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Technical Specification

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UTRAN Iu Interface RANAP Signalling

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Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project, Technical Specification Group <TSG name>.

The contents of this TS may be subject to continuing work within the 3GPP and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released with an identifying change of release date and an increase in version number as follows:

Version m.t.e

where:

m indicates [major version number]

x the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

y the third digit is incremented when editorial only changes have been incorporated into the specification.

1Scope

This document specifies the radio network layer signalling protocol called Radio Access Network Application Part (RANAP) for the Iu interface. RANAP supports the functions of Iu interface by signalling procedures defined in this document. RANAP is developed in accordance to the general principles stated in [1], [2] and [3].

2References

[Editor's note: To be updated.]

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] UMTS 235.930, Iu Principles

[2] UMTS 25.410, UTRAN Iu Interface; General Aspects and Principles

[3] UMTS 25.401, UTRAN Overall Description

[4] UMTS 25.931, UTRAN Functions, Examples on Signalling Procedures

[5] UMTS 25.412, UTRAN Iu Interface Signalling Transport

[6] UMTS 25.415, Iu Interface CN-UTRAN User Plane Protocols

3Definitions and abbreviations

3.1Definitions

For the purposes of the present document, the [following] terms and definitions [given in … and the following] apply.

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 to another relocation target external to UMTS or functionality equivalent to the serving RNS role from another relocation source external to UMTS to another RNS.

Serving RNS (SRNS): A 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.

Source RNS: A role, with respect to a specific connection between an UE and 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: A role an RNS gets with respect to a specific connection between UE and 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.

Elementary Procedure: The RANAP protocol consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between the RNS and the CN. 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 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.

An EP is performed as a response to the first EP.

Unsuccessful

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

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 initiates and terminates through response(s) or EP timer expiry.

The following applies concerning interaction between Elementary Procedures:

- The *Reset* procedure can interact with all EPs.
- The *Iu Release* procedure can interact with all EPs except the *Reset* procedure.

3.2Abbreviations

AAL2	ATM Adaptation Layer type 2
AS	Access Stratum
ASN.1	Abstract Syntax Notation One
ATM	Asynchronous Transfer Mode
CN	Core Network
CRNC	Controlling RNC
CS	Circuit Switched
DRNC	Drift RNC
DRNS	Drift RNS
EP	Elementary Procedure
MSC	Mobile services Switching Center
NAS	Non Access Stratum
PDU	Protocol Data Unit
PS	Packet Switched
QoS	Quality of Service
RAB	Radio Access Bearer
RNC	Radio Network Controller
RNS	Radio Network Subsystem
RANAP	Radio Access Network Application Part
SCCP	Signalling Connection Control Part
SGSN	Serving GPRS Support Node
SRNC	Serving RNC
SRNS	Serving RNS
UE	User Equipment
UTRAN	UMTS Terrestrial Radio Access Network

4General

[Editor's note: This chapter should describe requirements on RANAP forward/backward compatibility, error handling principles, message coding principles etc.]

5RANAP Services

[Editor's note: This chapter should describe services of RANAP protocol.]

[Editor's note: It has been agreed that the editor will provide text for this section.]

The RANAP offers the following services:

6Services expected from signalling transport

[Editor's note: This chapter should describe expected services from signalling transport.]

[Editor's note: It has been agreed that the editor will provide text for this section.]

7Functions of RANAP

Note. This section needs to be checked after the Iu functions have been specified.

RANAP protocol has the following functions:

- Relocating serving RNC. This function enables to change the serving RNC functionality as well as the related Iu resources (RAB(s) and Signalling connection) from one RNC to another.
- Overall RAB management. This function is responsible for setting up, modifying and releasing RABs.
- Queuing the setup of RAB. The purpose of this function is to allow placing some requested RABs into a queue, and indicate the peer entity about the queuing.
- Requesting RAB release. While the overall RAB management is a function of the CN, the UTRAN has the capability to request the release of RAB.
- Release of all Iu resources. This function is used to explicitly release all resources related to one UE from the corresponding Iu connection.
- Requesting the release of all Iu resources. While the Iu release is managed from the CN, the UTRAN has the capability to request the release of all Iu resources from the corresponding Iu connection.
- Controlling overload in the Iu interface. This function allows adjusting the load in the Iu interface.
- Resetting the Iu. This function is used for resetting an Iu interface.
- Sending the UE Common Id (permanent NAS UE identity) to the RNC. This function makes the RNC aware of the UE's Common Id.
- Paging the user. This function provides the CN for capability to page the UE.
- Controlling the tracing of the UE activity. This function allows setting the trace mode for a given UE.
- Transport of NAS information between UE and CN. This function has three sub-classes.
  - Transport of the initial NAS signalling message from the UE to CN. This function transfers transparently the NAS information. As a consequence also the Iu signalling connection is set up.
  - Transport of NAS signalling messages between UE and CN, This function transfers transparently the NAS signalling messages on the existing Iu signalling connection.
  - Transport of NAS information to be broadcasted to UEs. This function allows setting the NAS information to be broadcasted to the UEs from the CN.
- Controlling the security mode in the UTRAN. This function is used to send the security keys (ciphering and integrity check) to the UTRAN, and setting the operation mode for security functions.
- Controlling location reporting. This function allows the CN to set the mode in which the UTRAN reports the location of the UE
- Location reporting. This function is used for transferring the actual location information from RNC to the CN.
- Reporting general error situations. This function allows reporting of general error situations, for which function specific error messages have not been defined.

These functions are implemented by one or several RANAP elementary procedures described in the following section.

8RANAP procedures

[Editor's note: The procedure descriptions starting in section 8.2 have been rearranged. This order is editor's proposal.]

8.1Elementary Procedures

In the following tables, all EPs are divided into Class 1, Class 2 and Class 3 EPs:

Class 1

Elementary Procedure	Message	Successful Outcome		Unsuccessful Outcome	
		Response message	EP	Response message	Timer
Iu Release	IU RELEASE COMMAND	IU RELEASE COMPLETE			
Relocation Preparation	RELOCATION REQUIRED	RELOCATION COMMAND		RELOCATION PREPARATION FAILURE	
Relocation Resource Allocation	RELOCATION REQUEST	RELOCATION REQUEST ACKNOWLEDGE		RELOCATION FAILURE	
Relocation Cancel	RELOCATION CANCEL	RELOCATION CANCEL ACKNOWLEDGE			
SRNS Context Transfer	SRNS CONTEXT REQUEST	SRNS CONTEXT RESPONSE			
Rab release request	RAB RELEASE REQUEST		RAB ASSIGNMENT		
Iu release request	IU RELEASE REQUEST		IU RELEASE		
CipherSecurity Mode Control	CIPHERSECURITY MODE COMMAND	CIPHERSECURITY MODE COMPLETE		CIPHERSECURITY MODE REJECT	
Data Volume Report	DATA VOLUME REPORT REQUEST	DATA VOLUME REPORT			
Cn Information Broadcast	CN INFORMATION BROADCAST REQUEST	CN INFORMATION BROADCAST CONFIRM		CN INFORMATION BROADCAST REJECT	
Reset	RESET	RESET ACKNOW-LEDGE			

Class 2

Elementary Procedure	Message
RAB Release Request	RAB RELEASE REQUEST
Iu Release Request	IU RELEASE REQUEST
Relocation Detect	RELOCATION DETECT
Relocation Complete	RELOCATION COMPLETE
Paging	PAGING
Common ID	COMMON ID
CN Invoke Trace	CN INVOKE TRACE
Location Reporting Control	LOCATION REPORTING CONTROL
Location Report	LOCATION REPORT
Initial UE Message	INITIAL UE MESSAGE
Direct Transfer	DIRECT TRANSFER
Overload Control	OVERLOAD
Error Indication	ERROR INDICATION

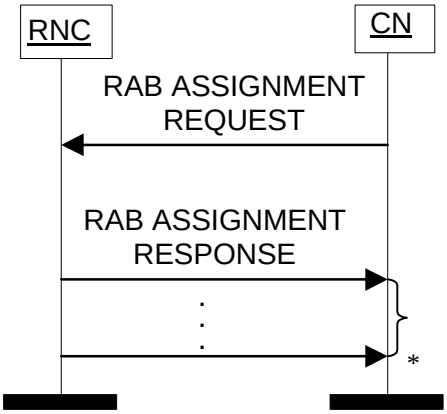
Class 3

Elementary Procedure	Message	Outcome
RAB Assignment	RAB ASSIGNMENT REQUEST	RAB ASSIGNMENT RESPONSE x N (N>=1)

8.2Radio Access Bearer Assignment

8.2.1 Normal operation

This procedure is used to modify or release an already established RAB or to establish a new RAB for a given UE. The procedure is connection oriented. The signalling flow for the *RAB Assignment* procedure is shown in Figure 1Figure 1Figure 1.



* it can be several responses

Figure 1. *RAB Assignment* procedure.

The CN initiates the procedure by sending a RAB ASSIGNMENT REQUEST message. When sending the RAB ASSIGNMENT REQUEST, the CN starts the $T_{RABAssgt}$ timer .

The message contains the information required by the UTRAN to build the new RAB configuration. CN can request UTRAN to:

- establish
- modify
- release

one or several RABs with one RAB ASSIGNMENT REQUEST message.

The RAB ASSIGNMENT REQUEST message contains the following information:

- list of RABs to establish with their bearer characteristics
- list of RABs to modify with their bearer characteristics
- list of RABs to release

Upon reception of the RAB ASSIGNMENT REQUEST message UTRAN shall execute the requested RAB configuration. UTRAN shall report to CN the outcome of the request by sending RAB ASSIGNMENT RESPONSE message(s).

UTRAN can report to CN for one or several RABs, which are:

- successfully established with their respective bearer characteristics (note FFS)
- successfully modified RABs with their respective bearer characteristics (note FFS)
- released
- failed to establish or modify or release
- queued

in one RAB ASSIGNMENT RESPONSE message.

If none of the RABs have been queued, the CN shall stop timer $T_{RABAssgt.}$ and the *RAB Assignment* procedure terminates. In that case, the procedure is also terminated in UTRAN.

Note FFS: The RAB parameters in the bearer characteristics are included in the RAB ASSIGNMENT RESPONSE message only if they are different than requested in the RAB ASSIGNMENT REQUEST message.

UTRAN shall report the outcome of a specific RAB configuration change only after the transport network control plane signalling, which is needed for this configuration establishment or modification, has been executed.

When the request to establish or modify one or several RABs is queued, UTRAN shall start the timer $T_{QUEUING}$. This timer specifies the maximum time for queuing of the request of establishment or modification. The same timer $T_{QUEUING}$ is supervising all RABs being queued.

For each RABs that are queued the following outcomes are possible:

- successfully established or modified
- failed to establish or modify
- failed due to expiry of the timer $T_{QUEUING}$

In the first RAB ASSIGNMENT RESPONSE message the RNC shall report about all RABs referenced in the RAB ASSIGNMENT REQUEST. Except in the case of $T_{QUEUING}$ expiry, UTRAN shall report the outcome of the queuing for every RAB individually or for several RABs in the RAB ASSIGNMENT RESPONSE message(s). This is left to implementation. UTRAN shall stop $T_{QUEUING}$ when all RABs have been either succesfully established or modified or failed to establish or modify. The *RAB Assignment* procedure is then terminated both in CN and UTRAN.

