

TSG-RAN Meeting #25
Palm Springs, USA, 07-09 April 2004

RP-040338
Agenda item 8.8 (TEI6)

Source: TSG-RAN WG2.
Title: CR to 25.303 (Rel-6)

The following CR is in RP-040338:

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Workitem
25.303	074	-	Rel-6	Clarification to SRNS Relocation	F	6.0.0	6.1.0	TEI6

CR-Form-v7.1

CHANGE REQUEST

№ **25.303 CR 074** № rev - № Current version: **6.0.0** №

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the № symbols.

Proposed change affects: UICC apps № ME Radio Access Network Core Network

Title:	№ Clarification to SRNS Relocation		
Source:	№ RAN WG2		
Work item code:	№ TEI6	Date:	№ 16/08/2004
Category:	№ F	Release:	№ Rel-6
	Use <u>one</u> of the following categories: F (correction) A (corresponds to a correction in an earlier release) B (addition of feature), C (functional modification of feature) D (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900 .		Use <u>one</u> of the following releases: Ph2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) Rel-4 (Release 4) Rel-5 (Release 5) Rel-6 (Release 6) Rel-7 (Release 7)

Reason for change:	№ The description of the SRNS relocation is incorrect with respect to the description of UE involved / not involved.
Summary of change:	№ The cases where the SRNS Relocation is UE involved / UE not involved is clarified.
Consequences if not approved:	№ The description of SRNS Relocation in section 6.4.8 will be incorrect

Clauses affected:	№ 6.4.8										
Other specs affected:	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">Y</td> <td style="width: 20px; text-align: center;">N</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">X</td> <td style="text-align: center;">X</td> </tr> </table> Other core specifications № Test specifications O&M Specifications	Y	N	X	X	X	X	X	X		
Y	N										
X	X										
X	X										
X	X										
Other comments:	№										

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at <http://www.3gpp.org/specs/CR.htm>. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked № contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under <ftp://ftp.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

6.4.8 SRNS Relocation

The SRNS relocation procedure can be divided into two phases. The first phase is relocation preparation; where the resources are reserved, new RABs are established while the second phase is the transfer of the Serving RNS from source to target RNC.

In what follows, lossless radio bearers are RBs using AM and configured to support lossless SRNS relocation. Seamless radio bearers are RBs using UM or AM not configured to support lossless SRNS relocation.

There are three cases in which an SRNS relocation can be performed:

- Serving SRNS relocation: This is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC.
- Combined Hard Handover and SRNS relocation: This is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC, while performing a hard handover decided by the UTRAN.
- Combined Cell/URA update and SRNS relocation: This is used to move the UTRAN to CN connection point at the UTRAN side from the source SRNC to the target RNC, while performing a cell re-selection in the UTRAN.

and these are described in subclauses 6.4.8.1, 6.4.8.2 (for lossless radio bearers), 6.4.8.3, 6.4.8.4 (for seamless radio bearers), and in more detail in [6].

6.4.8.1 Combined Cell/URA Update and SRNS relocation (lossless radio bearers)

The procedure is initiated by the source RNC deciding to perform a SRNS relocation. [The scenario below describes the SRNS Relocation of the type "UE not involved". Case I represents the situation when the UE is not involved and this is shown in figure 34. Case II represents the situation when the UE is involved and a Combined Cell/URA update and SRNS relocation is performed, also shown in figure 34. In Case I the SRNS relocation is triggered by the UTRAN MOBILITY INFORMATION message. In Case II the SRNS relocation is triggered by the CELL UPDATE CONFIRM message.](#)

A RANAP Relocation Command is received by the source RNC from the CN, indicating the RABs to be released and the RABs that are subject to data forwarding. Lossless SRNS relocation is always, and only, configured for RABs that are subject to data forwarding. The PDCP layer shall support PDCP sequence numbering when lossless SRNS relocation is supported [7].

