TSG-RAN Meeting #15
Cheju, Korea, 5 - 8 March 2002

TSGRP#15(02) 0177

Title: **Agreed CRs to TS 25.931**

Source: **TSG-RAN WG3**

Agenda item: **7.3.3/7.3.4**

RP_Num	Tdoc_Num	Specification	CR_Num	Revision_Num	3G_Release	CR_Subject	CR_Category	Cur_Ver_Num	Workitem
RP-020177	R3-020307	25.931	014		R99	Corrections and updates	F	3.5.0	TEI
RP-020177	R3-020308	25.931	015		Rel-4	Corrections and updates	A	4.2.0	TEI
RP-020177	R3-020602	25.931	016	1	R99	DSCH-related additions to Handover scenarios	F	3.5.0	TEI
RP-020177	R3-020603	25.931	017	1	Rel-4	DSCH-related additions to Handover scenarios	A	4.2.0	TEI

3GPP TSG-RAN WG3 Meeting #27 ***Tdoc R3-02-307***
Orlando, USA, 18th-22nd February 2002

CR-Form-v4

CHANGE REQUEST

⌘ **25.931** **CR** **014** ⌘ rev **-** ⌘ Current version: **3.5.0** ⌘

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

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

Title:	⌘	Corrections and updates
Source:	⌘	R-WG3
Work item code:	⌘	TEI
Date:	⌘	February 2002
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: ⌘ Several inaccuracies and errors are present both in the tables gathering the protocol messages mentioned in the document and in the examples on signalling procedures.

Some obsolete RRC messages are present (Intersystem Handover Command, Handover Complete).

Relocation Detect message is missing from the SRNS procedure example

The section dedicated to RRC Connection RACH/FACH Establishment points to a non-existing example in the 25.433 specification. The erroneous reference should be replaced by the example itself.

Summary of change: ⌘

- SRNS Relocation procedure has been added in table 1 with regard to the Relocation Detect message
- Paging message has been deleted from NBAP message table
- Physical Shared Channel Reconfiguration Response message has been inserted into NBAP message table
- Radio Link Addition Request & Response messages have been deleted from RNSAP and NBAP message table
- System Information Broadcast Request & Response have been substituted by System Information Update Request & Response in the NBAP message table
- Handover from UTRAN Command message has been inserted into RRC message table
- In section 7.3.1 the obsolete 'Initial UE Capability' IE has been removed from the RRC Connection Request message and the 'UE Radio Access Capability' IE has been added in the RRC Connection Setup Complete message.
- A figure depicting the RRC Connection RACH/FACH establishment procedure is

		added in 7.3.2 and the text is changed accordingly. • The example in 7.6.2 (DCH establishment) has been clarified for both CS an PS domain • Message Sequence Chart in fig. 20 has been renumbered and reference to Q.AAL2 has been corrected • In the Hard Handover Failure example (fig.28), the 'new cell' has been exchanged with the 'old one'. • In figure 35 explanation text, (SRNS Relocation), the Relocation Command message is not to be sent to the target RNC. The Relocation Detect message has been added • Intersystem Handover Command has been replaced by the Handover from UTRAN Command and Handover Complete has been replaced by Handover to UTRAN Complete in the intersystem handover procedure examples • Intersystem Handover Command has been replaced by Cell Change Order from UTRAN in the UMTS→ GPRS Cell Reselection example • Some typos have been corrected *Impact Analysis:* Impact assessment towards the previous version of the specification (same release): This CR has no impact with the previous version of the specification (same release) because 25.931 has purely informative character.
Consequences if not approved:	⌘	Inaccuracies and errors will remain in the TR

Clauses affected:	⌘	4.2; 4.4; 4.5; 4.7; 7.3.1; 7.3.2; 7.6.2; 7.8.1; 7.11.1.1; 7.11.1.2; 7.11.2.1; 7.12.2; 7.12.3; 7.13.1.1; 7.13.1.2; 7.13.1.3; 7.13.2; 7.13.5		
Other specs affected:	⌘	[X] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	25.931 v4.1.0 CR xxx
Other comments:	⌘			

4.2 RANAP Procedures & Messages

For a detailed description of RANAP procedures and messages refer to [3]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 1

