TSG-RAN Meeting #16
Marco Island, FL, USA, 4 - 7 June 2002

RP-020323

Title: **Agreed CRs (Release '99 and Rel-4/Rel-5 category A) to TS 25.303**

Source: **TSG-RAN WG2**

Agenda item: **7.2.3**

Doc-1st-	Status-	Spec	CR	Rev	Phase	Subject	Cat	Version	Versio
R2-021208	agreed	25.303	070		R99	Clarification on lossless SRNS Relocation	F	3.11.0	3.12.0
R2-021209	agreed	25.303	071		Rel-4	Clarification on lossless SRNS Relocation	A	4.4.0	4.5.0
R2-021210	agreed	25.303	072		Rel-5	Clarification on lossless SRNS Relocation	A	5.0.0	5.1.0

3GPP TSG-RAN WG2 meeting #29
Gyeongju, Korea, May 13-17, 2002

R2-021208

CR-Form-v5.1

CHANGE REQUEST

⌘ **25.303** **CR** **070** ⌘ **rev** **-** ⌘ Current version: **3.11.0** ⌘

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

Proposed change affects: ⌘ (U)SIM [ ] ME/UE [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Clarification on lossless SRNS Relocation
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2002-05-07
Category:	⌘	**F**
Release:	⌘	R99

Use one 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 one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	At WG2 #27 meeting, “Receive_SN” and “Send_SN” are modified as “Next_Receive_SN” and “Next_Send_SN” in the agreed CR R2-020411 for TS 25.323. The related sections described in TS 25.303 should also be modified to algin with that change.
Summary of change:	⌘	1. The uplink/downlink PDCP seqeunce number described in section 6.4.8.1 and 6.4.8.2 is replaced with the “next” uplink/downlink PDCP sequence number. 2. “Receive_SN” and “Send_SN” are replaced with “Next_Receive_SN” and “Next_Send_SN” respectively in figures.
Consequences if not approved:	⌘	Do not align with the current release of TS 25.323.

Clauses affected:	⌘	6.4.8.1, 6.4.8.2		
Other specs affected:	⌘	[ ] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	25.303 v4.4.0, CR 071 25.303 v5.0.0, CR 072
Other comments:	⌘			

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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. 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.

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.