For the affected radio bearers, the RLC entity is stopped and the next PDCP sequence numbers are retrieved by RRC. The next PDCP send and receive sequence numbers are then transferred in the RNSAP Relocation Commit message from source to target RNC for RABs that support lossless SRNS relocation. The target RNC becomes the serving RNC when the RANAP Relocation Detect message is sent.

The target RNC then sends on SRB#1 (UM/DCCH) a UTRAN MOBILITY INFORMATION (Case I) or a CELL/URA UPDATE CONFIRM (Case II); which configures the UE with the new U-RNTI and indicates the next uplink receive PDCP sequence number for each radio bearer configured to support lossless SRNS relocation.

The target RNC establishes a UM RLC entity for SRB#1, and the DL HFN and the VT(US) are set to the values in the RRC information container, respectively. In the UM RLC entity, the "Special LI" is used to indicate that an RLC SDU begins in the beginning of an RLC PDU.

Upon reception by the UE of the message, the UE compares the next uplink receive PDCP sequence number with the UE next uplink send PDCP sequence number. If this confirms PDCP SDUs successfully transferred before the start of relocation i.e. already received by the source RNC then these are discarded by the UE. The UE reinitialises the PDCP header compression entities of the radio bearers configured to use a header compression protocol [7]. The AM RLC entity for SRB#2 is (re-)established both on the UTRAN and UE sides, and their HFN values are set to the MAX(UL HFN of SRB2 | DL HFN of SRB2) incremented by one.

If the UE has successfully configured itself, it shall send a UTRAN MOBILITY INFORMATION CONFIRM (Case I and Case II). These messages contain the START values and the next downlink receive PDCP sequence number for each radio bearer configured to support lossless SRNS relocation.

Upon reception and acknowledgement by the UTRAN of the message, the UTRAN compares the next downlink receive PDCP sequence number with the next downlink send PDCP sequence number. The UTRAN initialises the PDCP header compression entities of the radio bearers configured to use a header compression protocol [7]. The RLC entities for affected radio bearers (other than SRB#2) are (re-)established both on the UTRAN and UE side. The HFN values for each RB are set to the START value in the message for the corresponding CN domain, and all the RLC data buffers are flushed.

In case of failure, the UE shall send a UTRAN MOBILITY INFORMATION FAILURE (Case I and Case II).

Upon reception of the UTRAN MOBILITY INFORMATION CONFIRM/FAILURE (Case I and Case II), the relocation procedure ends.