Message Name	UTRAN Procedure	Direction
Direct Transfer	Uplink Direct Transfer Downlink Direct Transfer	RNC ⇒ CN CN ⇒ RNC
Initial UE Message	NAS Signalling Connection Establishment	RNC ⇒ CN
Iu Release Command	RRC Connection Release Hard HO with switching in the CN SRNS Relocation UTRAN ⇒ GSM/BSS handover	CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC
Iu Release Complete	RRC Connection Release Hard HO with switching in the CN SRNS Relocation UTRAN ⇒ GSM/BSS handover	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Paging	Paging for a UE in RRC Idle Mode Paging for a UE in RRC Connected Mode	CN ⇒ RNC CN ⇒ RNC
Radio Access Bearer Assignment Request	Radio Access Bearer Establishment Radio Access Bearer Release Radio Access Bearer Modification	CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC
Radio Access Bearer Assignment Response	Radio Access Bearer Establishment Radio Access Bearer Release Radio Access Bearer Modification	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Relocation Command	Hard HO with switching in the CN SRNS Relocation UTRAN ⇒ GSM/BSS handover	CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC
Relocation Complete	Hard HO with switching in the CN SRNS Relocation GSM/BSS handover ⇒ UTRAN	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Relocation Detect	Hard HO with switching in the CN SRNS Relocation GSM/BSS handover ⇒ UTRAN	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Relocation Failure	SRNS Relocation	RNC ⇒ CN
Relocation Request	Hard HO with switching in the CN SRNS Relocation GSM/BSS handover ⇒ UTRAN	CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC
Relocation Request Acknowledge	Hard HO with switching in the CN SRNS Relocation GSM/BSS handover ⇒ UTRAN	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Relocation Required	Hard HO with switching in the CN SRNS Relocation UTRAN ⇒ GSM/BSS handover	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN

4.3 SABP Procedures & Messages

For a detailed description of SABP procedures and messages refer to [9]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 2

Message Name	UTRAN Procedure	Direction
Write-replace	Service Area Broadcast	CN ⇒ RNC
Write-replace Complete	Service Area Broadcast	RNC ⇒ CN
Write-Replace Failure	Service Area Broadcast	RNC ⇒ CN

4.4 RNSAP Procedures & Messages

For a detailed description of RNSAP procedures and messages refer to [4]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 3

Message Name	UTRAN Procedure	Direction
Common Transport Channel Resources Release	Cell Update	SRNC ⇒ DRNC
Common Transport Channel Resources Initialisation Request	Cell Update	SRNC ⇒ DRNC
Common Transport Channel Resources Initialisation Response	Cell Update	DRNC ⇒ SRNC
DL Power Control Request	Downlink Power Control	SRNC ⇒ DRNC
Downlink Signalling Transfer Request	RRC Connection Re-establishment URA Update	SRNC ⇒ DRNC SRNC ⇒ DRNC
~~Radio Link Addition Request~~	~~RRC Connection Release~~ ~~Soft Handover~~ ~~Hard Handover~~	~~SRNC ⇒ DRNC~~ ~~SRNC ⇒ DRNC~~ ~~SRNC ⇒ DRNC~~
~~Radio Link Addition Response~~	~~RRC Connection Release~~ ~~Soft Handover~~ ~~Hard Handover~~	~~DRNC ⇒ SRNC~~ ~~DRNC ⇒ SRNC~~ ~~DRNC ⇒ SRNC~~
Radio Link Deletion Request	RRC Connection Re-establishment Soft Handover Hard Handover	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Deletion Response	RRC Connection Re-establishment Soft Handover Hard Handover	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Radio Link Failure Indication	Hard Handover	DRNC ⇒ SRNC
Radio Link Reconfiguration Request	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Reconfiguration Commit	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Reconfiguration Prepare	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Reconfiguration Ready	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Radio Link Reconfiguration Response	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Radio Link Restore Indication	Soft Handover Hard Handover Channel and Mobile State Switching on Iur	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Radio Link Setup Request	RRC Connection Re-establishment Hard Handover USCH/DSCH Configuration and Capacity Allocation [TDD]	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Setup Response	RRC Connection Re-establishment Hard Handover USCH/DSCH Configuration and Capacity Allocation [TDD]	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Relocation Commit	SRNS Relocation URA Update	Source RNC ⇒ Target RNC
Uplink Signalling Transfer Indication	RRC Connection Re-establishment URA Update	DRNC ⇒ SRNC DRNC ⇒ SRNC

4.5 NBAP Procedures & Messages

For a detailed description of NBAP procedures and messages refer to [5]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 4

Message Name	UTRAN Procedure	Direction
DL Power Control Request	Downlink Power Control	RNC ⇒ Node B
~~Paging~~	~~Paging~~	~~RNC ⇒ Node B~~
Physical Shared Channel Reconfiguration Request	USCH/DSCH Configuration and Capacity Allocation [TDD]	RNC ⇒ Node B
Physical Shared Channel Reconfiguration ~~Request~~Response	USCH/DSCH Configuration and Capacity Allocation [TDD]	Node B ⇒ RNC
~~Radio Link Addition Request~~	~~Hard Handover~~ ~~Soft Handover~~	~~RNC ⇒ Node B~~ ~~RNC ⇒ Node B~~
~~Radio Link Addition Response~~	~~Hard Handover~~ ~~Soft Handover~~	~~RNC ⇒ Node B~~ ~~RNC ⇒ Node B~~
Radio Link Deletion	RRC Connection Release RRC Connection Re-establishment Hard Handover Soft Handover	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Deletion Response	RRC Connection Release RRC Connection Re-establishment Hard Handover Soft Handover	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
Radio Link Failure Indication	Hard Handover	Node B ⇒ RNC
Radio Link Reconfiguration Commit	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Reconfiguration Prepare	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Reconfiguration Ready	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
Radio Link Reconfiguration Request	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Reconfiguration Response	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
Radio Link Restore Indication	RRC Connection Establishment RRC Connection Re-establishment Soft Handover Hard Handover Channel and Mobile State Switching on Iur	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
Radio Link Setup Request	RRC Connection Establishment RRC Connection Re-establishment Hard Handover Soft Handover USCH/DSCH Configuration and Capacity Allocation [TDD]	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Setup Response	RRC Connection Establishment RRC Connection Re-establishment Hard Handover Soft Handover USCH/DSCH Configuration and Capacity Allocation [TDD]	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
System Information ~~Broadcast~~ Update Request	System Information Broadcasting Service Area Broadcast	RNC ⇒ Node B RNC ⇒ Node B
System Information ~~Broadcast~~	System Information Broadcasting	Node B ⇒ RNC