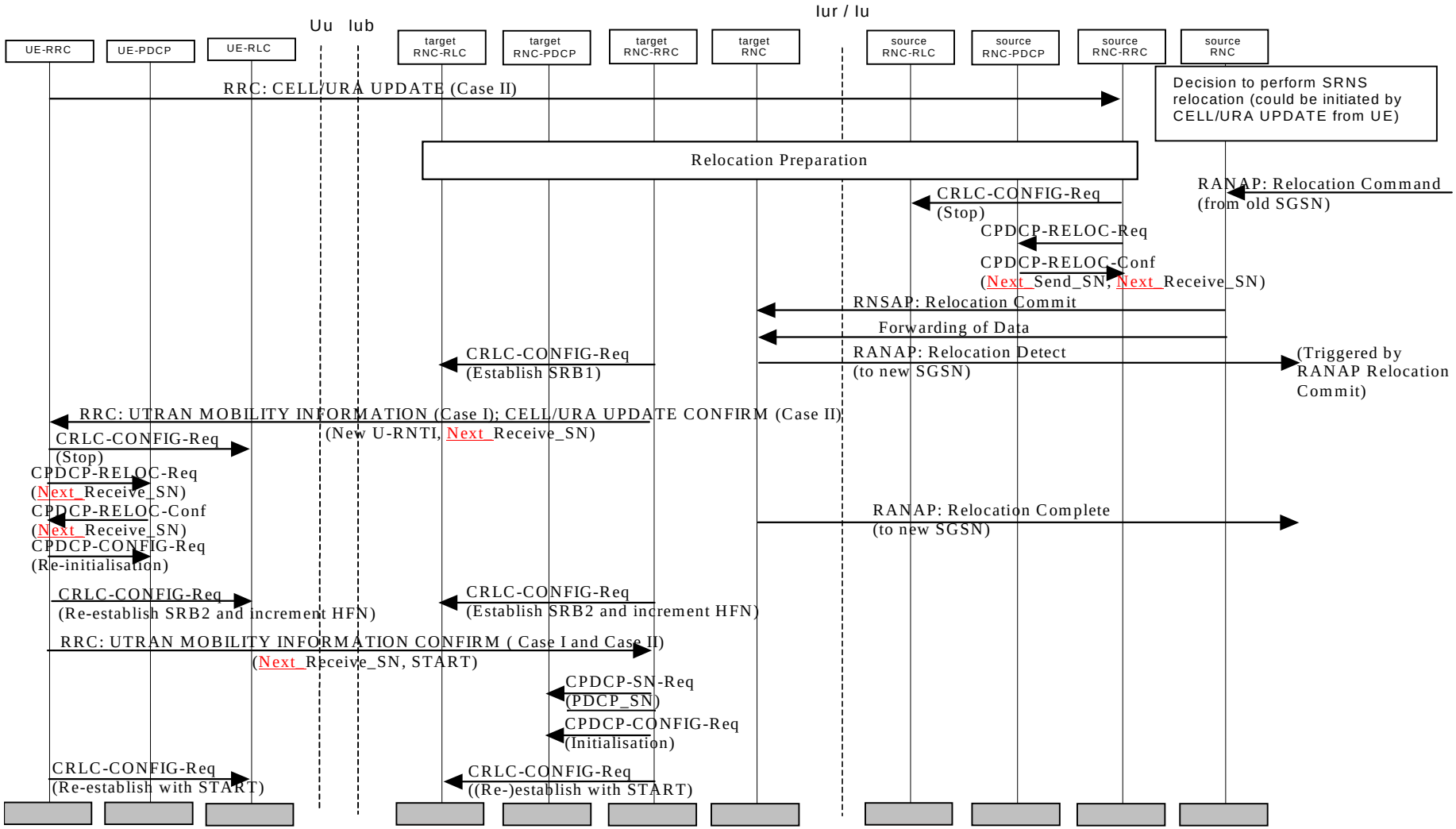

Figure 34: Combined Cell/URA Update and SRNS relocation (lossless radio bearers)

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.

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 MAX(uplink HFN of RB2 | 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.