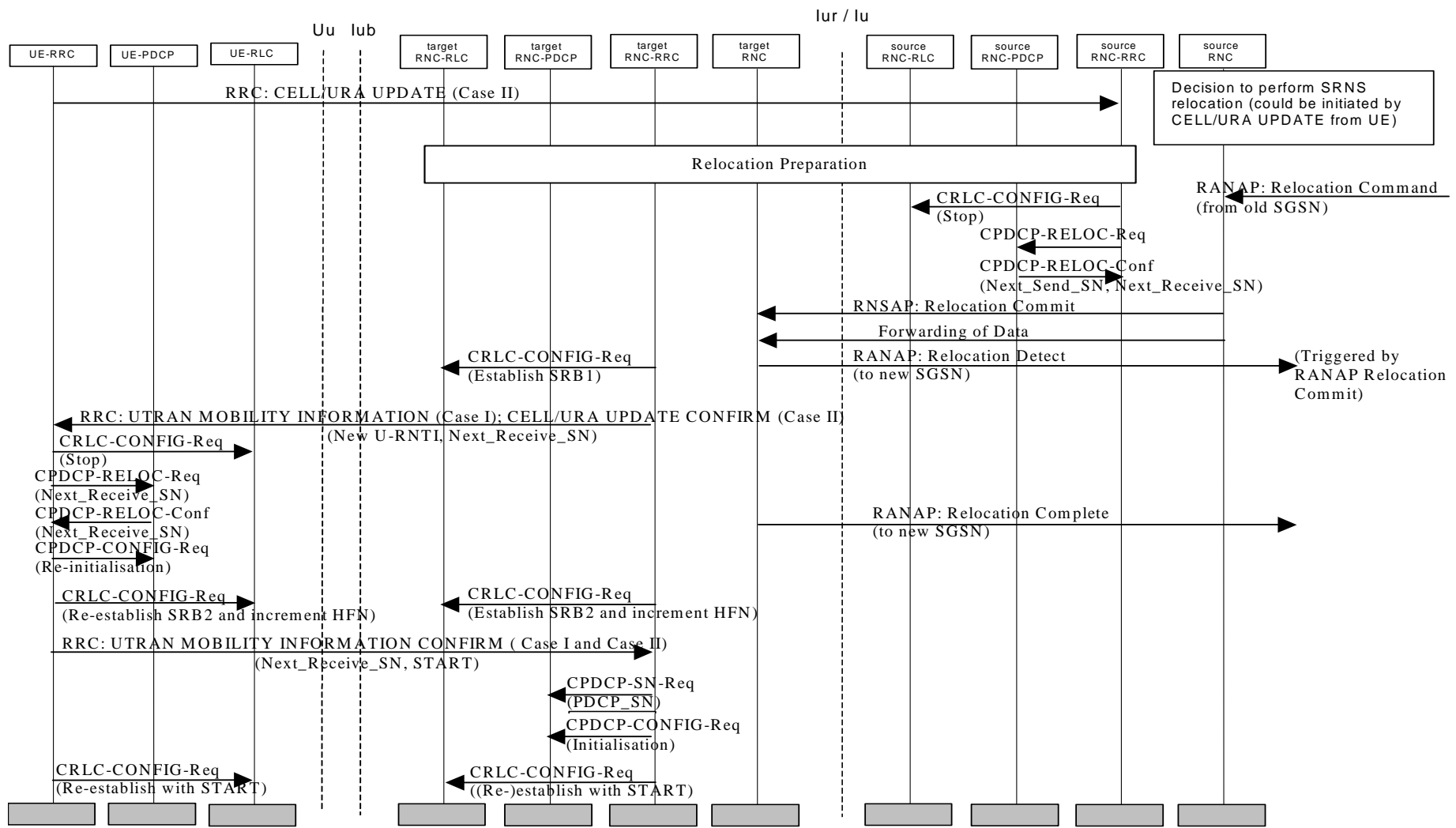


Figure 34: Combined Cell/URA Update and SRNS relocation (lossless radio bearers)

6.4.8.2 Combined Hard Handover and SRNS relocation (lossless radio bearers)

Based on measurement results and knowledge of the UTRAN topology, the source SRNC decides to initiate a combined hard handover and SRNS relocation. The UE is still under control of the SRNC but is moving to a location controlled by the target RNC. [The scenario below describes the SRNS Relocation of the type “UE involved”.](#)

A RANAP Relocation Command is received by the source RNC from the CN, indicating the RABs to be released, the Target RNC to Source RNC Transparent Container and the RABs that are subject to data forwarding. Lossless SRNS relocation is always, and only, configured for RABs that are subject to data forwarding. The PDCP layer shall support PDCP sequence numbering when lossless SRNS relocation is supported [7]. The Target RNC to Source RNC Transparent Container includes the RRC message (e.g. PHYSICAL CHANNEL RECONFIGURATION) for hard handover.

Upon reception of the RANAP Relocation Command, the RRC entity in the source RNC stops the RLC entities for the affected radio bearers and retrieves the PDCP sequence numbers. It then triggers the execution of the relocation of SRNS by sending the RRC message to the UE using the acknowledged mode dedicated signalling radio bearer (SRB #2). This message includes the new U-RNTI (from the target RNC) and the next uplink receive PDCP sequence number for each radio bearer configured to support lossless SRNS relocation (from the source RNC). The UE reinitialises the PDCP header compression entities of the radio bearers configured to use a header compression protocol [7].