Message Name	UTRAN Procedure	Direction
Update Response	Service Area Broadcast	Node B ⇒ RNC

4.6 ALCAP

ALCAP is a generic name to indicate the protocol(s) used to establish data transport bearers on the Iu, Iur and Iub interfaces. Q.2630.1 (Q AAL2) is one of the selected protocols to be used as ALCAP.

The following should be noted:

- data transport bearers may be dynamically established using ALCAP or preconfigured;
- transport bearers may be established before or after allocation of radio resources.

4.6.1 Q2630.1 (Q.AAL 2)

The following figure is showing an example of use of Q.2630.1 in the UTRAN context, for the different interfaces.

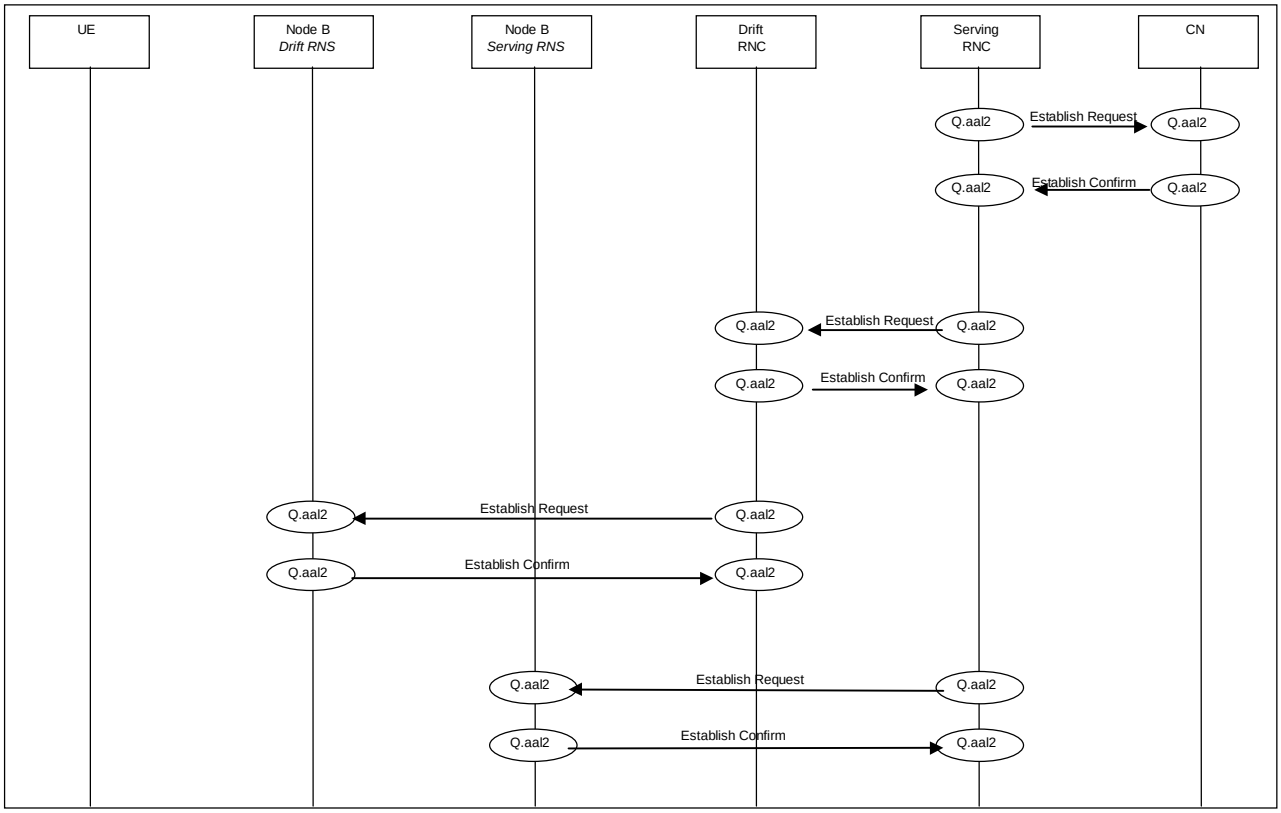


Figure 2: Example on Q.2630.1

4.7 RRC Procedures & Messages

For a detailed description of RRC procedures and messages refer to [8]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 5