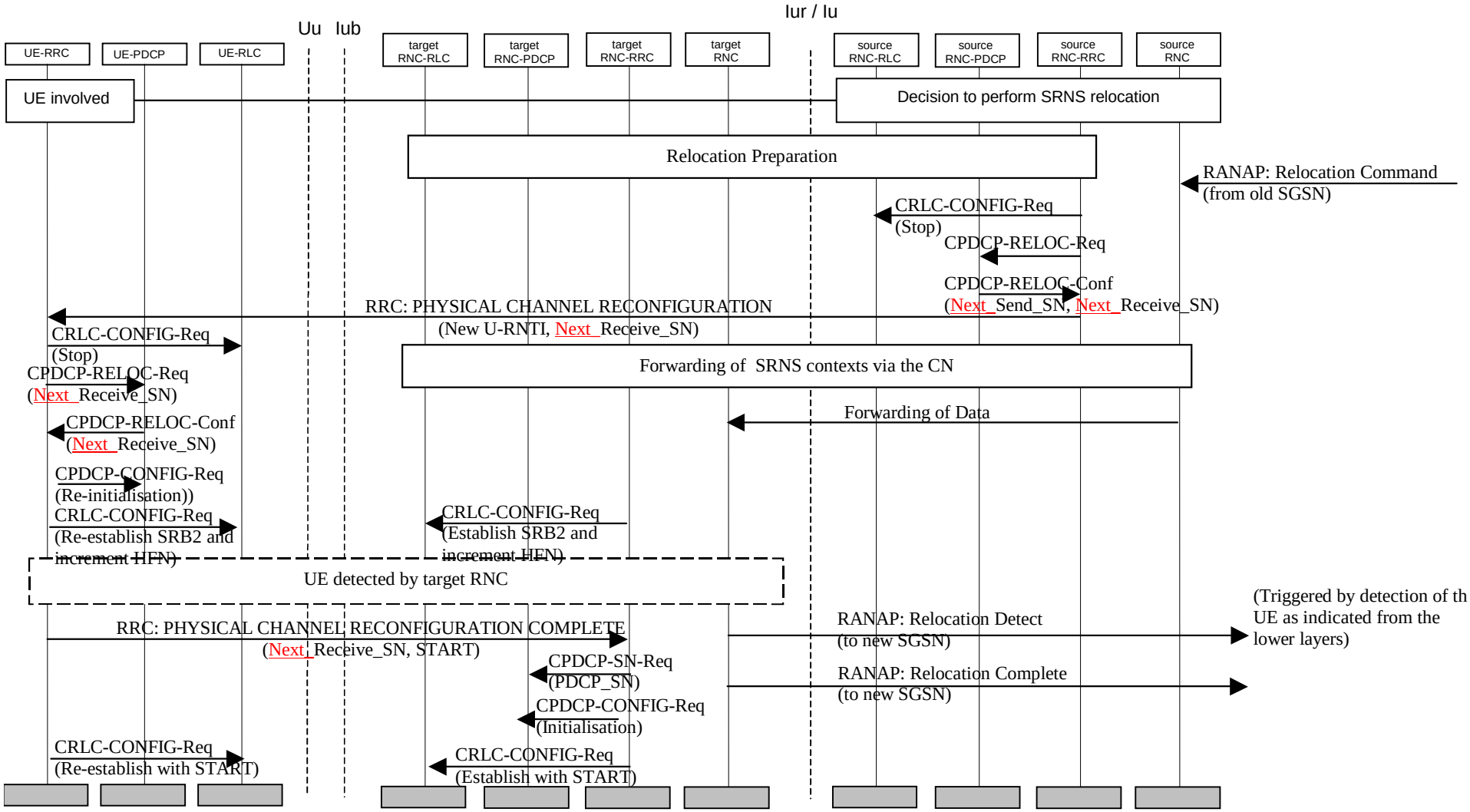

Figure 35: Combined Hard Handover and SRNS relocation (lossless radio bearers)

3GPP TSG-RAN WG2 meeting #29
Gyeongju, Korea, May 13-17, 2002

R2-021209

CR-Form-v5.1

CHANGE REQUEST

⌘ **25.303** **CR** **071** ⌘ **rev** **-** ⌘ Current version: **4.4.0** ⌘

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

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Clarification on lossless SRNS Relocation
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2002-05-07
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
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REL-5	*(Release 5)*

Reason for change:	⌘	At WG2 #27 meeting, “Receive_SN” and “Send_SN” are modified as “Next_Receive_SN” and “Next_Send_SN” in the agreed CR R2-020411 for TS 25.323. The related sections described in TS 25.303 should also be modified to algin with that change.
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Consequences if not approved:	⌘	Do not align with the current release of TS 25.323.

Clauses affected:	⌘	6.4.8.1, 6.4.8.2		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.303 v3.11.0, CR 070 25.303 v5.0.0, CR 072
Other comments:	⌘			

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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.

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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).