~~*[Contributor's Note: Following two bullet points can be removed and the information can be moved to message contents chapter as proper parameters.]*~~

~~*To ensure the necessary load sharing on the Iu-PS interface,*~~

- ~~*When the CN sends RAB ASSIGNMENT REQUEST for all Radio Access Bearers (associated with PDP contexts) of an UE, the CN specifies the IP address of the packet processing function allocated to this / each of these PDP context(s) in the CN.*~~
- ~~*In the response to the CN request, i.e. in RAB ASSIGNMENT RESPONSE, the RNC specifies the IP address of the packet processing function allocated to this / each of these Radio Access Bearer(s) in the RNC.*~~

When CN receives the response that one or several RABs are queued, CN expects UTRAN to provide the outcome of the queuing function for each RAB before expiry of the $T_{RABAssgt}$ timer. Otherwise, CN considers the *RAB Assignment* procedure terminated.

In the case the timer $T_{QUEUING}$ expires, the *RAB Assignment* procedure terminates in UTRAN for all queued RABs, and UTRAN shall respond for all of them in one RAB ASSIGNMENT RESPONSE message. The *RAB Assignment* procedure is also terminated in CN.

Abnormal conditions

If the relocation becomes absolutely necessary during the *RAB Assignment* in order to keep the communication with the UE, the RNC may initiate the Relocation procedure while the *RAB Assignment* is in progress as follows:

1. The RNC shall terminate the *RAB Assignment* procedure:
   - for all queued RABs,
   - for RABs not already established or modified and
   - for RABs not already released

   with the cause ‘Relocation triggered’.
2. The RNC shall terminate the *RAB Assignment* procedure

- for RABs already established or modified but not yet reported to the CN and
- for RABs already released but not yet reported to the CN.

3. The RNC shall report this outcome of the procedure in one RAB ASSIGNMENT RESPONSE message.
4. The RNC shall invoke relocation by sending the RELOCATION REQUIRED to the active CN node(s).
5. The CN shall terminate the *RAB Assignment* procedure at reception of the RAB ASSIGNMENT RESPONSE message.

8.3RAB Release Request

This procedure is used to request a release of one or several radio access bearers from UTRAN side. Procedure is initiated by RNC generating a RAB RELEASE REQUEST message towards the CN. The procedure is connection oriented.

This message indicates the list of RABs requested to be released and cause value for each release request. On receipt of a RAB RELEASE REQUEST the CN shall initiate *RAB Assignment* procedure requesting indicated RABs to be released.

Figure 22. RAB Release Request procedure.

8.4Iu Release Request

If the release of the radio bearers assigned to a particular UE is required because of a UTRAN generated reason (e.g. "O and M intervention", "equipment failure", "RAB pre-empted") then, the RNS controlling the Iu connection(s) of that particular UE shall generate an IU RELEASE REQUEST message towards the CN. If it exists two Iu connections for that particular UE, then an IU RELEASE REQUEST message shall be sent to CN domain. *Iu Release Request* is a connection oriented procedure.

If the contact with the UE is lost then an IU RELEASE REQUEST message shall be sent to the CN node(s) having an Iu connection with the RNS for that particular UE.

The IU RELEASE REQUEST message shall include a Cause Information Element, indicating the reason for the release.The signalling flow for *Iu Release Request* procedure due to UTRAN generated reasons is shown in Figure 3Figure 3Figure 3:

Figure 33. *Iu Release Request* procedure.

8.5Iu Release

Normal operation

Iu Release procedure is used by CN to release the Iu connection and all UTRAN resources related onlyt to the Iu connection to be released. Messages belonging to this procedure are transmitted utilising the connection oriented mode of the signalling bearer.

The *Iu Release* procedure can be initiated for the following reasons:

- Completion of transaction between UE and CN.
- UTRAN generated reasons, i.e. reception of IU RELEASE REQUEST.
- Completion of successful relocation of SRNS.

Procedure is initiated by the CN by sending message IU RELEASE COMMAND to UTRAN.

After the IU RELEASE COMMAND has been sent, the CN shall not send further RANAP connection oriented messages on this particular connection, except IU RELEASE COMMAND.

The IU RELEASE COMMAND message shall include a Cause Information Element, indicating the reason for the release.

When the RNS receives the IU RELEASE COMMAND:

1) The clearing of the UTRAN resources is initiated. However, the UTRAN shall not clear resources related to other Iu signalling connections the UE might have.

2) The RNC returns an IU RELEASE COMPLETE message to the CN and takes action to return any assigned user plane resources to idle. (The RNC does not need to wait for the release of UTRAN resources to be completed before returning the IU RELEASE COMPLETE message.)

The signalling flow for *Iu Release* procedure is shown in Figure 4Figure 4Figure 4:

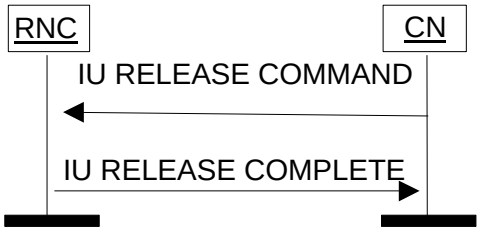


Figure 44. *Iu Release* procedure.

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

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

Abnormal conditions

If the *Iu Release* procedure is not initiated towards the source RNC from CN before the expiry of timer $T_{RELOCoverall}$, the source RNC should initiate the *Iu Release Request* procedure towards the CN with a cause value "$T_{relocoverall}$ expiry".

8.6Relocation

8.6.1General

Note 1: The impact of handover from GPRS to UMTS on Relocation procedure shall be studied.

Note 2: The reason for initiating the procedure has to be included (an air interface handover or SRNS relocation).

Relocation is used to relocate the serving RNS functionality from one RNS to an other. Procedure may or must not involve change of the radio resources assigned for the corresponding UE. This procedure can be used within one UTRAN if the Iur interface can not (or is not desired to) be used for active set management, between two UTRANs or at UTRAN side in handovers between two Radio Access systems (e.g. UMTS to GSM).

Relocation is carried over Iu interface, by the RANAP protocol.

All RANAP messages concerned with relocation are sent using the connection oriented mode of the signalling bearer.

8.6.2Relocation Preparation

8.6.2.1Successful operation

Procedure is initiated by the Serving RNC by sending a RELOCATION REQUIRED message to active CN nodesdomains. Timer T(RELOCATION COMMAND) is started, upon transmitting the message. RELOCATION REQUIRED message allows a RNC to request that a relocation is to be carried out for a particular UE, having signalling connection via the serving RNC.

The cause of the *Relocation Preparation* initiation is indicated to the CN. It is used by the CN to proceed the *Relocation Preparation* execution appropriately e.g. considering switching execution timing.

As a response to the RELOCATION REQUIRED message the CN sends RELOCATION COMMAND to the source RNC.

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

Upon reception of RELOCATION COMMAND belonging to ongoing procedure the RNC stops the timer T(RELOCATION COMMAND). Depending on the cause of the *Relocation Preparation* initiation, hard handover or SRNS relocation, the source RNC either triggers the handover procedure in the air interface or commits the execution of the relocation in the target RNS, respectively. When the execution of relocation is committed via Iur, source RNC may stop the air interface data transmission and should start the data duplicate forwarding for the RABs for which Iu transport bearer to be used for the data forwarding is established. A copy of forwarded data may be stored within the source RNC . It is FFS, how we classify the services for which the RNC keeps the forwarded packets. When data forwarding is initialised, timer T(Data forwarding) is started.

The signalling flow between the source RNC and the CN is shown in Figure 5Figure 5Figure 1.

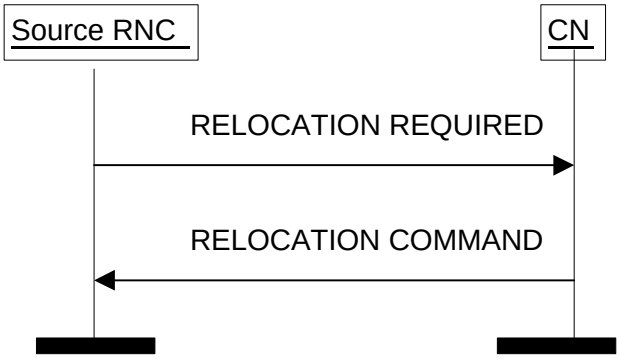


Figure 551. *Relocation Preparation* procedure between source RNC and CN.

8.6.2.2Unsuccessful operation

If a failure occurs during the *Relocation Preparation* procedure in the CN, the CN sends RELOCATION PREPARATION FAILURE message to the source RNC.

The signalling flow for this case is shown in Figure 6Figure 6Figure 2.

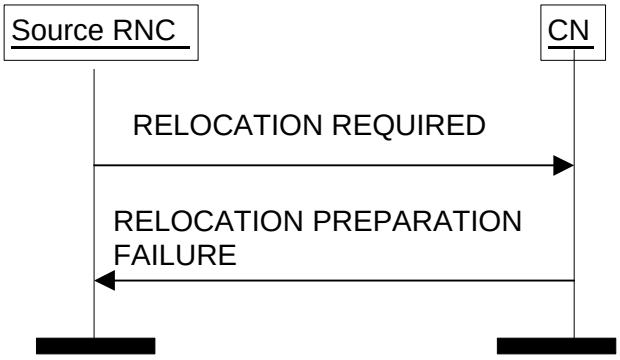


Figure 662. *Relocation Preparation* failure.

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 should cancel the *Relocation Preparation* procedure by initiating the *Relocation Cancel* procedure. Cause value ‘$T_{relocprep}$ expiry’ is used.

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 by sending a RELOCATION PREPARATION FAILURE with a cause ‘Unknown target RNC’ to the source RNC.

2. The CN shall continue to use the existing Iu connection towards the source RNC.

8.6.2.3Relocation co-ordination in source RNC

Relocation co-ordination shall be executed by source RNC when serving RNS relocation is to be done for an UE having multiple Iu signalling connections. If multiple Iu signalling connections are involved following co-ordination of relocation shall be ensured by source RNC.

When RNC initiates relocation of serving RNC functionality for an UE, source RNC shall initiate *Relocation Preparation* procedure on all Iu signalling connections existing for the UE.

Source RNC has to indicate in each RELOCATION REQUIRED message the amount of Iu signalling connections between source RNC and CN involved into the relocation of the serving RNC.

Source RNC shall proceed in execution of the relocation of SRNC only once *Relocation Preparation* procedure is successfully terminated on all Iu signalling connections existing for the UE.

If source RNC receives RELOCATION PREAPARATION FAILURE from CN, source RNC has to cancel all other pending or successfully terminated *Relocation Preparation* procedures related to the same relocation of serving RNC by initialising a *Relocation Cancel* procedure on the corresponding Iu signalling connections.

If source RNC decides to cancel *Relocation Preparation* procedure due to other reasons than reception of RELOCATION PREPARATION FAILURE, the *Relocation Cancel* procedure has to be initiated on all Iu signalling connection existing for the UE.

Interactions with other RANAP procedures

If RNC decides to initiate *Relocation Preparation* procedure after it has received a RANAP message initiating a class 1 or 3 RANAP procedure, RNC shall not process further the initiated RANAP procedure and RNC shall reject the initiated procedure by sending appropriate response message to CN.

If, after RELOCATION REQUIRED is sent, RNC receives a RANAP message initiating a RANAP class 1 or 3 procedure, RNC shall either

- cancel the relocation of SRNS (Execute *Relocation Cancel* procedure) and then continue the processing of the initiated RANAP procedure.

or

- reject the initiated RANAP procedure by sending appropriate response message to CN.

or

- execute the RANAP procedures.