The next PDCP send and receive sequence numbers are then transferred via the CN during the forwarding of SRNS contexts from source to target RNC. The target RNC becomes the serving RNC when the RANAP Relocation Detect message is sent.

Upon reception and acknowledgment by the UE of the message, the RLC entity for the acknowledged mode dedicated signalling radio bearer (SRB #2) is re-established, both on the UTRAN and UE sides and their HFN values are set to the $\text{MAX}(\text{uplink HFN of RB2} \mid \text{downlink HFN of RB2}) + 1$. Care should be taken by UTRAN in timing the SRNS relocation so that there is no risk of a SN rollover on SRB #2 during this procedure.

The UE compares the next uplink receive PDCP sequence number with the next uplink send PDCP sequence number. If this confirms PDCP SDUs successfully transferred before the start of relocation i.e. already received by the source RNC then these are discarded by the UE.

If the UE has successfully configured itself, it sends a response message, in this case a PHYSICAL CHANNEL RECONFIGURATION COMPLETE message to the target RNC using the acknowledged mode dedicated signalling radio bearer (SRB #2). This message contains the START values and the next downlink receive PDCP sequence number for each radio bearer configured to support lossless SRNS relocation.

Upon acknowledgement of the message, the RLC entities for affected radio bearers are re-established both on the UTRAN and UE side. The HFN values for each RB are set to the START value in the message for the corresponding CN domain.

UTRAN compares the next downlink receive PDCP sequence number with the next downlink send PDCP sequence number. The UTRAN initialises the PDCP header compression entities of the radio bearers configured to use a header compression protocol [7].

The UTRAN and the UE continue the RLC and PDCP entities of the affected RBs and the relocation procedure ends.