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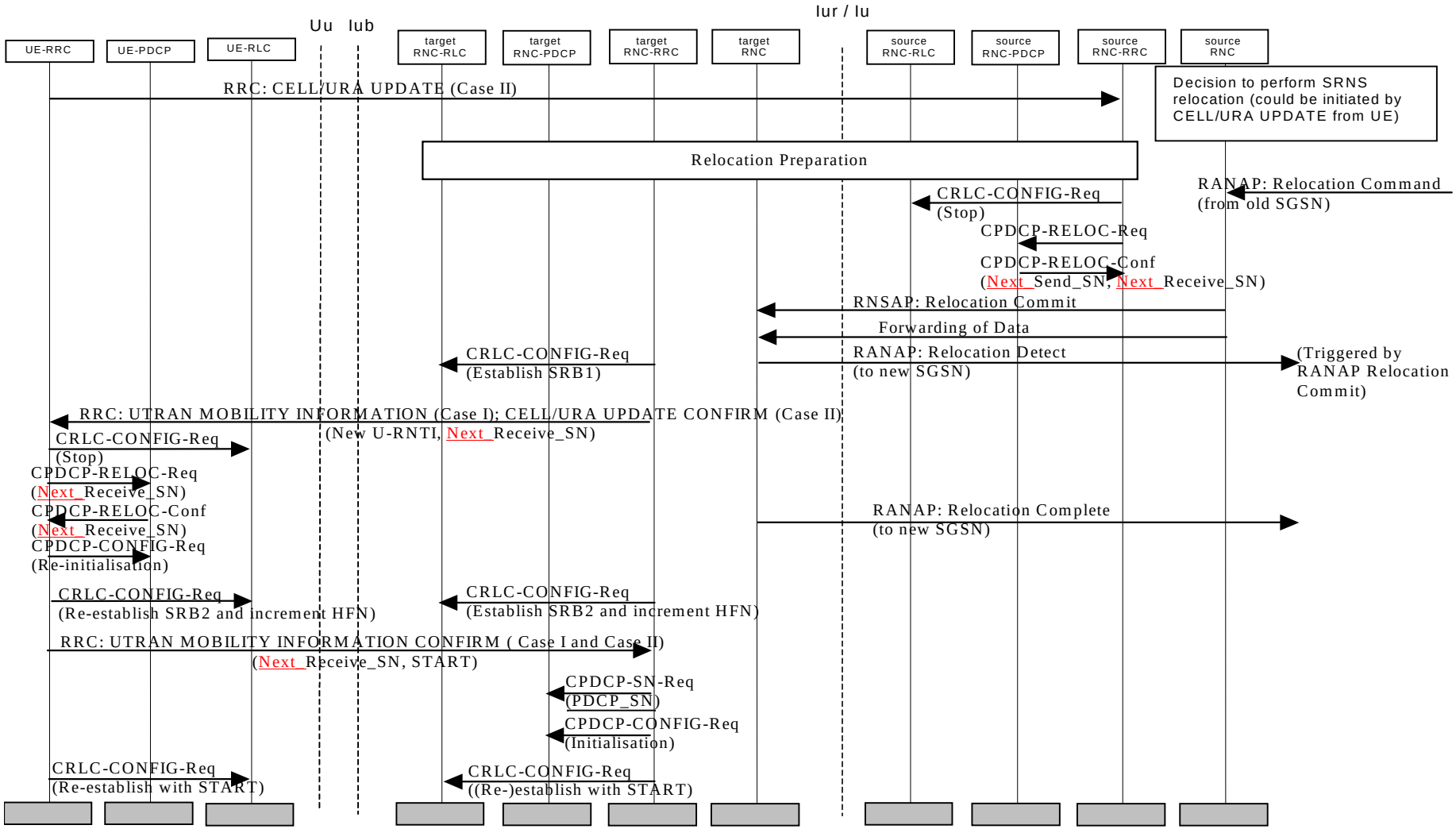

Figure 34: Combined Cell/URA Update and SRNS relocation (lossless radio bearers)

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.

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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 MAX(uplink HFN of RB2 | 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.