If, after RELOCATION REQUIRED is sent RNC receives a RANAP message initiating a RANAP class 2 procedure (except *Direct Transfer*, which is handled normally) and the RNC does not decide to cancel the relocation, RNC shall ignore the received RANAP mesage.

When RELOCATION COMMAND is received from CN all RANAP messages (except those RANAP procedures that override other RANAP procedures) received via the same signalling bearer shall be ignored by RNC.

8.6.3Relocation resource allocation

8.6.3.1Successful operation

The CN node sends a RELOCATION REQUEST message to the target RNC (selected by the source RNC and indicated in the RELOCATION REQUIRED message). This message contains details of the resource(s) required like bearer identifier and binding ID of each bearer to be established to the new Iu interface.

On receipt of this message the target RNC shall check availability of requested resources.

If all necessary resource(s) including the User plane setup are successfully allocated the target RNC sends back to the CN a RELOCATION REQUEST ACKNOWLEDGE message. The RELOCATION REQUEST ACKNOWLEDGE message sent by the target RNC may optionally contain a transparent container, which is transferred by the CN node to the source RNC using the RANAP message RELOCATION COMMAND.

Figure 7Figure 7Figure 3 shows the signalling flow for *Relocation Resource Allocation*.

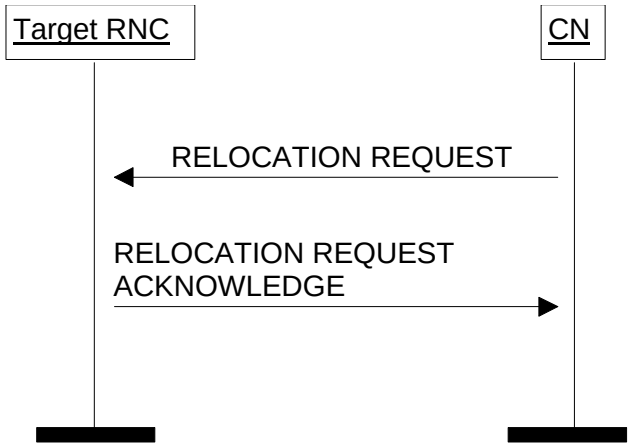


Figure 77. Resource allocation for relocation.

8.6.3.2 Unsuccessful operation

If a failure occurs during the *Relocation Resource Allocation* procedure in the target RNC, the target RNC sends RELOCATION FAILURE message to the CN.

The signalling flow for this case is shown in Figure 8Figure 8Figure 4.

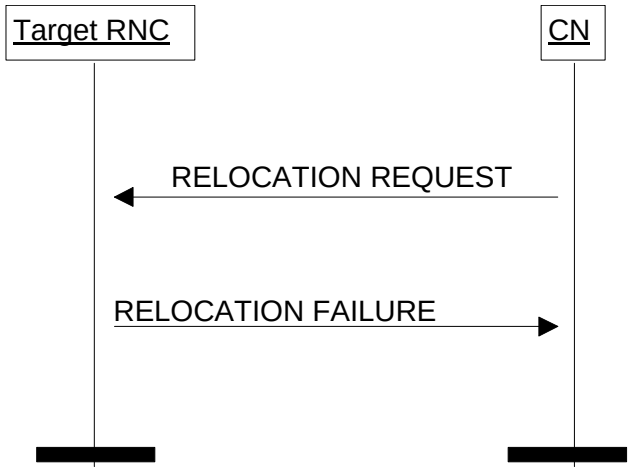


Figure 88. *Relocation Resource Allocation* failure.

If the relocation of SRNS terminates (unsuccessfully) in CN before the *Relocation Resource Allocation* is completed: The CN should stop timer $T_{RELOCalloc}$.

The CN shall release the Iu connection towards the target RNC that may already have been established and towards the source RNC by initiating the *Iu Release* procedure with a cause 'Relocation cancelled'.

If the CN receives the RELOCATION FAILURE message from the target RNC indicating that the relocation of SRNS has failed:

1. The CN should stop timer $T_{RELOCalloc}$.
2. The CN should inform the source RNC that the relocation of SRNS has been rejected by sending the RELOCATION PREPARATION FAILURE message with a cause 'Relocation failure in Target RNC'.
3. The CN should release the Iu connection towards the target RNC that may already have been established by initiating the *Iu Release* procedure with a cause 'Relocation cancelled'.

If the timer $T_{RELOCalloc}$ expires in the CN:

1. The CN should inform the source RNC that the *Relocation Preparation* procedure has failed by sending the RELOCATION PREPARATION FAILURE message with a cause ' $T_{RELOCalloc}$ expiry'.

2. CN should release the Iu connection towards the target RNC by initiating the *Iu Release* procedure with a cause 'Relocation cancelled'.

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 later message will be discarded and the *Relocation Resource Allocation* continues normally.

If the RELOCATION REQUEST ACKNOWLEDGE message contains information which conflicts with the information in the request e.g. the RAB ID list is different, the CN should reject the relocation of SRNS as follows:

1. The CN informs the source RNC that the Relocation of SRNS has been rejected by sending the RELOCATION PREPARATION FAILURE message with a cause 'Relocation rejected'.
2. The CN shall release the Iu connection towards the target RNC that may already have been established by initiating the *Iu Release* procedure with a cause 'Relocation cancelled'.
3. The CN shall continue to use the existing Iu interface towards the source RNC.
4. The CN shall stop timer $T_{RELOCalloc}$

8.6.3.3Relocation co-ordination in target RNC

Relocation co-ordination shall be executed by target RNC when a received RELOCATION REQUEST message indicates that more than one Iu signalling connection is involved.

Target RNC should handle *Relocation Resource Allocation* procedures in general independently of each other. However the information which may depend on the contents of all the expected RELOCATION REQUEST messages and which is to be sent in the transparent field to the source RNC (e.g. information of new radio resources) shall be sent only after all expected RELOCATION REQUEST messages are received and analysed.

Target RNC has to ensure that there is no conflicting information in target RNC to source RNC Transparent fields in RELOCATION REQUEST ACKNOWLEDGE messages transmitted via different Iu signalling connections and related to the same relocation.

The selection of signalling connection utilised for the different kind of transparent information in RELOCATION REQUEST ACKNOWLEDGE message is not dependent on the signalling connection via which transparent information was received in RELOCATION REQUEST message.

8.6.4Relocation Detect

Normal operation

When the relocation execution trigger is received, the target RNC shall send a RELOCATION DETECT message to the active CN nodes and start to act as an SRNC.

The signalling flow for *Relocation Detect* procedure is shown in Figure 9Figure 9.

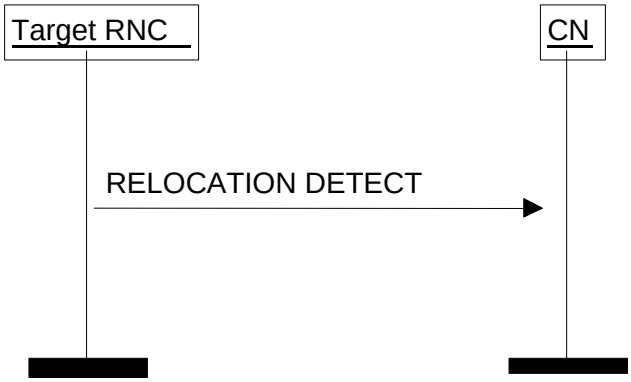


Figure 995. *Relocation Detect* procedure.

Abnormal conditions

If the RELOCATION DETECT message is not received at the CN from the target RNC before the reception of the RELOCATION COMPLETE message, the relocation of SRNS shall continue normally. Generation of an alarm in the CN is an implementation option.

8.6.5Relocation Complete

Normal operation

When the UE is successfully in communication with the target RNC, i.e. the new SRNC-ID + SRNTI are successfully exchanged with the UE, then the target RNC shall send a RELOCATION COMPLETE message to the CN and terminate the procedure.

The signalling flow for *Relocation Complete* procedure is illustrated in Figure 10Figure 10Figure 6.

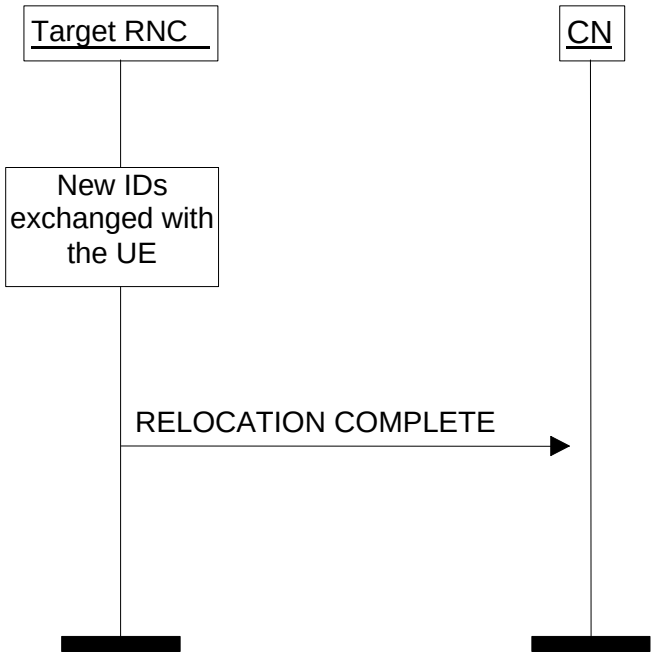


Figure 10106. *Relocation Complete* procedure.

The CN elements shall release all resources associated to the Source RNS.

Unsuccessful operation

If the CN receives the RELOCATION FAILURE message from the target RNC indicating that the relocation of SRNS has failed:

1. The CN should stop timer $T_{RELOCalloc}$.
2. The CN should inform the source RNC that the relocation of SRNS has been rejected by sending the RELOCATION PREPARATION FAILURE message with a cause 'Relocation failure in target RNC'.
3. The CN should release the Iu connection towards the target RNC that may already have been established by initiating the *Iu Release* procedure with a cause 'Relocation cancelled'.

If the timer $T_{RELOCalloc}$ expires in the CN:

1. The CN should inform the source RNC that the *Relocation Preparation* procedure has failed by sending the RELOCATION PREPARATION FAILURE message with a cause ' $T_{RELOCalloc}$ expiry'.
2. The CN should release the Iu connection towards the target RNC by initiating the *Iu Release* procedure with a cause 'Relocation cancelled'.

If the timer $T_{RELOCcomplete}$ expires:

- The CN should initiate release of Iu connections towards the source and the target RNC by initiating the *Iu Release* procedure with a cause ' $T_{RELOCcomplete}$ expiry'.

If the relocation of SRNS terminates (unsuccessfully) in the CN before the *Relocation Resource Allocation* is completed:

1. The CN should stop the timer $T_{RELOCcomplete}$.
2. The CN should initiate release of Iu connection towards the target RNC by initiating the *Iu Release* procedure with a cause 'Relocation cancelled before completion'.

8.6.6Relocation Cancel

When the source RNC has decided to cancel the relocation, it sends RELOCATION CANCEL message to the CN. If the CN receives RELOCATION CANCEL message, the CN terminates the ongoing *Relocation Preparation* procedure (if any) and sends RELOCATION CANCEL ACKNOWLEDGE message to the source RNC.

The signalling flow for *Relocation Cancel* procedure is shown in Figure 11Figure 11Figure 7.