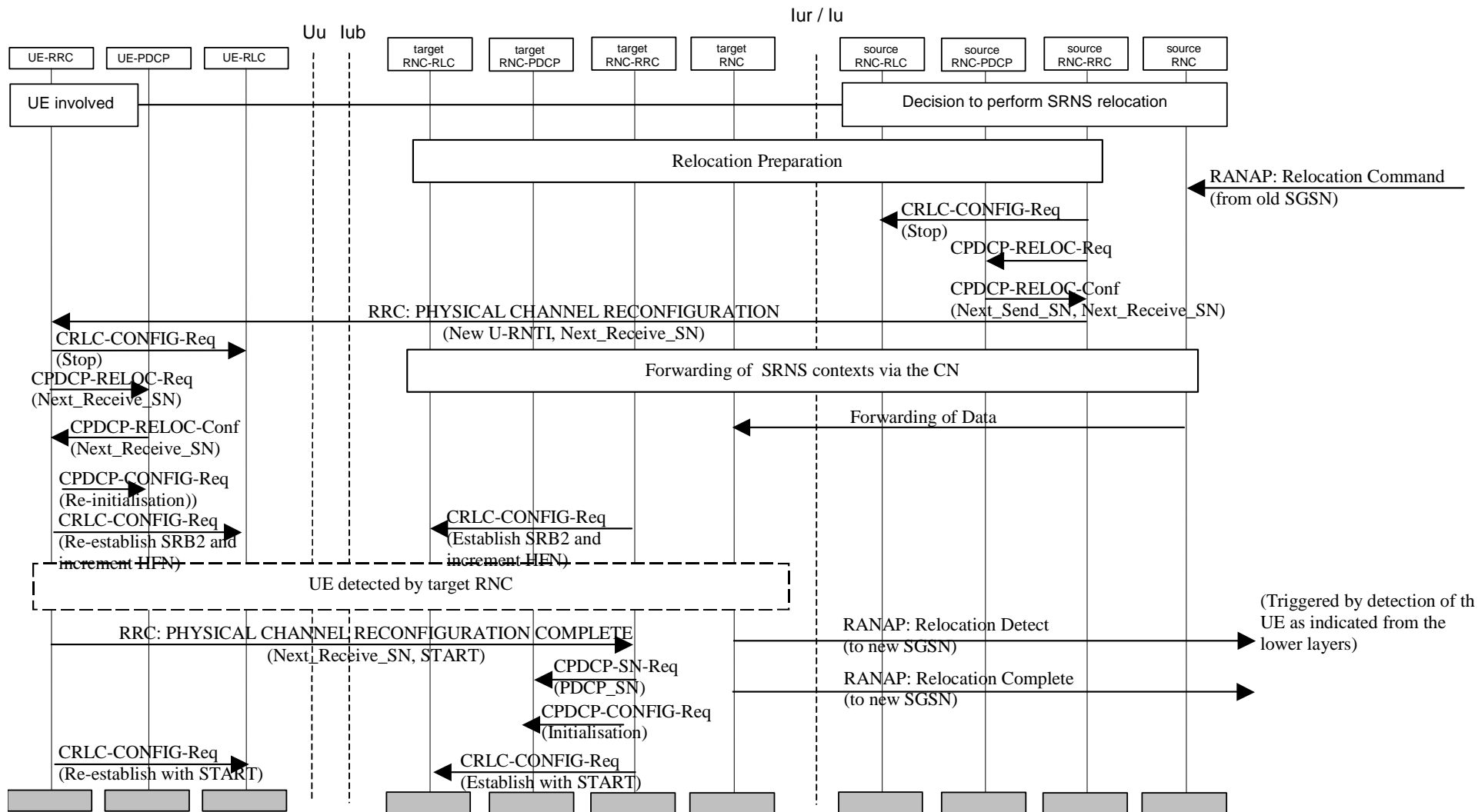


Figure 35: Combined Hard Handover and SRNS relocation (lossless radio bearers)

6.4.8.3 Combined Cell/URA Update and SRNS relocation (seamless radio bearers)

The procedure is initiated by the source RNC deciding to perform a SRNS relocation. [The scenario below describes the SRNS Relocation of the type "UE not involved". Case I represents the situation when the UE is not involved and this is shown in figure 36. Case II represents the situation when the UE is involved and a Combined Cell/URA update and SRNS relocation is performed, also shown in figure 36. In Case I the SRNS relocation is triggered by the UTRAN MOBILITY INFORMATION message. In Case II the SRNS relocation is triggered by the CELL UPDATE CONFIRM message.](#)

A RANAP Relocation Command is received by the source RNC from the CN, indicating the RABs to be released. PDCP of the source RNC takes a snapshot of the header compression context on the radio bearers and header compression protocols configured to apply the context relocation [7] and transfers the context information to target RNC. The source RNC continues the downlink data transmission on radio bearers supporting seamless SRNS relocation until the target RNC becomes the serving RNC. The target RNC becomes the serving RNC when the RANAP Relocation Detect message is sent.

The target RNC sends on SRB#1 (UM/DCCH) a UTRAN MOBILITY INFORMATION (Case I) or a CELL/URA UPDATE CONFIRM (Case II); which configures the UE with the new U-RNTI.

The target RNC establishes a UM RLC entity for SRB#1, and the DL HFN and the VT(US) are set to the values in the RRC information container, respectively. In the UM RLC entity, the "Special LI" is used to indicate that an RLC SDU begins in the beginning of an RLC PDU.

Upon reception by the UE of the message, the AM RLC entity for SRB#2 is (re-)established both on the UTRAN and UE sides, and their HFN values are set to the MAX(UL HFN of SRB2 | DL HFN of SRB2) incremented by one.

If the UE has successfully configured itself, it shall send a UTRAN MOBILITY INFORMATION CONFIRM (Case I and Case II). These messages contain the START values (to be used in integrity protection and in ciphering on radio bearers using UM and AM RLC).