Message Name	UTRAN Procedure	Direction
Active Set Update	Soft Handover	RNC ⇒ UE
Active Set Update Complete	Soft Handover	UE ⇒ RNC
Cell Update	RRC Connection Re-establishment Cell Update	UE ⇒ RNC UE ⇒ RNC
Cell Update Confirm	RRC Connection Re-establishment Cell Update	RNC ⇒ UE RNC ⇒ UE
Direct Transfer	NAS Signalling Conn. Establishment	UE ⇔ RNC
Downlink Direct Transfer	Downlink Direct Transfer	RNC ⇒ UE
Initial Direct Transfer	NAS Signalling Connection Establishment	UE ⇒ RNC
Measurement Control	Downlink Power Control	RNC ⇒ UE
Measurement Report	Downlink Power Control	UE ⇒ RNC
Paging Type 1	Paging for a UE in RRC Idle Mode and RRC connected mode (CELL_PCH and URA_PCH states) Paging for a UE in RRC Connected Mode	RNC ⇒ UE
Paging Type 2	Paging for a UE in RRC Connected Mode (CELL_DCH and CELL_FACH states)	RNC ⇒ UE
Physical Channel Reconfiguration	Physical Channel Reconfiguration Hard Handover	RNC ⇒ UE RNC ⇒ UE
Physical Channel Reconfiguration Allocation	USCH/DSCH Configuration and Capacity Allocation [TDD]	RNC ⇒ UE
Physical Channel Reconfiguration Complete	Physical Channel Reconfiguration Hard Handover	UE ⇒ RNC UE ⇒ RNC
PUSCH Capacity Request	USCH/DSCH Configuration and Capacity Allocation [TDD]	UE ⇒ RNC
RB Reconfiguration	USCH/DSCH Configuration and Capacity Allocation [TDD]	RNC ⇒ UE
RB Reconfiguration Complete	USCH/DSCH Configuration and Capacity Allocation [TDD]	UE ⇒ RNC
RB Release	Radio Access Bearer Release	RNC ⇒ UE
RB Release Complete	Radio Access Bearer Release	UE ⇒ RNC
RB Setup	Radio Access Bearer Establishment	RNC ⇒ UE
RB Setup Complete	Radio Access Bearer Establishment	UE ⇒ RNC
RRC Connection Release	RRC Connection Release	RNC ⇒ UE
RRC Connection Release Complete	RRC Connection Release	UE ⇒ RNC
RRC Connection Request	RRC Connection Establishment.	UE ⇒ RNC
RRC Connection Setup	RRC Connection Establishment	RNC ⇒ UE
RRC Connection Setup Complete	RRC Connection Establishment	UE ⇒ RNC
System Information	System Information Broadcasting	Node B ⇒ UE
Transport Channel Reconfiguration	Physical Channel Reconfiguration	RNC ⇒ UE
Transport Channel Reconfiguration Complete	Physical Channel Reconfiguration	UE ⇒ RNC
UE Capability Information	NAS Signalling Conn. Establishment.	UE ⇒ RNC
Uplink Direct Transfer	Uplink Direct Transfer	UE ⇒ RNC
URA Update	Cell Update	UE ⇒ RNC
URA Update Confirm	Cell Update	RNC ⇒ UE
UTRAN Mobility Information Confirm	RRC Connection Re-establishment Cell Update URA Update	UE ⇒ RNC UE ⇒ RNC UE ⇒ RNC
Handover from UTRAN Command	UTRAN to GSM/BSS handover	RNC ⇒ UE
Handover to UTRAN Complete	GSM /BSS to UTRAN handover	UE ⇒ RNC
Cell Change Order from UTRAN	UMTS to GPRS Cell Reselection	RNC ⇒ UE

4.8 BMC Procedures & Messages

For a detailed description of BMC procedures and messages refer to [11] and [12]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 6

Message Name	UTRAN Procedure	Direction
CBS Message	Service Area Broadcast	Node B ⇒ UE

********** Unaffected text **********

7.3.1 DCH Establishment

This example shows establishment of an RRC connection in dedicated transport channel (DCH) state.