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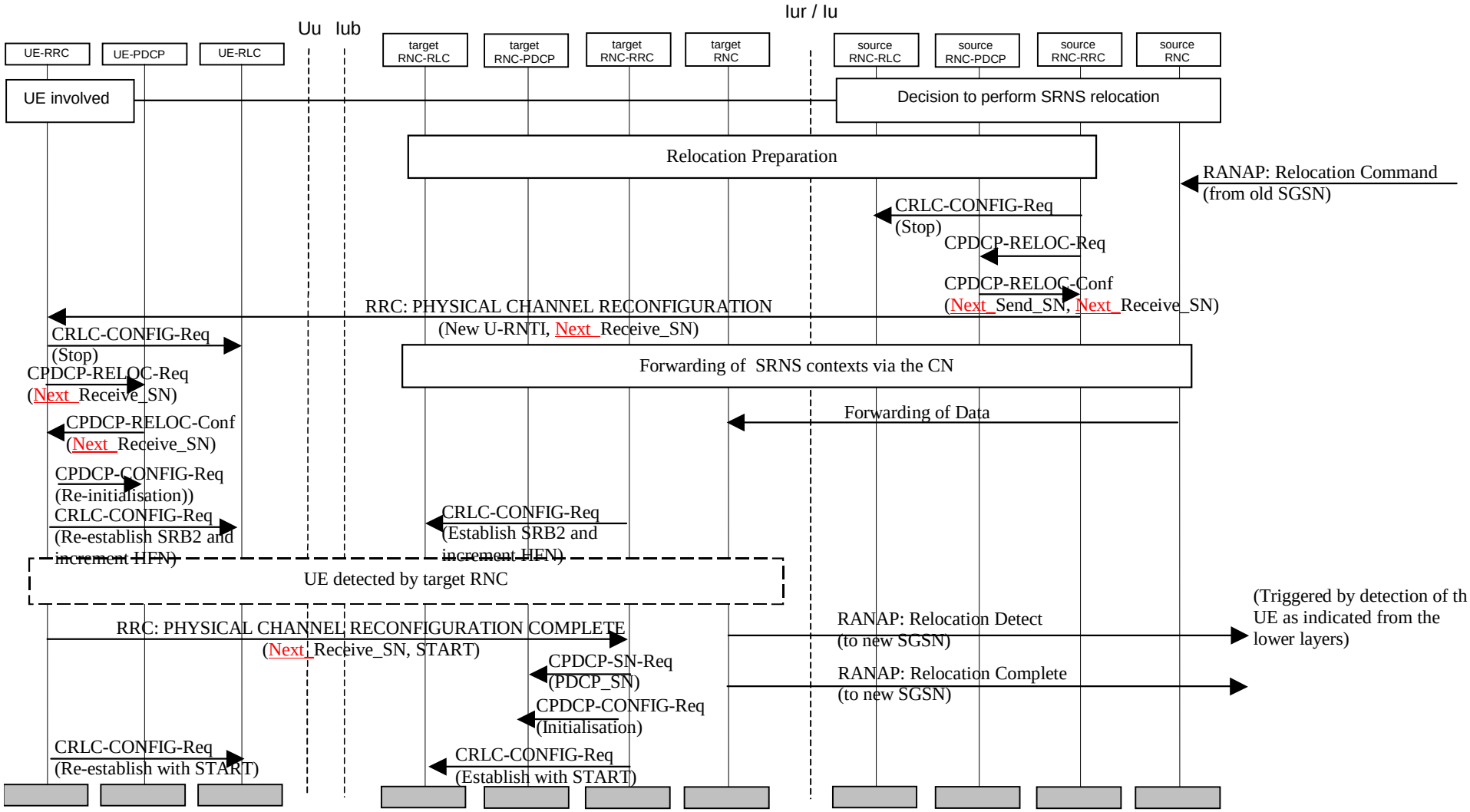

Figure 35: Combined Hard Handover and SRNS relocation (lossless radio bearers)

3GPP TSG-RAN WG2 meeting #29
Gyeongju, Korea, May 13-17, 2002

R2-021210

CR-Form-v5.1

CHANGE REQUEST

⌘ **25.303** **CR** **072** ⌘ **rev** **-** ⌘ Current version: **5.0.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Clarification on lossless SRNS Relocation
Source:	⌘	TSG-RAN WG2
Work item code:	⌘	TEI
Date:	⌘	2002-05-07
Category:	⌘	**A**
Release:	⌘	REL-5

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Clauses affected:	⌘	6.4.8.1, 6.4.8.2		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.303 v3.11.0, CR 070 25.303 v4.4.0, CR 071
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The procedure is initiated by the source RNC deciding to perform a SRNS relocation. 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.

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.