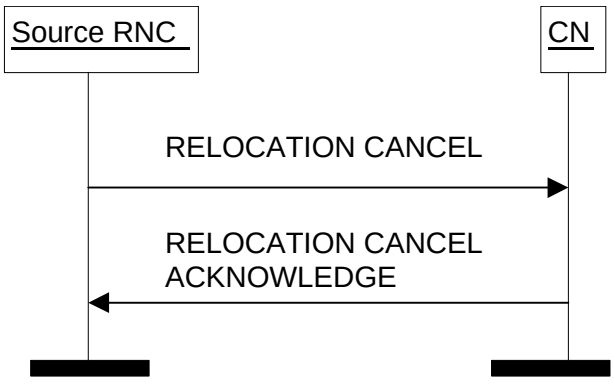


Figure 11117. *Relocation Cancel* procedure.

SRNS Context Transfer

This procedure may be used to trigger the transfer of SRNS contexts from RNC to CN (PS domain) in case of inter system forward handover. Messages belonging to this procedure utilise the connection oriented mode of the Iu signalling

bearer. SRNS contexts contain for each concerned RAB the sequence numbers of the GTP-PDUs next to be transmitted in uplink and downlink directions.

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

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

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

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

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

The signalling flow for *SRNS Context Transfer* procedure is shown in Figure 12~~Figure 12~~.

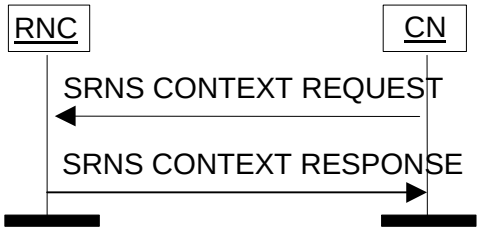


Figure 12~~12~~. *SRNS Context Transfer* procedure.

~~8.7~~Paging

PAGING messages for all UEs shall be sent as a connectionless message. These will include some information to allow derivation of the paging population number, the IMSI of the user to be used as the Common Id of the user in the RNC, the Id of the User to be used in the paging channel (e.g. TMSI); they may also include information on the subsequent transaction related to the paging. A corresponding radio interface paging message transmitted over the radio interface at the appropriate time. The issue of storing the PAGING message for future paging repetition is FFS.

It should be noted that each PAGING message on the CN-UTRAN interface relates to only one UE and therefore the UTRAN has to pack the pages into the relevant radio interface paging message.

The CN node sending the PAGING message shall set the CN domain indicator according to its own type i.e. CS domain or PS domain.

Note. Once the domain distribution is clarified with SA2 the Paging indicator may need to be modified.

A single PAGING message across the CN to UTRAN interface contains information on the area in which the page shall be broadcast. This is indicated with Paging Area ID (content FFS, e.g. LA or RA).

If a Non Searching Indication parameter is present, the RNC need not search the Common Id.

The signalling flow of the *Paging* procedure is illustrated in Figure 13~~Figure 13~~.

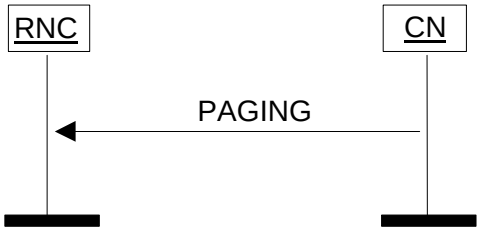


Figure 1313*16*. *Paging* procedure.

*8.8*Common Id

This procedure is needed, if the MM concept will require the UTRAN to send a page message on the existing RRC connection. This procedure is connection oriented.

The purpose of the *Common Id* procedure is to allow the RNC to create a reference between the permanent NAS UE Identity of a user and the RRC connection of that user. This is achieved by sending the permanent NAS UE Identity of a *verified* user from the CN to the RNC. The RNC is then able to check whether there is already *signalling bearer*RRC connection to the UE when a CN starts connection establishment by sending PAGING message. The *signaling bearer*RRC connection can be already used by an other CN, and if this is the case, the RNC uses it to send the PAGING message to the UE.

The CN sends a COMMON ID message to UTRAN*after it has ensured the identity of UE*. The message contains the permanent NAS UE Identity of the user. The RNC associates the permanent identity to the RRC Connection of that user and saves it for the duration of the RRC connection. The signalling flow for the *Common Id* procedure is shown in Figure 14*Figure 14*.

Figure 1414*17*. *Common Id* procedure.

Note. If Common ID information element is included inthe Transparent Field, then Common Id *needs to be changed to class 1 elementary procedure.*

*8.9*CN Invoke Trace

The purpose of the *CN Invoke Trace* procedure is to inform the receiving entity that it should begin producing a trace record on this particular transaction.

The trace is invoked by the CN sending a CN INVOKE TRACE message to the UTRAN.

The events and parameters to be recorded are indicated in the “Trace Type” information element.

The element “OMCId”, if present, indicates the OMC to which the record is destined.

The CN may allocate and include an “CN transaction reference” (typically a call reference) into the CN INVOKE TRACE message. The transaction reference is contained in the information element “TransactionId”.

The message includes a Trace Reference which is allocated by the entity which triggered the trace.

The element “TriggerId”, if present, indicates the entity which triggered the trace.

The Trace Reference, and TriggerId and TransactionId information elements are used to tag the trace record to allow simpler construction of the total record by the entity which combines trace records.

The message is sent as a connection oriented message on the connection on which a trace is required.

The signalling flow of the *CN Invoke Trace* procedure is shown in Figure 15Figure 15Figure 14.

Figure 1515*14*. *CN Invoke Trace* procedure.

8.10SecurityCipher Mode Control

8.10.1Successful operation

The *Cipher Mode Control* procedure allows the CN to pass cipher mode information to the UTRAN to select and load the user data and signaling encryption device with the appropriate key.

This is achieved by sending the UTRAN a CIPHER MODE COMMAND message. Receipt of the message at the UTRAN will trigger the execution of the corresponding radio interface procedure and, if applicable, invoke the encryption device and start stream ciphering.

In the CIPHER MODE COMMAND the CN specifies which of the ciphering algorithms may be used by the UTRAN. The UTRAN then selects internally an appropriate algorithm, taking into account the UE ciphering capabilities. The UTRAN can deduce from the UE capability information of the supported algorithms. The CIPHER MODE COMPLETE message returned to the CN indicates the chosen ciphering algorithm. The set of permitted ciphering algorithms specified in the CIPHER MODE COMMAND shall remain applicable for subsequent Assignments and Intra UTRAN Handovers.

The CIPHER MODE COMMAND and CIPHER MODE COMPLETE messages utilise the connection oriented mode of the signalling bearer.

When the radio interface is operating according to the CIPHER MODE COMMAND, RNC shall send the CIPHER MODE COMPLETE message to the CN.

The handling of ciphering keys from two CN entities is FFS.

The signalling flow of the successful *Cipher Mode Control* procedure is shown in Figure 15.

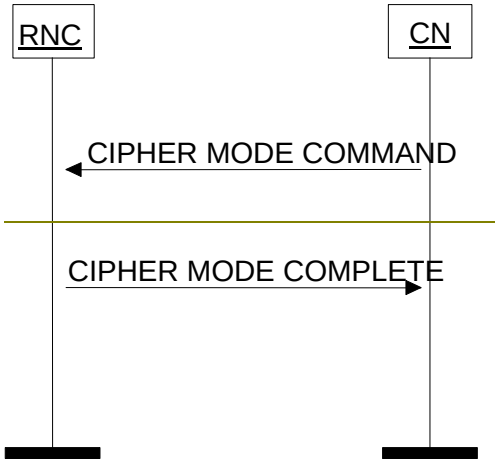


Figure 15. *Cipher Mode Control* procedure, successful case.

The *Security Mode Control* procedure allows the CN to pass cipher and integrity mode information to the UTRAN. UTRAN uses this information to select and load the encryption device for the user and signalling data with the appropriate parameters and also to store the appropriate parameters for the integrity algorithm. This is achieved by sending the UTRAN a SECURITY MODE COMMAND message. Receipt of the message at the UTRAN shall trigger the execution of the corresponding radio interface procedure and, if applicable, invoke the encryption device and start stream ciphering and also start the integrity protection.

In the SECURITY MODE COMMAND the CN shall specifiy which ciphering and integrity protection algorithms that may be used by the UTRAN. The UTRAN shall then internally select appropriate algorithms, taking into account the UE/UTRAN capabilities. The SECURITY MODE COMPLETE message returned to the CN indicates the chosen algorithms. The set of permitted algorithms specified in the SECURITY MODE COMMAND shall remain applicable for subsequent *RAB Assignment*s and Intra-UTRAN Relocations.

When the execution of the radio interface procedure is successfully finished, UTRAN shall return a SECURITY MODE COMPLETE message to the CN.

The SECURITY MODE COMMAND and SECURITY MODE COMPLETE messages are sent as connection oriented messages via the appropriate signalling connection.

In case of a UE with Radio Access Bearers towards both core networks, the RABs towards CS shall always be ciphered according to the information received from CS and the RABs towards PS with the information received from PS. The signalling data shall always be ciphered with the last received ciphering information and integrity protected with the last received integrity protection information.

The signalling flow of the successful *Security Mode Control* procedure is shown in Figure 17~~Figure 17~~.

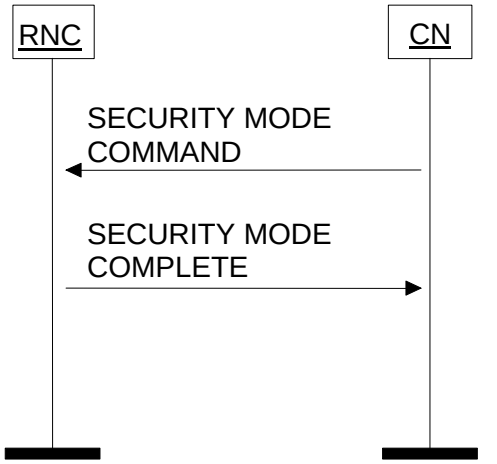


Figure 17~~17~~. *Security Mode Control* procedure, successful case.

8.10.2Unsuccessful operation

If the UTRAN or the UE is unable to support the ciphering algorithm specified in the CIPHER MODE COMMAND message then it shall return a CIPHER MODE REJECT message with Cause value "Ciphering algorithm not supported". A CIPHER MODE REJECT message shall also be returned if the CN requests a change of ciphering algorithm when ciphering is already active.

The signalling flow of the *Cipher Mode Control* procedure in abnormal conditions is shown in Figure 16.

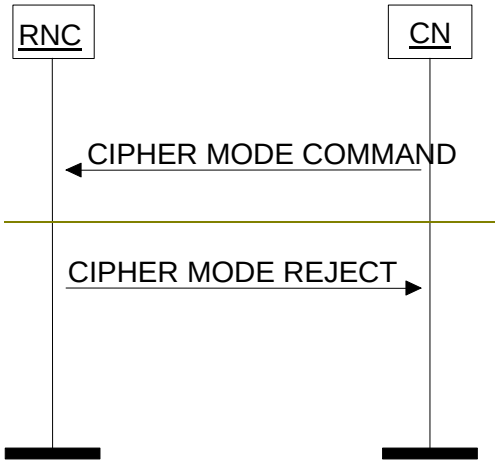


Figure 16. *Cipher Mode Control* procedure, unsuccessful case.