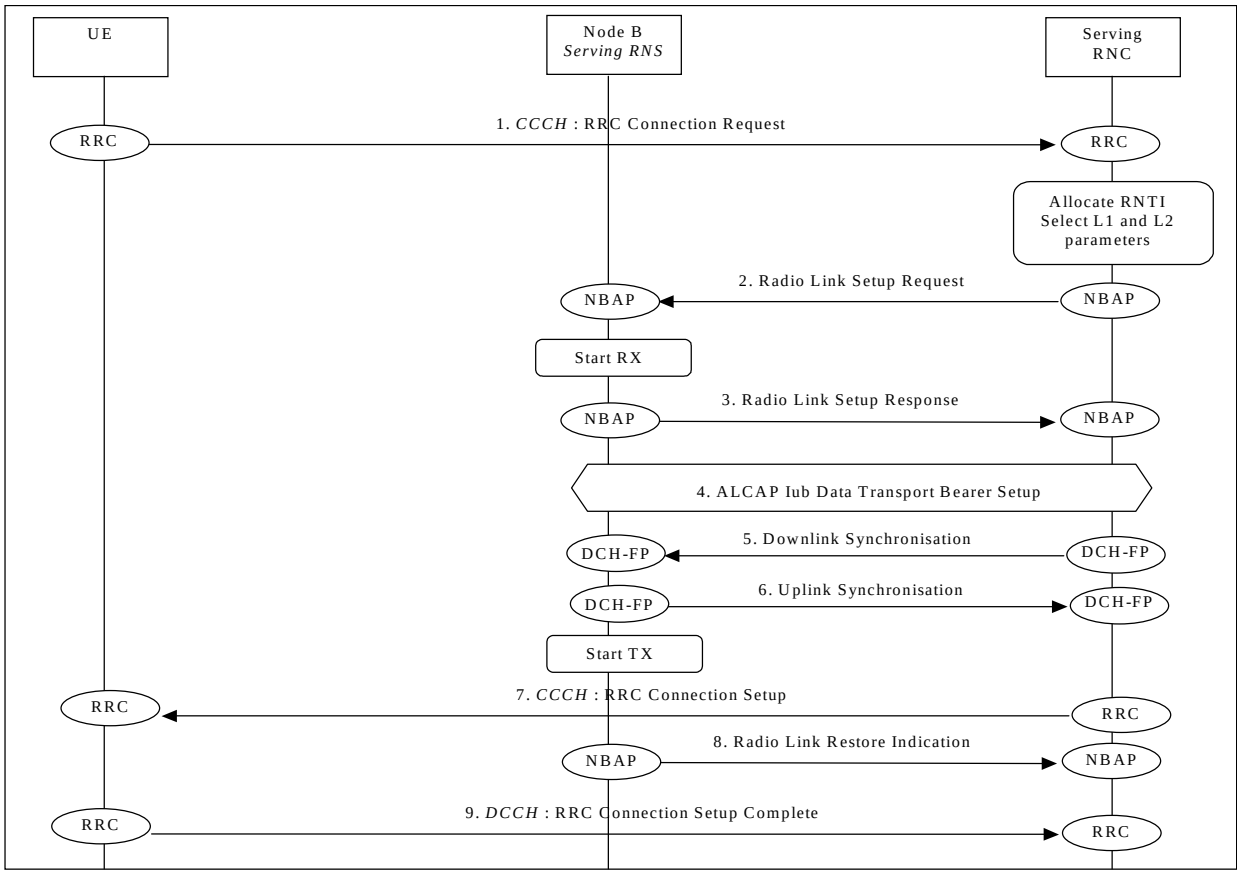


Figure 8: RRC Connection Establishment - DCH Establishment

1. The UE initiates set-up of an RRC connection by sending **RRC** ~~message~~ **Connection Request** message on CCCH.
   Parameters: Initial UE Identity, Establishment cause~~, Initial UE Capability~~.

2. The SRNC decides to use a DCH for this RRC connection, allocates U-RNTI and radio resources for the RRC connection. When a DCH is to be set-up, NBAP message **Radio Link Setup Request** is sent to Node B.
   Parameters: Cell id, Transport Format Set, Transport Format Combination Set, frequency, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information.

3. Node B allocates resources, starts PHY reception, and responds with NBAP message **Radio Link Setup Response**.
   Parameters: Signalling link termination, Transport layer addressing information (AAL2 address, AAL2 Binding Identity) for the Iub Data Transport Bearer.

4. SRNC initiates set-up of Iub Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to the DCH. The request for set-up of Iub Data Transport bearer is acknowledged by Node B.

5./6.The Node B and SRNC establish synchronism for the Iub and Iur Data Transport Bearer by means of exchange of the appropriate DCH Frame Protocol frames **Downlink Synchronisation** and **Uplink Synchronisation**. Then Node B starts DL transmission.

7. Message **RRC Connection Setup** is sent on CCCH from SRNC to UE.
   Parameters: Initial UE Identity, U-RNTI, Capability update Requirement, Transport Format Set, Transport Format Combination Set, frequency, DL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information.

8. Node B achieves uplink sync and notifies SRNC with NBAP message **Radio Link Restore Indication**.

9. Message **RRC Connection Setup Complete** is sent on DCCH from UE to SRNC.
   Parameters: Integrity information, ciphering information, UE radio access capability.

