establish all RAB subflow combinations indicated within the <i>RAB Parameters</i> IE.
Reduce Load in Serving Cell	Load on serving cell needs to be reduced.
No Radio Resources Available in Target Cell	Load on target cell is too high.

Transport Layer cause	Meaning
Iu Transport Connection Failed to Establish	The action failed because the Iu Transport Network Layer connection could not be established.
Signalling Transport Resource Failure	Signalling transport resources have failed (<i>e.g. processor reset</i>).

NAS cause	Meaning
Normal Release	The release is normal.
User Restriction Start Indication	A location report is generated due to entering a classified area set by O&M.
User Restriction End Indication	A location report is generated due to leaving a classified area set by O&M.

Protocol cause	Meaning
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerning criticality indicated "reject".
Abstract Syntax Error (Ignore And Notify)	The received message included an abstract syntax error and the concerning criticality indicated "ignore and notify".
Abstract Syntax Error (Falsely Constructed Message)	The received message contained IEs or IE groups in wrong order or with too many occurrences.
Message Not Compatible With Receiver State	The received message was not compatible with the receiver state.
Semantic Error	The received message included a semantic error.
Transfer Syntax Error	The received message included a transfer syntax error.

Miscellaneous cause	Meaning
Network Optimisation	The action is performed for network optimisation.
No Resource Available	No requested resource is available.
O&M Intervention	The action is due to O&M intervention.
Unspecified Failure	Sent when none of the specified cause values applies.

9.3.4 Information Element Definitions

-- *****

```
--
-- Information Element Definitions
--
-- *****
```

```
RANAP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-IEs (2) }
```

```
DEFINITIONS AUTOMATIC TAGS ::=
```

```
BEGIN
```

*** unaffected ASN.1 definitions ***

```
-- C
```

```
Cause ::= CHOICE {
    radioNetwork          CauseRadioNetwork,
    transmissionNetwork  CauseTransmissionNetwork,
    nAS                   CauseNAS,
    protocol              CauseProtocol,
    misc                  CauseMisc,
    non-Standard          CauseNon-Standard,
    ...
}

CauseMisc ::= INTEGER {
    om-intervention (113),
    no-resource-available (114),
    unspecified-failure (115),
    network-optimisation (116)
} (113..128)

CauseNAS ::= INTEGER {
    user-restriction-start-indication (81),
    user-restriction-end-indication (82),
    normal-release (83)
} (81..96)

CauseProtocol ::= INTEGER {
    transfer-syntax-error (97),
    semantic-error (98),
    message-not-compatible-with-receiver-state (99),
    abstract-syntax-error-reject (100),
    abstract-syntax-error-ignore-and-notify (101),
    abstract-syntax-error-falsely-constructed-message (102)
} (97..112)
```

```
CauseRadioNetwork ::= INTEGER {
    rab-pre-empted (1),
    trelocoverall-expiry (2),
    trelocprep-expiry (3),
    treloccomplete-expiry (4),
    tqueing-expiry (5),
    relocation-triggered (6),
    trellocalloc-expiry(7),
    unable-to-establish-during-relocation (8),
    unknown-target-rnc (9),
    relocation-cancelled (10),
    successful-relocation (11),
    requested-ciphering-and-or-integrity-protection-algorithms-not-supported (12),
    conflict-with-already-existing-integrity-protection-and-or-ciphering-information (13),
    failure-in-the-radio-interface-procedure (14),
    release-due-to-utran-generated-reason (15),
    user-inactivity (16),
    time-critical-relocation (17),
    requested-traffic-class-not-available (18),
    invalid-rab-parameters-value (19),
    requested-maximum-bit-rate-not-available (20),
    requested-guaranteed-bit-rate-not-available (21),
    requested-transfer-delay-not-achievable (22),
    invalid-rab-parameters-combination (23),
    condition-violation-for-sdu-parameters (24),
    condition-violation-for-traffic-handling-priority (25),
    condition-violation-for-guaranteed-bit-rate (26),
```

```
user-plane-versions-not-supported (27),
iu-up-failure (28),
relocation-failure-in-target-CN-RNC-or-target-system(29),
invalid-RAB-ID (30),
no-remaining-rab (31),
interaction-with-other-procedure (32),
requested-maximum-bit-rate-for-dl-not-available (33),
requested-maximum-bit-rate-for-ul-not-available (34),
requested-guaranteed-bit-rate-for-dl-not-available (35),
requested-guaranteed-bit-rate-for-ul-not-available (36),
repeated-integrity-checking-failure (37),
requested-request-type-not-supported (38),
request-superseded (39),
release-due-to-UE-generated-signalling-connection-release (40),
resource-optimisation-relocation (41),
requested-information-not-available (42),
relocation-desirable-for-radio-reasons (43),
relocation-not-supported-in-target-RNC-or-target-system (44),
directed-retry (45),
radio-connection-with-UE-Lost (46),
rNC-unable-to-establish-all-RFCs (47),
deciphering-keys-not-available(48),
dedicated-assistance-data-not-available(49),
relocation-target-not-allowed (50),
reduce-load-in-serving-cell (51),
no-radio-resources-available-in-target-cell (52)
} (1..64)

CauseNon-Standard ::= INTEGER (129..256)
-- Cause value 256 shall not be used --

CauseTransmissionNetwork ::= INTEGER {
    signalling-transport-resource-failure (65),
    iu-transport-connection-failed-to-establish (66)
} (65..80)
```

*** unaffected ASN.1 definitions ***