If the UTRAN or the UE is unable to support the ciphering and/or integrity protection algorithms specified in the SECURITY MODE COMMAND message, then the UTRAN shall return to CN a SECURITY MODE REJECT message with a cause value saying that requested ciphering and/or integrity protection algorithms are not supported". A SECURITY MODE REJECT message shall also be returned if a CN requests a change of ciphering and/or integrity protection algorithms for a UE when ciphering or integrity protection is already active for that CN. A cause value shall indicate that ciphering and/or integrity protection is already active.
Note: Re-authentication is being discussed in S3, which may result in that changing of algorithms will be allowed. Guidance from S3 is needed.

If the radio interface Security Control Procedure fails, SECURITY MODE REJECT shall be sent to CN with a cause value indicating failure in the radio interface procedure.

The signalling flow of the *Security Mode Control* procedure in case of unsuccessful operation is shown in Figure 19Figure 19.

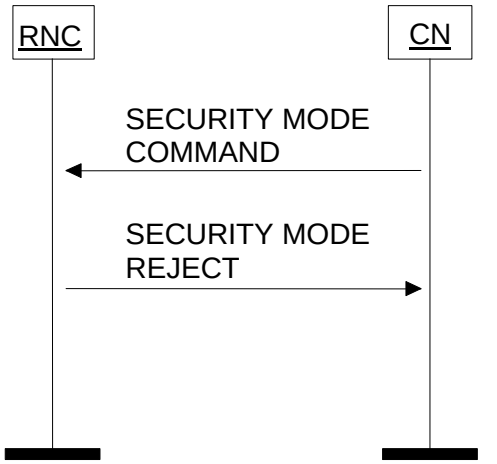


Figure 1919. *Security Mode Control* procedure, unsuccessful case.

8.11Location Reporting Control

Note. This procedure needs to be aligned with the GSM location services.

8.11.1Normal operation

The LOCATION REPORTING CONTROL message is issued from the CN to the RNC. It is used to initiate, modify or stop location reporting from RNC to CN, while the UE, whose location is to be reported has its connection with the CN. Each ongoing location reporting is assigned a reporting number, which will be used in LOCATION REPORT messages triggered by the respective *Location Reporting Control* procedure. The procedure is connection oriented.

Note. The identification of different location reports is FFS.

The Request Type parameter is used to indicate what kind of location reporting is desired from UTRAN.

Following request types are defined:

1. Report the Area Identity Code of the UE always when changed.

The signalling flow for Location Request procedure is shown in Figure 20Figure 20Figure 17.

Figure 20Figure 20Figure 17. *Location Reporting Control* procedure.

8.11.2Abnormal conditions

8.11.2.1Abnormal conditions in RNC

If RNC receives a LOCATION REPORTING CONTROL message indicating a change in measurement parameters which are in contradiction to existing parameters RNC shall ignore the existing parameters in RNC and assume the parameters given in the new message as correct. *Note. The definition of existing parameters is FFS.*

8.12Location Report

8.12.1Successful operation

The LOCATION REPORT message is issued from the RNC to the CN. It is used to provide the UE location information to the CN. This may be used as a response for the LOCATION REPORTING CONTROL message. Also, when a user enters or leaves a classified area set by O&M, e.g. disaster area, a LOCATION REPORT message will be sent to the CN. Cause information is included in the message. Other triggers of this message are FFS. The procedure is connection oriented.

In case the reporting of Area Identity Code is requested by CN, then RNC shall issue a location report always when the information given in the previous LOCATION REPORT or INITIAL UE MESSAGE is not anymore valid. In this case RNC shall include to the LOCATION REPORT message the Area Identity Code which indicates one of the cells from which the UE is consuming radio resources.

The signalling flow for *Location Report* procedure is shown in Figure 21Figure 21Figure 18.

Figure 212118. *Location Report* procedure.

8.12.2Unsuccessful operation

If the RNC can not deliver the location information as requested, RNC shal indicate UE location to be "Undetermined". A cause value shall be added to indicate the reason for the undetermined location.

8.12.3Abnormal conditions

8.12.3.1Abnormal conditions in CN

If CN receives a LOCATION REPORT message reporting location that was not requested by CN, CN should stop the indicated location reporting by utilising *Location Reporting Control* procedure. (FFS).

Data Volume Report

Note. This procedure only applies to PS domain.

Data Volume Report procedure is used by CN to request the transmitted DL data volume for specific RABs. The procedure uses connection oriented mode of the signalling bearer.

Procedure is initiated by CN by sending DATA VOLUME REPORT REQUEST message to UTRAN. Message contains the list of RABs for which the data volume report shall be issued.

At reception of this message UTRAN shall produce the DATA VOLUME REPORT message indicating the amount of successfully transmitted downlink data for the addressed RABs since the last data volume indication to CN. UTRAN shall also reset the data volume counter for the reported RABs. UTRAN shall send the DATA VOLUME REPORT message to CN.

The signlalling flow of *Data Volume Report* procedure is illustrated in Figure 22Figure 22.

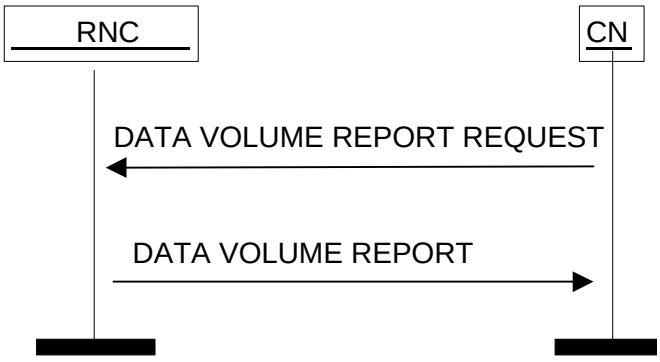


Figure 2222. *Data Volume Report* procedure.

8.13Initial UE Message

When the Iu signalling connection establishment is performed by the RNC, the radio interface initial layer 3 message received from the UE is proceeded. The procedure is connection oriented.

The RNC shall analyze the protocol discriminator of the message and if entire radio interface initial layer 3 message (e.g. CM SERVICE REQUEST, LOCATION UPDATE REQUEST, PAGING RESPONSE, IMUI DETACH) is also passed to the CN, using an INITIAL UE MESSAGE. The RNC does not analyze the contents of the initial layer 3 message, it may be added the other information (e.g. location information).

In addition to the received NAS-PDU, RNC shall add following information to the INITIAL UE MESSAGE:

- For CS domain, the same LAI which was the last LAI indicated to the UE by UTRAN.
- For PS domain, the same LAI+RAC which were the last LAI+RAC indicated to the UE by UTRAN.
- Area Identity Code indicating one of the cells from which the UE is consuming radio resources.

The signalling flow for *Initial UE Message* procedure is shown in Figure 23Figure 23Figure 19.

Figure 232319. *Initial UE Message* procedure.

8.14Direct Transfer

The *Direct Transfer* procedure is used to carry UE – CN signaling messages over the Iu Interface. The UE – CN signalling messages are not interpreted by the UTRAN, and their content (e.g. MM or CC message) is outside the scope of this specification. The UE – CN signalling messages are transported as a parameter in the *Direct Transfer* messages. The procedure is connection oriented.

When the CN has message that has to be sent to the UE (e.g. a CC or MM message) it will send DIRECT TRANSFER to the RNC including the CN to UE message as a parameter. The signalling flow for the CN originated *Direct Transfer* procedure is shown in Figure 24Figure 24Figure 20.

Figure 242420. *Direct Transfer*, CN originated.

When the RNC has received a message from the UE that has to be sent to the CN without interpretation (e.g. a CC or MM message in response to the previously sent CC or MM message from the CN) it will send DIRECT TRANSFER to the CN and including the UE to CN message as a parameter. The signalling flow for the UTRAN originated *Direct Transfer* procedure is shown in Figure 25Figure 25Figure 21.

Figure 25251. *Direct Transfer*, RNC originated.

Note. SAPI or priority indication is FFS.

8.15CN Information Broadcast

A functionality of the (UT)RAN is to broadcast repetitively to all users [in idle mode] system information as provided by the core network. A core network element sets or modifies the CN systembroadcast information by sending a connectionless CN INFORMATION BROADCAST REQUEST message which indicates:

- The information pieces to be broadcast, as a number of bit strings. The internal structure of these bit stringsinformation pieces is transparent to UTRANnot known or analysed by the RAN, and is specified as part of the CN-UE protocols.
- With each bit stringbroadcast information, a geographical area where to broadcast it.
- With each bit stringbroadcast information, some categorisation parameters to be used by the UTRAN to prioritise the broadcast information on the radio interface and determine how to schedule the repetition cycle.

If the UTRAN can broadcast the information as requested, a CN INFORMATION BROADCAST CONFIRM message is returned to the CN.

If the UTRAN can not broadcast the information as requested, a CN INFORMATION BROADCAST REJECT message is returned to the CN.

Each information piece is broadcast in the intersection between the indicated geographical area and the area under control by the receiving RNC. It is broadcast until explicitly changed or a *Reset* occurs. In case the ending of the broadcasting hasn't been indicated when setting the broadcasting, an empty bit string will be used to turn off the broadcasting. A CN element will run this procedure typically after each *Reset*, and whenever the information needs to be changed.

Between a *Reset* and the first reception of this message, what is broadcast is FFS. However, great care shall be taken to ensure that UE's do not reselect another PLMN and cause e.g. a surge of location updating on that other PLMN.

8.16Overload Control

8.16.1General

These procedures are defined to give some degree of flow control. At the UTRAN processor overload and overload in the capability to send signalling messages to the UE are catered for, and at the CN processor overload is catered for. *Overload Control* procedure is connectionless.

8.16.2Philosophy

The philosophy used is to stem the traffic at source with known effect on the service. The algorithm used is:

- On receipt of the first OVERLOAD message or signaling point congested information, the traffic is reduced by one step. It is also possible optionally to indicate the number of steps to reduce the traffic. At the same time, timers T(igOC)(T(igOR)) and T(inTC)(T(inTR)) are started. During T(igOC)(T(igOR)) all received overload messages or signaling point congested information are ignored in order not to

reduce the traffic too rapidly. Reception of an OVERLOAD message or signaling point congested information after expiry of T(igOC)(T(igOR)) but still during T(inTC)(T(inTR)) , will decrease the traffic load by one more step, and restart T(igOC)(T(igOR)) and T(inTC)(T(inTR)).

- This step by step reduction of traffic is continued until maximum reduction is obtained by arriving at the last step. If T(inTC)(T(inTR)) expires (i.e. no OVERLOAD message or signaling point congested information is received during T(inTC)(T(inTR))) the traffic will be increased by one step and T(inTC)(T(inTR)) will be started, unless full load has been resumed.

NOTE: Timers T(igOC) and T(inTC) are running in the CN whilst Timers T(igOR) and T(inTR) are running in the UTRAN.

- The number of steps and the method of reducing the load is considered to be an implementation specific function.

There may be other traffic control mechanisms from O and M activities occurring simultaneously.

8.16.3Overload at the CN

The CN can indicate to the RNC that it is in a congested state by sending an OVERLOAD message. This is sent as a connectionless global message.

At the UTRAN receipt of this message causes the reduction of traffic to the CN node sending the message.

The signalling flow for *Overload Control* at the CN is shown in Figure 26Figure 26Figure 15.

Figure 262615. Overload at the CN.

8.16.4Overload at the UTRAN

If the UTRAN is not capable to send signalling messages to the UE due to overloaded resources then the UTRAN sends an OVERLOAD message to the CN.

The signalling flow for *Overload Control* at the UTRAN is shown in Figure 27Figure 27Figure 16.