7.3.2 RACH/FACH Establishment

~~An Example of procedure for establishment of an RRC connection in common transport channel (RACH/FACH) state is specified in subclause 8.2.1 of [5].~~ This example shows establishment of an RRC connection on the RACH/FACH common transport channel. A prerequisite for this example is that the necessary Iub Data Transport bearer for the RACH/FACH is established prior to this procedure.

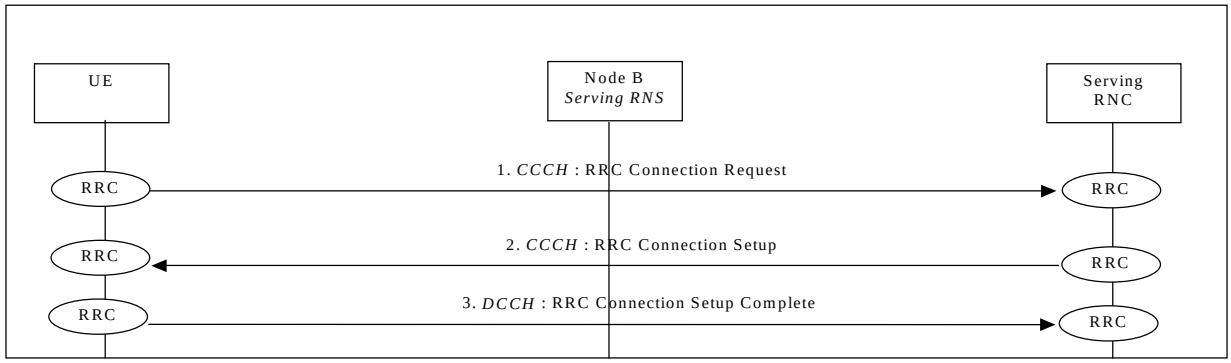


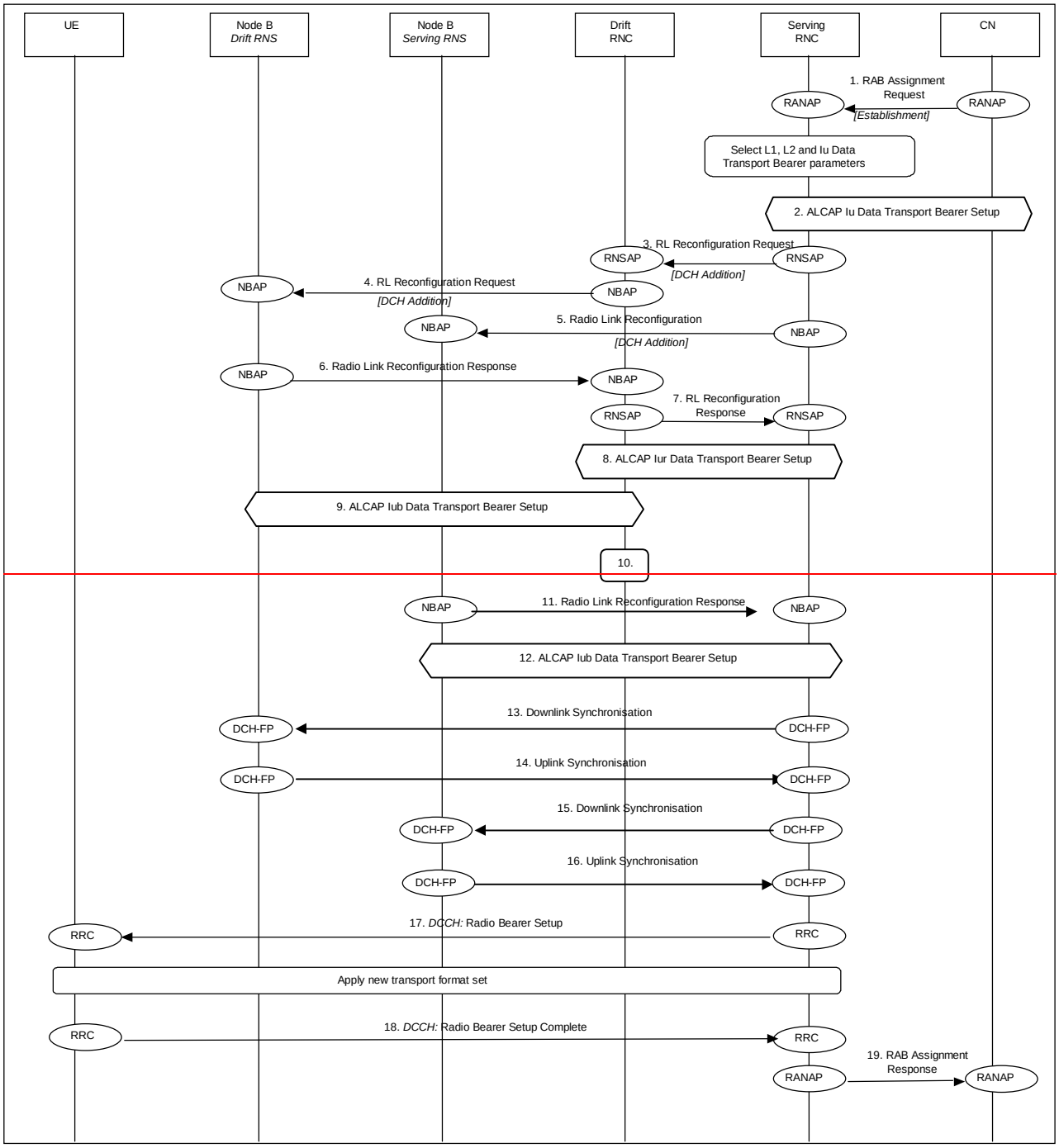
Figure 8b: RRC Connection Establishment – RACH/FACH Establishment