Upon reception and acknowledgement by the UTRAN of the message, the UTRAN initialises and the UE reinitialises the PDCP header compression protocols of the radio bearers configured to use a header compression protocol without the context relocation [7]. For the radio bearers and header compression protocols applying context relocation, UTRAN initialises header compression protocols based on the context information received from the source RNC and UE continues header compression without re-initialisation. Further description of specific actions in UTRAN and UE in the case of context relocation is found in [7]. The RLC entities for affected radio bearers (other than SRB#2) are (re-)established both on the UTRAN and UE side. The HFN values for each RB are set to the START value in the message for the corresponding CN domain, and all the RLC data buffers are flushed.

In case of failure, the UE shall send a UTRAN MOBILITY INFORMATION FAILURE (Case I and Case II).

Upon reception of the UTRAN MOBILITY INFORMATION CONFIRM/FAILURE (Case I and Case II), the relocation procedure ends.

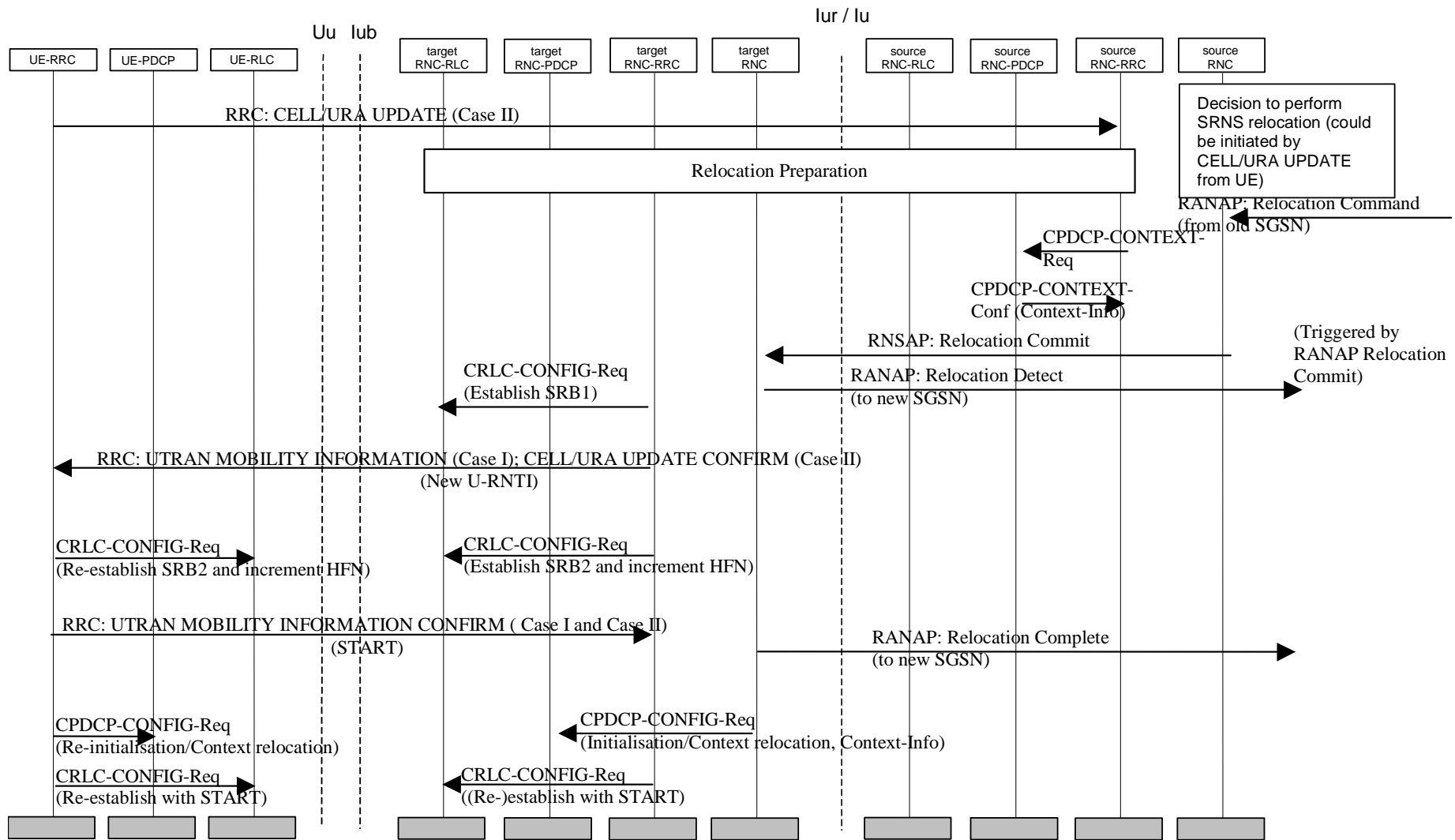


Figure 36: Combined Cell/URA Update and SRNS relocation (seamless radio bearers)

6.4.8.4 Combined Hard Handover and SRNS relocation (seamless radio bearers)

Based on measurement results and knowledge of the UTRAN topology, the source SRNC decides to initiate a combined hard handover and SRNS relocation. The UE is still under control of the SRNC but is moving to a location controlled by the target RNC. [The scenario below describes the SRNS Relocation of the type "UE involved"](#).

The source RNC continues the downlink data transmission on radio bearers supporting seamless SRNS relocation until the target RNC becomes the serving RNC. The target RNC becomes the serving RNC when the RANAP Relocation Detect message is sent.

A RANAP Relocation Command is received by the source RNC from the CN, indicating the RABs to be released. The Target RNC to Source RNC Transparent Container includes the RRC message (e.g. PHYSICAL CHANNEL RECONFIGURATION) for hard handover. This message includes the new U-RNTI.