Figure 272716. Overload at the UTRAN.

8.17Reset

8.17.1General

The purpose of the *Reset* procedure is to initialise the UTRAN and CN in the event of a failure. The procedure is a global procedure applying to a whole RNC (instead of a particular UE), and therefore all messages relating to the *Reset* procedure are sent as global messages using the connectionless mode of the signalling bearer.

If only a limited part of the CN or UTRAN has suffered a failure then Radio Access Bearer Assignment Request procedures (indicating bearer release) can be used to clear only the affected Radio Access Bearers.

8.17.2Reset at the UTRAN

In the event of a failure at the UTRAN which has resulted in the loss of transaction reference information, a RESET message is sent to the CN. This message is used by the CN to release affected Radio Access Bearers and erase all affected references.

After a guard period of T(RatR) seconds a RESET ACKNOWLEDGE message is returned to the UTRAN indicating that all references have been cleared.

The signalling flow for *Reset* at the UTRAN is shown in Figure 28Figure 28Figure 17.

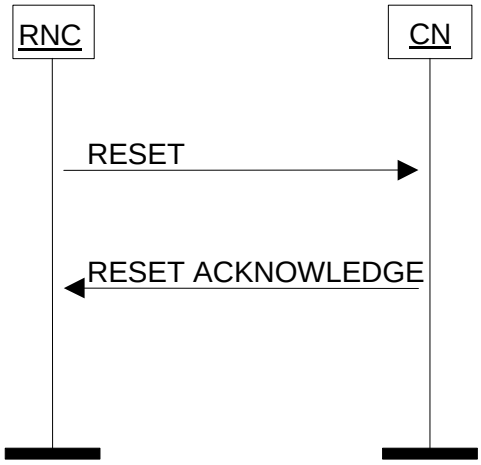


Figure 28Figure 28Figure 17. *Reset* at the UTRAN.

8.17.3Reset at the CN

In the event of a failure at the CN which has resulted in the loss of transaction reference information, a RESET message is sent to the RNC. This message is used by the UTRAN to release affected Radio Access Bearers and erase all affected references.

After a guard period of T(RatC) seconds a RESET ACKNOWLEDGE message is returned to the CN, indicating that all UEs which were involved in a call are no longer transmitting and that all references at the UTRAN have been cleared.

Figure 29Figure 29Figure 18 shows the signalling flow for *Reset* at the CN.

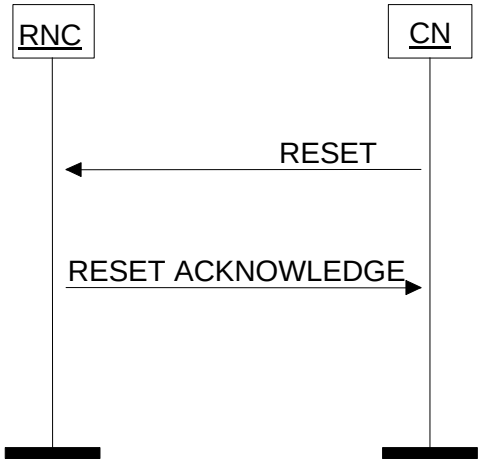


Figure 2929~~18~~. *Reset* at the CN.

~~8.17.4~~Abnormal Conditions

~~8.17.4.1~~Abnormal Condition at the UTRAN

If the RNC sends a RESET message to the CN and receives no RESET ACKNOWLEDGE message within a period T(RafC) then it shall repeat the entire *Reset* procedure. The sending of the RESET message is repeated a maximum of "n" times where n is an operator matter. After the n-th unsuccessful repetition the procedure is stopped and the maintenance system is informed.

~~8.17.4.2~~Abnormal Condition at the CN

If the CN sends a RESET message to the RNC and receives no RESET ACKNOWLEDGE message within a period T(RafR) then it shall repeat the entire *Reset* procedure. The sending of the RESET message is repeated a maximum of "n" times where n is an operator matter. After the n-th unsuccessful repetition the procedure is stopped and the maintenance system is informed.

~~8.17.4.3~~Crossing of Reset messages

When an entity has sent a RESET message and is waiting for a RESET ACKNOWLEDGE message, but receives a RESET message from the peer entity, the sending entity stops timer T(RatC or RatR) and sends a RESET ACKNOWLEDGE message to the peer entity.

~~8.18~~Error Indication

~~8.18.1~~General

The *Error Indication* procedure is used to carry error messages over the Iu Interface. The procedure uses the connectionless mode of the signalling bearer.

~~8.18.2~~CN originated Error Indication

On the PS side, the SGSN may send an ERROR INDICATION to the RNC if it receives a G-PDU with an unknown ~~Flow Label~~Iu Transport Association. The Cause Value to be used is:

- 'Unknown ~~Flow Label~~Iu Transport Association'

For the Cause Value 'Unknown ~~Flow Label~~Iu Transport Association', both Binding Identity and Network Layer Address is mandatory.

The Binding Identity, i.e. the ~~Flow Label~~Iu Transport Association, and the Network Layer Address used in the ERROR INDICATION message shall be fetched from the G-PDU that triggered the procedure.

The signalling flow for the CN originated *Error Indication* procedure is shown in Figure 30~~Figure 30~~~~Figure 26~~.

Figure 30~~30~~~~26~~. *Error Indication*, CN originated.

~~8.18.3~~RNC originated Error Indication

On the PS side, the RNC may send an ERROR INDICATION to the SGSN if it receives a G-PDU with an unknown ~~Flow Label~~Iu Transport Association. The Cause Value to be used is:

- 'Unknown ~~Flow Label~~Iu Transport Association'

For the Cause Value 'Unknown ~~Flow Label~~Iu Transport Association', both Binding Identity and Network Layer Address is mandatory.

The Binding Identity, i.e. the ~~Flow Label~~Iu Transport Association, and the Network Layer Address used in the ERROR INDICATION message shall be fetched from the G-PDU that triggered the procedure.

The signalling flow for the UTRAN originated *Error Indication* procedure is shown in Figure 31~~Figure 31~~~~Figure 27~~.

Figure 31~~31~~~~27~~. *Error Indication*, RNC originated.

~~9~~Elements for RANAP communication

~~9.1~~Message contents

For each message there is, a table listing the signalling elements in their order of appearance in the transmitted message.

All the RANAP messages are listed in the following table:

Message name	Reference
RAB ASSIGNMENT REQUEST	
RAB ASSIGNMENT RESPONSE	

RAB RELEASE REQUEST	
IU RELEASE REQUEST	
IU RELEASE COMMAND	
IU RELEASE COMPLETE	
RELOCATION REQUIRED	
RELOCATION REQUEST	
RELOCATION REQUEST ACKNOWLEDGE	
RELOCATION COMMAND	
RELOCATION DETECT	
RELOCATION COMPLETE	
RELOCATION PREPARATION FAILURE	
RELOCATION FAILURE	
RELOCATION CANCEL	
RELOCATION CANCEL ACKNOWLEDGE	
SRNS CONTEXT REQUEST	
SRNS CONTEXT RESPONSE	
PAGING	
COMMON ID	
CN INVOKE TRACE	
CIPHERSECURITY MODE COMMAND	
CIPHERSECURITY MODE COMPLETE	
CIPHERSECURITY MODE REJECT	
LOCATION REPORTING CONTROL	
LOCATION REPORT	
DATA VOLUME REPORT REQUEST	
DATA VOLUME REPORT	
INITIAL UE MESSAGE	
DIRECT TRANSFER	
CN INFORMATION BROADCAST REQUEST	
CN INFORMATION BROADCAST CONFIRM	
CN INFORMATION BROADCAST REJECT	
OVERLOAD	
RESET	
RESET ACKNOWLEDGE	
ERROR INDICATION	

Table 1. List of RANAP messages.

9.1.1RAB ASSIGNMENT REQUEST

Information element	Reference	Type
Message Type		M
RABs x n to be setup or modified		**C1**
RAB ID		M
NAS Binding Information		M
RAB parameters		M (1)
Data Volume Reporting Indication		M (3)
User Plane mode		M
Transport Address		M
Iu Transport Association		M
Priority level, queuing and pre-emption indication		O (2)
RAB linking		O
RABs x n to be released		**C1**
RAB ID		M
Cause		M

C1 At least one group shall be present.

(1) This includes all the necessary parameters for RAB's (both for MSC and SGSN) including QoS.

(2) It needs to be clarified how this parameter is in relation to priority parameters already included with the RAB parameters.

(3) Only for PS domain.

Note. It needs to be clarified how the re-ordering information as proposed in Tdoc 276 relates to QoS attribute SDU in-sequence delivery.

9.1.2RAB ASSIGNMENT RESPONSE

Information element	Reference	Type
Message type		M
Location Identifier		O
RABs x n established or modified		**C1**
RAB ID		M

RAB parameters		O (1)
Transport address		M (2)
Iu transport association		M (2)
RABs x n released		**C1**
RAB ID		M
Transmitted DL Data Volume		O
RABs x n queued		**C1**
RAB ID		M
RABs x n failed to establish or modify		**C1**
RAB ID		M
Cause		M
RABs failed to release		**C1**
RAB ID		M
Cause		M

C1 At least one group shall be present.

(1) RAB parameters are needed only if something has changed.

(2) Always present for SGSN.

9.1.3RAB RELEASE REQUEST

Information element	Reference	Type
Message type		M
RABs x n to be released		**C1**
RAB ID		M
Cause		M

C1 At least one group shall be present.

9.1.4IU RELEASE REQUEST

Information element	Reference	Type
Message type		M
Cause		M

9.1.5IU RELEASE COMMAND

Information element	Reference	Type
Message type		M
Cause		M
RABs subject to Data forwarding x n		**O(1)**
RAB ID		M
Transport Address		M
Iu Transport Association		M

(1) Only for PS domain.

9.1.6IU RELEASE COMPLETE

Information element	Reference	Type
Message type		M
RAB Data Volume Report x n		**O**
RAB ID		M
Transmitted DL Data Volume		M

9.1.7RELOCATION REQUIRED

Information element	Reference	Type
Message type		M
Cause		M
Source ID		M
Target ID		M (1)
Source RNC to target RNC transparent container		M

(1) The usage and format of this information element is FFS.

9.1.8RELOCATION REQUEST

Information element	Reference	Type
Message type		M
Cause		M
Source RNC to target RNC transparent container		M
RABs x n to be setup		M
RAB ID		M
RAB parameters		M
User Plane mode		M
Transport address		M
Iu transport association		M
Priority level, queuing and pre-emption indication		O
RAB linking		O

9.1.9RELOCATION REQUEST ACKNOWLEDGE

Information element	Reference	Type
Message type		M
Target RNC to source RNC transparent container		O (1)
RABs x n		O (2)
RAB ID		M
Transport address		M (3)
Iu transport association		M (3)

(1) Required only via one CN entity.

(2) Always present for SGSN, and present for MSC if parameters have been modified by target RNC.

(3) Always present for SGSN.

9.1.10RELOCATION COMMAND

Information element	Reference	Type
Message type		M
Target RNC to source RNC transparent container		O (1)
RABs subject to Data forwarding x n		**O (2)**
RAB ID		M
Transport Address		M
Iu Transport Association		M

(1) Required only via one CN entity.

(2) Only for PS domain.