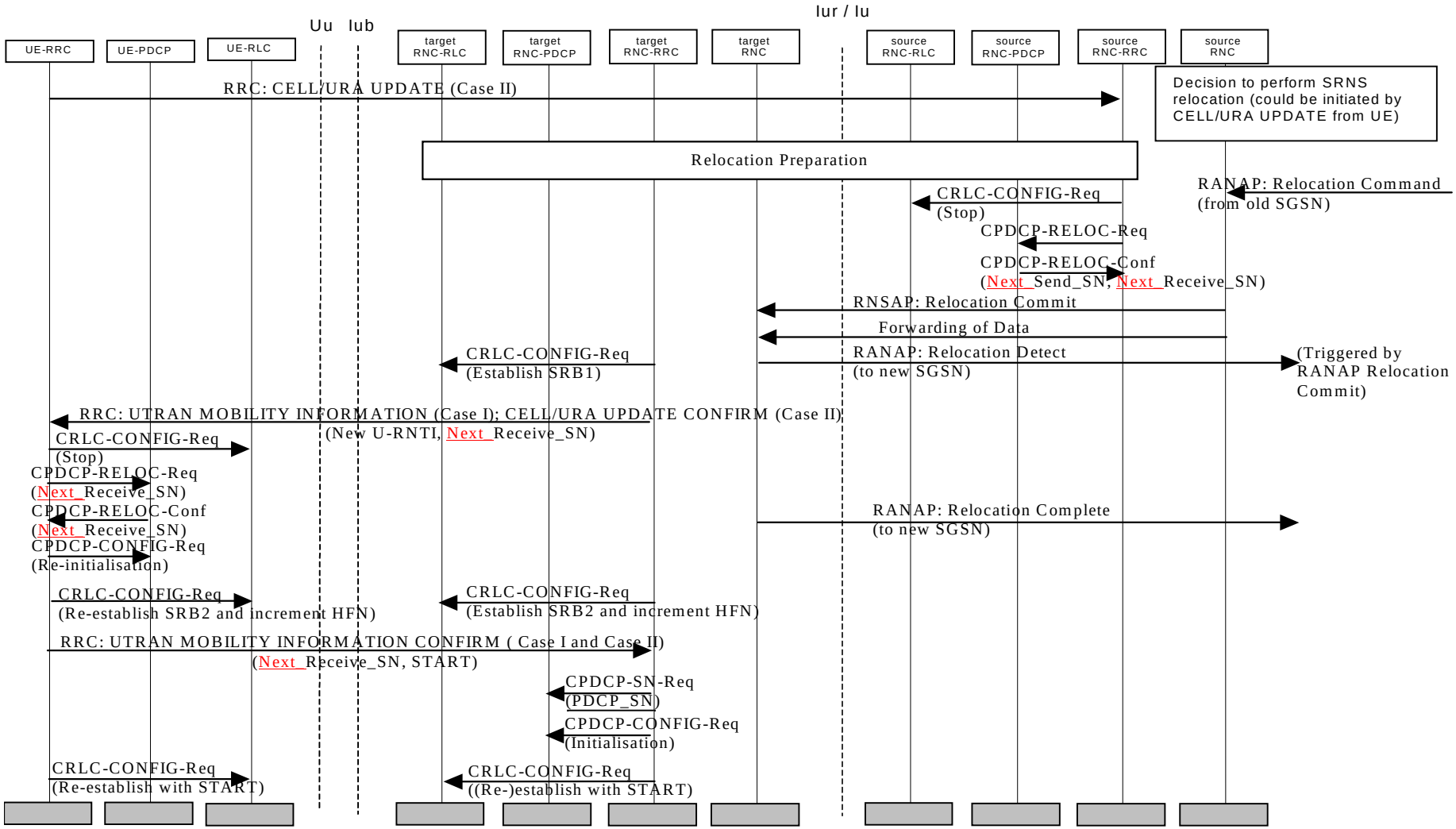

Figure 34: Combined Cell/URA Update and SRNS relocation (lossless radio bearers)

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.