Upon reception of the RANAP Relocation Command, the source RNC triggers the execution of the relocation of SRNS by sending the RRC message to the UE using the acknowledged mode dedicated signalling radio bearer. Simultaneously PDCP of the source RNC takes a snapshot of the header compression contexts on each of those radio bearers and header compression protocols configured to apply the context relocation and transfers them to target RNC during the "forwarding of SRNS contexts via the CN" phase [7].

Upon reception and acknowledgment by the UE of the PHYSICAL CHANNEL RECONFIGURATION message, the RLC entity for the acknowledged mode dedicated signalling radio bearer (SRB #2) is re-established, both on the UTRAN (target SRNC) and UE sides, and their HFN values are set to $\text{MAX}(\text{uplink HFN of RB2} \mid \text{downlink HFN of RB2}) + 1$. Care should be taken by UTRAN in timing the SRNS relocation so that there is no risk of a SN rollover on SRB #2 during this procedure.

If the UE has successfully configured itself, it sends a response message, in this case PHYSICAL CHANNEL RECONFIGURATION COMPLETE message to the target RNC using the acknowledged mode dedicated signalling radio bearer (SRB #2). This message is transmitted based on the new RLC context and contains the START values (to be used in integrity protection and in ciphering on radio bearers using UM and AM RLC). The UTRAN initialises and the UE reinitialises the PDCP header compression protocols of the radio bearers configured to use a header compression protocol without the context relocation [7]. For those radio bearers and header compression protocols applying context relocation, UTRAN initialises header compression protocols based on the context information received from the source RNC and UE continues header compression without re-initialisation. Further description of specific actions in UTRAN and UE in the case of context relocation is found in [7].

Upon acknowledgement of the message, the RLC entities for the rest of the affected radio bearers are re-established both on the UTRAN and UE side. The HFN values for each RB are set to the START value in the message for the corresponding CN domain. The HFN values for each remaining signalling radio bearer (other than SRB #2) are set to the START value in the message for the last configured CN domain.

The relocation procedure ends.