9.1.11RELOCATION DETECT

Information element	Reference	Type
Message type		M

9.1.12RELOCATION COMPLETE

Information element	Reference	Type
Message type		M

9.1.13RELOCATION PREPARATION FAILURE

Information element	Reference	Type
Message type		M
Cause		M

9.1.14RELOCATION FAILURE

Information element	Reference	Type
Message type		M
Cause		M

9.1.15RELOCATION CANCEL

Information element	Reference	Type
Message type		M
Cause		M

9.1.16RELOCATION CANCEL ACKNOWLEDGE

Information element	Reference	Type
Message type		M

SRNS CONTEXT REQUEST

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

SRNS CONTEXT RESPONSE

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

9.1.17PAGING

Information element	Reference	Type
Message type		M
CN Domain Indicator		M
IMSIPermanent NAS UE Identity		M
Temporary UE ID		O
Paging area ID		O
Paging Cause		O
Non Searching Indication		O

9.1.18COMMON ID

Information element	Reference	Type
Message type		M
Permanent NAS UE Identity (e.g. IMSI)		M

9.1.19CN INVOKE TRACE

Information element	Reference	Type
Message type		M
Trace Type		M
Trigger ID		O
Trace Reference		M
UE Identity		O
OMC ID		O

9.1.20SECURITYCIPHER MODE COMMAND

Information element	Reference	Type
Message type		M
Integrity Protection Information		M (1)
UE Classmark		M
Encryption Information		OM (1)

(1) Integrity and Encryption information includes key(s) and permitted algorithms.

Note 1. It is FFS whether the NAS information should be included in this message.

Note 2. The possibility to cipher only some of the RABs is FFS.

Note 3. The need for including UE Classmark has to be agreed with RAN WG2.

9.1.21SECURITYCIPHER MODE COMPLETE

Information element	Reference	Type
Message type		M
Chosen Integrity Protection Algorithm		M
Chosen Encryption Algorithm		O

Note 1. It is FFS whether the NAS information should be included in this message.

9.1.22SECURITYCIPHER MODE REJECT

Information element	Reference	Type
Message type		M
Cause		M

9.1.23LOCATION REPORTING CONTROL

Information element	Reference	Type
Message type		M
Request type		M

9.1.24LOCATION REPORT

Information element	Reference	Type
Message Type		M
Location Information		M
Area Identity Code		O
Cause		O

DATA VOLUME REPORT REQUEST

Information element	Reference	Type
Message Type		M
RAB Data Volume report x n		**M**
RAB ID		M

DATA VOLUME REPORT

Information element	Reference	Type
Message type		M
RAB Data Volume report x n		**M**
RAB ID		M
Transmitted DL data volume		M

9.1.25INITIAL UE MESSAGE

Information element	Reference	Type
Message Type		M
CN Domain Indicator		M
~~Location Information~~		~~M~~
~~NAS Layer 3 Information~~		~~M~~
LAI		M
RAC		O(1)
Area Identity Code		M
NAS-PDU		M

(1) Only for PS domain

9.1.26DIRECT TRANSFER

Information element	Reference	Type
Message type		M
NAS PDU		M

9.1.27CN INFORMATION BROADCAST REQUEST

Information element	Reference	Type
Message type		M
CN Domain Indicator		M
CN ~~System~~Broadcast Information piece x n		**C1**
NAS ~~bit string~~Broadcast Information		M
Broadcast area		M
Categorisation parameters		M

C1 At least one group must be present.

Note 1. It is FFS how the broadcasting is turned off.

9.1.28CN INFORMATION BROADCAST CONFIRM

Information element	Reference	Type
Message type		M
CN Domain Indicator		M

9.1.29CN INFORMATION BROADCAST REJECT

Information element	Reference	Type
Message type		M
CN Domain Indicator		M
Cause		M

9.1.30OVERLOAD

Information element	Reference	Type
Message type		M
Number of steps		O

9.1.31RESET

Information element	Reference	Type
Message type		M
Cause		M

9.1.32RESET ACKNOWLEDGE

Information element	Reference	Type
Message type		M
CN Domain Indicator		M

9.1.33ERROR INDICATION

Information element	Reference	Type
Message type		M
CN Domain Indicator		M
Cause		M
Binding ID		O
Source Network Layer Address		O

9.2Information element definitions

[Study item 7: Usage of ASN.1 and encoding rules versus the description of information elements in TTC/ARIB document.]

9.2.1Radio network layer related IEs

9.2.1.1Message Type

Message type uniquely identifies the message being sent. It is mandatory for all messages.

9.2.1.2RAB ID

[Editor's note: This definition needs to be harmonized with UMTS 23.10.]

This element uniquely identifies the radio access bearer over one Iu connection. The radio access bearer identification has only local significance in one Iu connection. The RAB ID shall remain the same for the duration of the RAB.ID is to identify a particular radio access bearer in Iu.

9.2.1.3RAB parameters

The purpose of the RAB parameter information element is to indicate all RAB parameters for both directions, e.g. Quality of service (QoS) classes.

9.2.1.4Cause

The cause element is used to indicate the reason for a particular event to have occurred according to the cause code list.

9.2.1.5Priority level, queuing and pre-emption indication

The Priority level Iindicates the priority of the request. The pre-emption indicator may (alone or along with the priority level) be used to manage the queueing, pre-emption and priority function.

9.2.1.6RAB linking

This element is a common reference shared by A groupa set of RABs which must be treated together as requested.either all established, or all rejected.

9.2.1.7Location Identifier

Indicates location of the UE.

9.2.1.8CN Domain Indicator

Indicates the CN domain from which the message originates or to which the message shall be sent.

9.2.1.9Trace Type

A fixed length element indicating the type of trace information to be recorded.

9.2.1.10Trigger ID

A variable length element indicating the identity of the entity which initiated the trace.

9.2.1.11Trace Reference

A fixed length element providing a trace reference number allocated by the triggering entity.

9.2.1.12UE Identity

This element identifies the element to be traced i.e. the subscriber or the user equipment.Indicates the identity of the UE.

9.2.1.13OMC ID

A variable length element indicating the destination address of the Operation and Maintenance Center (OMC) to which trace information is to be sent.

Integrity Protection Information

9.2.1.14Encryption Information

This element contains the user data encryption information (key(s) and permitted algorithms) used to control any encryption equipment at the RNC.

UE Classmark

Chosen Integrity Protection Algorithm

9.2.1.15Chosen Encryption Algorithm

This element indicates the encryption algorithm being used by the RNC.

9.2.1.16Broadcast Area

With each NAS Broadcast Informationbit string, this element identifies athe geographical area where to broadcast it.

9.2.1.17Categorisation parameters

With each NAS Broadcast Informationbit string, this element to beis used by the RNC to determine how to prioritise the information and schedule the repetition cycle.

9.2.1.18Request Type

[Editor's note: This definition needs to be harmonized with UMTS 23.10.]

This information request the information type that to be reported from RNC, e.g. to report LAI and RAI of the current UE location. Other request types are FFS.

Data Volume Reporting Indication

This information element indicates whether or not RNC has to calculate the successfully transmitted NAS data amount for the RAB and to report the amount of data when the RAB is released.

9.2.1.19Location Information

[Editor's note: This definition needs to be harmonized with UMTS 23.10.]

This information shows the location information that has been requested by the CN, e.g. LAI and RAI. Other types of location information are FFS.

9.2.1.20User Plane Mode

This element indicates the mode of operation of the Iu User plane requested for realising the RAB. The Iu user plane modes are defined in UMTS 25.415.

9.2.1.21Paging Area ID

This element uniquely identifies the area, where the PAGING message shall be broadcasted. The Paging area ID may be e.g. a Location Area ID or Routing Area ID.

Non Searching Indication

This parameter allows the RNC not to search Common ID when receiving a PAGING message from the CN.

9.2.1.22Source ID

Source ID identifies the source for the relocation of SRNS. The Source ID may be e.g. Source RNC-ID or serving cell ID.

9.2.1.23Target ID

Target ID identifies the target for the relocation of SRNS. The target ID may be e.g. Target RNC-ID (for UMTS-UMTS relocation) or ~~Global~~ Cell Global ID of the relocation target (in case of UMTS to GSM relocation).

9.2.1.24Source 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 relocation the IE is transmitted either from external relocation source to target RNC or from source RNC to the external relocation target.

This IE is transparent to CN.

9.2.1.25Target RNC to Source RNC Transparent Container

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

This IE is transparent to CN.

9.2.1.26Number of steps

Indicates the number of steps to reduce traffic in overload situation.

DL GTP-PDU Sequence Number

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

UL GTP-PDU Sequence Number

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

UL RLC-PDU Sequence Number

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

DL RLC-PDU Sequence Number

This IE indicates the sequence number of the DL RLC-PDU which carried the last segment of the last N-PDU to the UE.

9.2.2Transport network layer related IEs

9.2.2.1Transport address

For the PS domain this information element is an IP address Tto be used for the user plane transport. For the CS domain this address is to be used for Transport Network Control Plane signalling to set up the U-Plane connection.

9.2.2.2Iu transport association

This element is used to associate the RAB and the corresponding user plane connection. For the CS domain this information element is the Binding Id to be used in Transport Network Control Plane signalling during set up of the U-Plane connection. In PS domain this information element is the GTP Tunnel Endpoint Identifier.

9.2.3NAS related IEs

9.2.3.1NAS Binding Information

[Editor's note: This definition needs to be harmonized with UMTS 23.10.]

This element contains application specific information, to be used by the remote NAS entity at the UE side. It serves as the binding to a NAS call. This element information is a informationis transmitted transparently to the RNC.

9.2.3.2Permanent NAS Identity

This element is used to identify the UE commonly in UTRAN and in CN. RNC uses ID is common for mobile terminal and is used by the RNC to findcheck if SRB is already existing (from other NE) to other existing signalling connections theof this same UE (e.g. RRC or Iu signalling connections)when new radio access bearer is in establishment phase. Initially this is of the type of IMSI. The future usagetype is FFS.

Note: IMSI is specified in the TS 23.003.

9.2.3.3IMSI

International Mobile Subscriber Identity, identifies a subscriber.

9.2.3.4Temporary UE ID

Temporary Mobile Subscriber Identity, used for security reasons to hide the identity of a subscriber.

9.2.3.5Paging Cause

Tells This element indicates the cause of paging to the UE.

9.2.3.6NAS Bit StringBroadcast Information

This element identifies broadcast information that belongs to the non-access stratum (e.g. LAC, RA code etc). This information is transparent to RNC.The NAS information peace to be broadcast. The internal structure of this bit string is not known or analysed by the RNC, and is specified as part of the CN – UE protocols.

9.2.3.7NAS PDU

This information element contains the CN – UE or UE – CN message that is transferred without interpretation in the RNC. Typically it contains call control, session management, supplementary services, short message service and mobility management messages.

LAI

RAC

Area Identity Code

Transmitted Data Volume

This information element indicates the data volume (octets) that is successfully transmitted over the air in DL direction for the RAB.

9.2.3.8NAS Layer 3 Information

This is a variable length element used to pass radio interface messages from one network entity to another.