1. The UE initiates set-up of an RRC connection by sending **RRC** ~~message~~ **Connection Request** message on CCCH.
   Parameters: Initial UE Identity, Establishment cause.
2. The SRNC decides to use RACH/FACH for this RRC connection and allocates both U-RNTI and C-RNTI identifiers. Message **RRC Connection Setup** is sent on CCCH.
   Parameters: Initial UE Identity, U-RNTI, C-RNTI, Capability update Requirement, frequency (optionally).
3. UE sends **RRC Connection Setup Complete** on a DCCH logical channel mapped on the RACH transport channel.
   Parameters: Integrity information, ciphering information, UE radio access capability.

********** **Unaffected text** **********

7.6.2 DCH - DCH Establishment - Unsynchronised ~~(PS Core Network)~~

This example shows the establishment of a radio access bearer (DCH) in dedicated transport channel (DCH) RRC state. The UE communicates via two Nodes B. One Node B is controlled by SRNC, one Node B is controlled by DRNC. The reconfiguration time does not require to be synchronised among Node-Bs, SRNC and UE.


UE
Node B
Drift RNS
Node B
Serving RNS
Drift
RNC
Serving
RNC
CN
1. RAB Assignment Request
RANAP
RANAP
[Establishment]
Select L1, L2 and Iu Data Transport Bearer parameters
2. ALCAP Iu Data Transport Bearer Setup
3. RL Reconfiguration Request
RNSAP
RNSAP
[DCH Addition]
NBAP
4. RL Reconfiguration Request
NBAP
[DCH Addition]
NBAP
5. Radio Link Reconfiguration
NBAP
[DCH Addition]
NBAP
6. Radio Link Reconfiguration Response
NBAP
7. RL Reconfiguration Response
RNSAP
RNSAP
8. ALCAP Iur Data Transport Bearer Setup
9. ALCAP Iub Data Transport Bearer Setup
10.
NBAP
11. Radio Link Reconfiguration Response
NBAP
12. ALCAP Iub Data Transport Bearer Setup
13. Downlink Synchronisation
DCH-FP
DCH-FP
DCH-FP
14. Uplink Synchronisation
DCH-FP
15. Downlink Synchronisation
DCH-FP
DCH-FP
16. Uplink Synchronisation
DCH-FP
DCH-FP
RRC
17. DCCH: Radio Bearer Setup
RRC
Apply new transport format set
RRC
18. DCCH: Radio Bearer Setup Complete
RRC
19. RAB Assignment Response
RANAP
RANAP