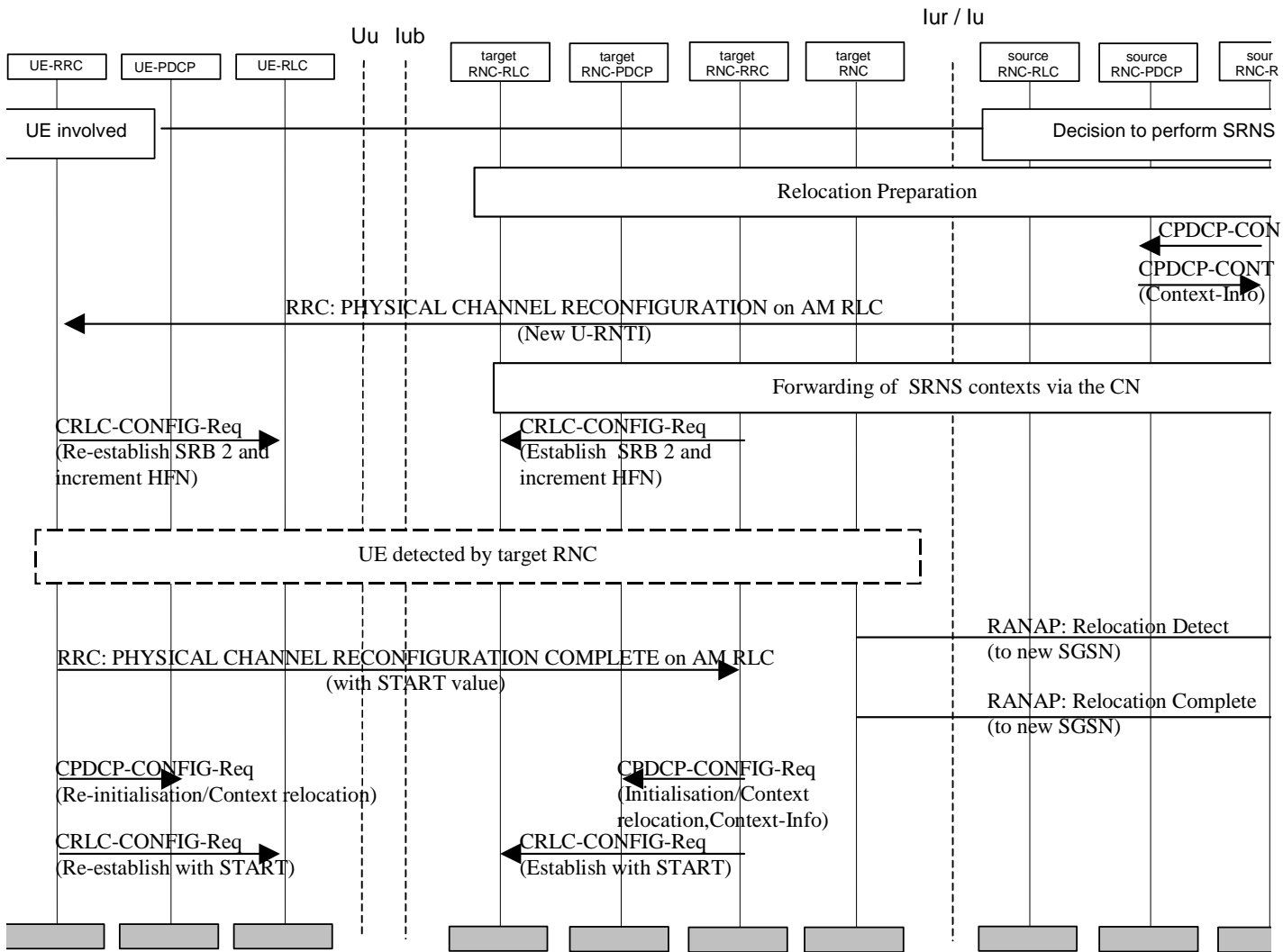


Figure 37: Combined Hard Handover and SRNS relocation (seamless radio bearers)