9.3Message and Information element abstract syntax (with ASN.1)

```
-- **************************************************************
--
-- PDU descriptions for RANAP.
--
-- **************************************************************

RANAP-PDU-descriptions -- { object identifier to be allocated }--
DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- **************************************************************
--
-- PDU content types from the PDU module.
--
-- **************************************************************

IMPORTS
-- Imports PDU content types from RANAP PDU contents module
-- *** TO BE DEFINED ***
      ExampleMessageContents1,
      ExampleMessageContents2-v1,
      ExampleMessageContents2-v2,
      ExampleMessageContents3
FROM RANAP-PDU-contents;

-- **************************************************************
--
-- Table column structure.
--
-- RANAP-PDU-DESCR associates a RANAP PDU structure with a PDU
-- identifier.
--
-- **************************************************************

RANAP-PDU-DESCR ::= CLASS {
      &PDUType,
      &versionID        VersionID   UNIQUE,
      &LogicalProcedure    LogicalProcedure
}
WITH SYNTAX {
      PDU TYPE       &PDUType
      VERSION NUMBER AND ID      &versionID
      LOGICAL PROCEDURE       &LogicalProcedure
}

-- *** TO BE DEFINED ***
VersionID ::= SEQUENCE {
      pduID          INTEGER (0..63),
      versionNumber        VersionNumber
}

-- *** TO BE DEFINED ***
VersionNumber           ::= INTEGER (1 .. 255)

-- *** TO BE DEFINED ***
```

```
LogicalProcedure ::= ENUMERATED {
      global,
      dedicated
}

-- **************************************************************
--
-- Table row definitions.
--
-- RANAP PDU descriptions.
--
-- **************************************************************

RANAP-PDUs RANAP-PDU-DESCR ::= {
      -- *** TO BE DEFINED ***
      exampleMessage1   |
      exampleMessage2-v1   |
      exampleMessage2-v2   |
      exampleMessage3   |

      -- Additional PDU descriptions can be added in future
      ...
}

-- *** TO BE DEFINED ***
exampleMessage1 RANAP-PDU-DESCR ::= {
      PDU TYPE       ExampleMessageContents1
      VERSION NUMBER AND ID      { pduID 1, versionNumber 1 }
      LOGICAL PROCEDURE    { global }
}

exampleMessage2-v1 RANAP-PDU-DESCR ::= {
      PDU TYPE       ExampleMessageContents2-v1
      VERSION NUMBER AND ID      { pduID 2, versionNumber 1 }
      LOGICAL PROCEDURE    { dedicated }
}

exampleMessage2-v2 RANAP-PDU-DESCR ::= {
      PDU TYPE       ExampleMessageContents2-v2
      VERSION NUMBER AND ID      { pduID 2, versionNumber 2 }
      LOGICAL PROCEDURE    { dedicated }
}

exampleMessage3 RANAP-PDU-DESCR ::= {
      PDU TYPE       ExampleMessageContents3
      VERSION NUMBER AND ID      { pduID 3, versionNumber 1 }
      LOGICAL PROCEDURE    { global | dedicated }
}

-- **************************************************************
--
-- Generic PDU structure. The RANAP-PDUs table above describes
-- valid contents for the vid, indication and value fields.
--
-- **************************************************************

RANAP-PDU ::= SEQUENCE {
      vid        RANAP-PDU-DESCR.&versionID ({RANAP-PDUs}),
      value      RANAP-PDU-DESCR.&PDUType   ({RANAP-PDUs}{@vid})
}

END
```

```
-- **************************************************************
--
-- RANAP PDU content definitions
--
-- **************************************************************

RANAP-PDU-contents DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- IMPORTS

-- *** TO BE DEFINED ***
-- FROM RANAP-IEs

-- *** TO BE DEFINED ***
-- FROM RANAP-Constants;
```

```
-- Definitions of RANAP PDU content types one by one
-- *** TO BE DEFINED ***

ExampleMessageContents1 ::= SEQUENCE {
      -- *** IEs to be defined ***
      ...
}

ExampleMessageContents2-v1 ::= SEQUENCE {
      -- *** IEs to be defined ***
      ...
}

ExampleMessageContents2-v2 ::= SEQUENCE {
      -- *** IEs to be defined ***
      ...
}

ExampleMessageContents3 ::= SEQUENCE {
      -- *** IEs to be defined ***
      ...
}

END
```

```
-- **************************************************************
--
-- RANAP Information Elements
--
-- **************************************************************

RANAP-IEs DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- IMPORTS

-- *** TO BE DEFINED ***
-- FROM RANAP-Constants;

-- Definitions of RANAP IEs one by one
-- *** TO BE DEFINED ***

END
```

```
-- **************************************************************
--
-- Constant definitions for RANAP
--
-- **************************************************************

RANAP-Constants DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- Definitions of RANAP constants one by one
-- *** TO BE DEFINED ***

END
```

9.4Message transfer syntax

9.5Timers

[Editor's note: This chapter should list and describe the used timers.]

$T_{RELOCprep}$

specifies the maximum time for *Relocation Preparation* in the source RNC, started at sending of RELOCATION REQUIRED message and stopped at reception of either RELOCATION COMMAND or the RELOCATION PREPARATION FAILURE messages from the CN.

$T_{RELOCoverall}$

specifies the maximum time for the protection of overall Relocation procedure in the source RNC, started at reception of RELOCATION COMMAND message from the CN and stopped when the *Iu Release* procedure is initiated by the CN towards the source RNC or the source RNC detects that he acts again as the serving RNC.

$T_{RELOCalloc}$

specifies the maximum time for *Relocation Resource Allocation* in the CN, started at sending of RELOCATION REQUEST message and stopped at reception of either RELOCATION REQUEST ACKNOWLEDGE or the RELOCATION FAILURE messages from the target RNC.

$T_{RELOCcomplete}$

specifies the maximum time for waiting the relocation completion in the CN, started at sending of RELOCATION COMMAND message and stopped at reception of RELOCATION COMPLETE message from the target RNC.

10Handling of unknown, unforeseen and erroneous protocol data

11Annex A (normative):

Annex B Document Stability Assessment Table

Section	Content missing	Incomplete	Restructuring needed	Checking needed	Editorial work required	Finalisation needed	Almost stable	Stable
1	√							√
2					√			
3				√				
4	√							
5	√							
6	√							
7				√				
8						√		
9		√			√			

10	√							

12History

Document history		
0.0.1	February 1999	Document skeleton created.
0.0.2	February 1999	Relevant sections from Merged "Description of Iu Interface" have been introduced.
0.0.3	March 1999	The results of the solved study items Iu/2, Iu/3, Iu/4 and Iu/6 have been updated to the text. The heading of section 8 has been changed to "RANAP procedures".
0.0.4	April 1999	Editorial changes: - References to "Merged Description of Iu Interface" have been removed. - Remaining instances of Signalling Channel Setup and Response procedure have been removed. - In Hard HO procedure it has been corrected that target RNC receives RELOCATION COMMIT message from source RNC.
0.0.5	April 1999	Editorial changes: - Words "Radio Access", related to radio access bearer setup, reconfiguration and release messages, have been added in front of those messages where it was missing. - RAB Release procedure updated to return RAB ASSIGNMENT COMPLETE message before User plane release.
0.1.0	April 1999	Same as 0.0.5, approved by WG3.
1.0.0	April 1999	Approved by TSG RAN. Same contents as 0.1.0.
1.0.1	May 1999	Main updates made based on WG3 meeting #3 and other decisions: • Specification number changed to UMTS 25.413. • Title changed to UTRAN Iu Interface RANAP Signalling. • SRNS Relocation and Inter RNS Hard HO procedures merged to a Relocation procedure with a split to elementary procedures according to Tdoc R3-99339 with agreed modifications. The merging was possible based on the approved Tdoc R3-99340, which added RELOCATION DETECT message to the SRNS Relocation procedure. • A statement in the Relocation procedure added related to the load sharing on the Iu-PS interface, according to Tdoc R3-99257 with modifications. • *Location Request* and *Location Report* procedures added according to Tdoc R3-99358 with agreed modifications. • Information elements for Relocation procedure have been added according to Tdoc R3-99328 with modifications.

1.0.2	June 1999	Main updates made based on WG3 meeting #4 decisions: • *Relocation Required Indication* procedure replaced by *Relocation Preparation* procedure according to R3-99477 with agreed modifications. • It was decided to use combined *RAB Assignment* procedure based on solved Study item Iu/5. • *Location Request* procedure was replaced by *Location Reporting Control* procedure according to R3-99475 with agreed modifications. • RANAP *Error Indication* procedure was introduced according to R3-99456. • CN domain indicator to *Paging* procedure was accepted according to R3-99461. • Information elements for *RAB Assignment* procedure were agreed according to R3-99503 with modifications. • Some minor editorial changes made.
1.1.0	July 1999	Same as v. 1.0.2 approved in RAN WG3 and raised to v. 1.1.0.
1.1.1.	July 1999	Main updates made based on WG3 meeting #5 decisions: • Description and definition of elementary procedure added according to R3-99727 with modifications. List of elementary procedures included. • As a result of R3-99727, *Iu Release Request* changed to an elementary procedure. Text proposed by the Editor. • Failure handling added to Relocation procedure based on R3-99746 with modifications. • *Relocation Cancel* elementary procedure added according to R3-99745 with modifications. • Bearer ID changed to RAB ID and NAS Binding ID added according to R3-99747. • User Plane Mode parameter added to *RAB Assignment* and Relocation procedures according to R3-99720. • The Cause parameter added and Transparent field changed to mandatory in RELOCATION REQUIRED and RELOCATION REQUEST messages according to R3-99678. • The parameters for *Location Reporting Control* and *Location Report* procedures were agreed according to R3-99748. • The message contents for the remaining procedures and parameter definitions added based on R3-99670 with modofications.
1.1.2	August 1999	'Cause' parameter removed from *Overload Control* procedure description. Minor editorial changes.
1.2.0	August 1999	Version 1.1.2 approved in WG3#6 and raised to v. 1.2.0.

1.2.1	September 1999	Decisions from WG3#6 have been updated as follows: • *RAB Assignment* procedure rewritten according to Tdoc R3-99A74 (=updated Tdoc R3-99942) with modifications. Type Class 3 of Elementary Procedure introduced. • *RAB Release Request* procedure added according to Tdoc R3-99A09. • List of RANAP functions added according to Tdoc R3-99A01 with modifications. • 'Transparent field' changed to 'Transparent container' according to Tdoc R3-99952. • A concept of handling relocation co-ordination in source and target RNC added according to Tdoc R3-99A10 with modifications. • Handling of the crossing of RESET messages was included as proposed in Tdoc R3-99909. • Editorial comments proposed in Tdoc R3-99940 included with modifications. • Definitions in Tdoc R3-99A60 added with modifications.
1.2.2	September 1999	Some additional updates made to fullfil the agreements from WG3#6: • The definition of Class 3 Elementary Procedure clarified. • The *Overload Control* and *Location Report* procedures have been updated according to the agreements in WG3#6. • The description of *Iu Release* and *Cipher Mode Control* procedures has been further updated to better reflect the decisions in WG3#6. • The possibility of RAB release to fail added also into the message contents of RAB ASSIGNMENT RESPONSE. • Some other minor editorial updates.
1.2.3	September 1999	Editor's proposals according to WG3#6 agreements: • Section 'Scope' has been rewritten. • Missing IE definitions have been proposed. • The order of describing procedures, message contents and IE definitions has been changed. • Proposed to replace 'signalling connection' by 'signalling bearer' in some instances. • Proposed to remove the paragraph regarding load sharing on the Iu PS interface in section 8.6.3 Relocation resource alllocation.
1.3.0		Version 1.2.3 approved in WG3#7 and raised to v. 1.3.0
1.3.1		Updated based on the decisions in WG3#7. A summary of modifications can be found in Tdoc R3-99D24, which is the Chairman's report from Iu SWG meeting. Minor editorial changes are also included.
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