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 MAX(uplink HFN of RB2 | 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.

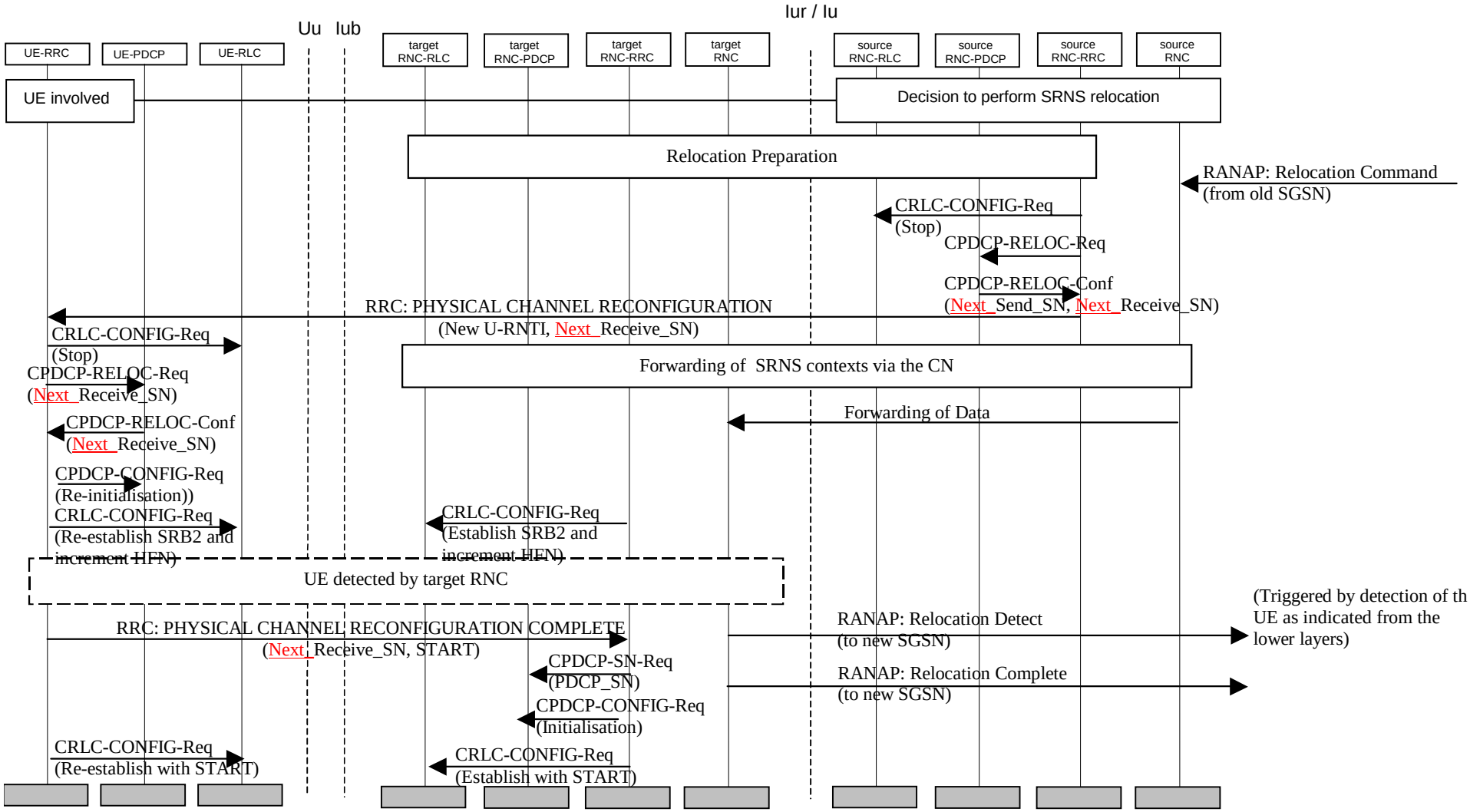

Figure 35: Combined Hard Handover and SRNS relocation (lossless radio bearers)