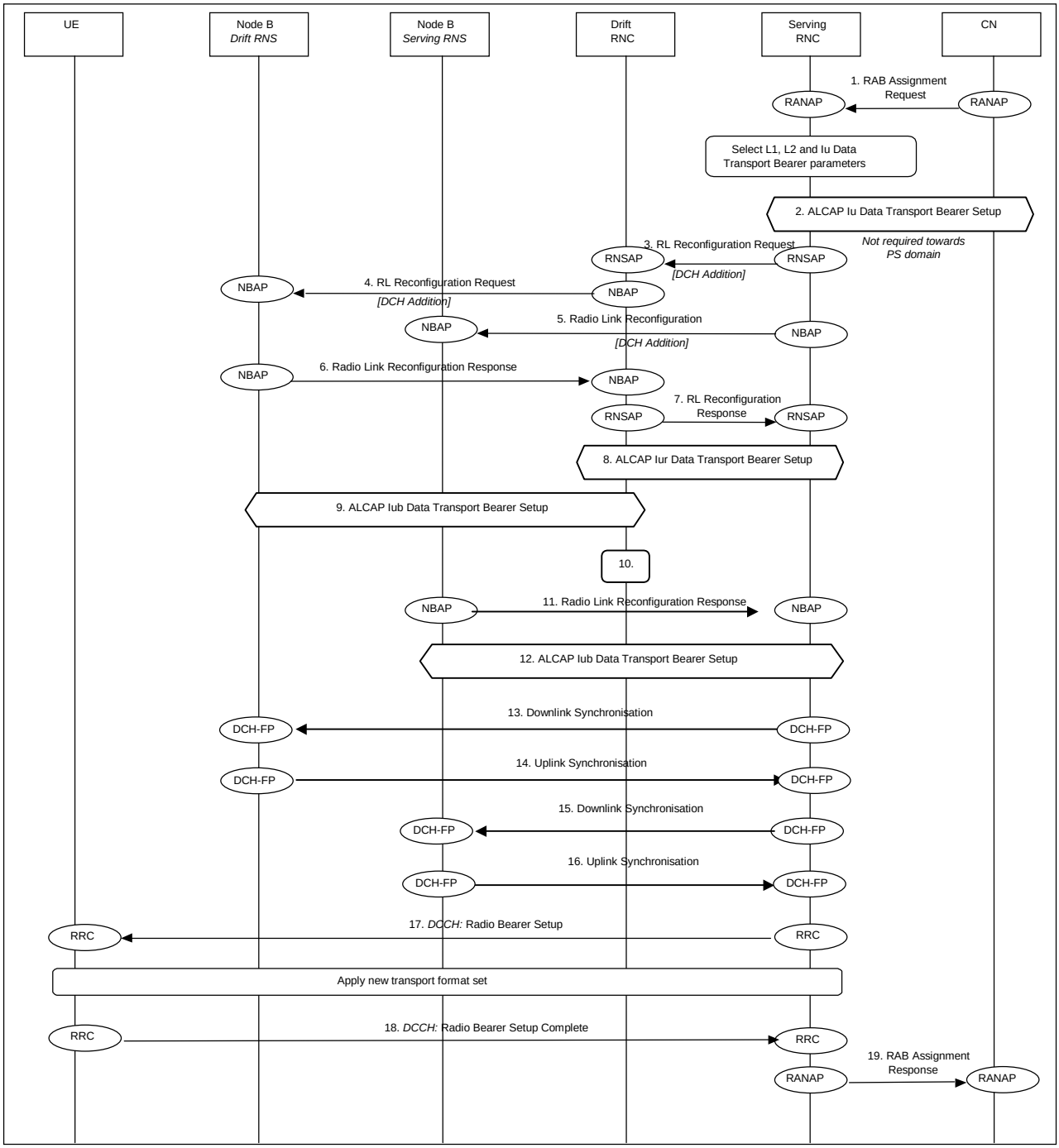


Figure 14: Radio Access Bearer Establishment - DCH - DCH Establishment – Unsynchronised

1. CN initiates establishment of the radio access bearer with RANAP **Radio Access Bearer Assignment Request** message.
   Parameters: radio access bearer parameters, User Plane Mode, Transport Address, Iu Transport Association.
2. SRNC performs mapping of the radio access bearer QoS parameters to AAL2 link characteristics and initiates set-up of Iu Data Transport bearer using ALCAP protocol (this step is not required towards PS domain).
   Parameters: Served User Generated Reference, AAL2 link characteristics …
3. SRNC decided that there are no need for a synchronous RL reconfiguration, and requests DRNC to setup a new DCH sending the **RL Reconfiguration Request** message. The modification shall be done immediately without waiting for the command message.
   Parameters: Bearer ID, Transport Format Set, Transport Format Combination Set, Power control information.
4. DRNC requests its Node B to establish of a new DCH in the existing Radio Link sending the **RL Reconfiguration Request** message.
   Parameters: Bearer ID, Transport Format Set, Transport Format Combination Set, Power control information.

5. SRNC requests its Node B setup a new DCH in the existing Radio Link sending the **RL Reconfiguration Request** message.
   Parameters: Bearer ID, Transport Format Set, Transport Format Combination Set, Power control information.
6. Node B allocates resources and notifies DRNC that the setup is done sending the **RL Reconfiguration Response** message.
   Parameters: Transport layer addressing information (AAL2 address, AAL2 Binding Id) for Iub Data Transport Bearer.
7. DRNC notifies SRNC that the setup is done sending the **RL Reconfiguration Response** message.
   Parameters: Transport layer addressing information (AAL2 address, AAL2 Binding Id) for Iub Data Transport Bearer.
8. SRNC initiates setup of Iur Data Transport Bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to DCH.
9. SRNC initiates setup of Iub Data Transport Bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to DCH.
10. DRNC performs bridging of Iub and Iur Data Transport bearers.
11. Node B allocates resources and notifies SRNC that the setup is sending the **RL Reconfiguration Response**.
    Parameters: Transport layer addressing information (AAL2 address, AAL2 Binding Id) for Iub Data Transport Bearer.
12. SRNC initiates setup of Iub Data Transport Bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to DCH.

13./14./15./16. The Nodes B and SRNC establish synchronism for the Iub and Iur Data Transport Bearer by means of exchange of the appropriate DCH Frame Protocol frames **Downlink Synchronisation** and **Uplink Synchronisation**.

17. RRC message **Radio Bearer Setup** is sent by SRNC to UE.
    Parameters: Transport Format Set, Transport Format Combination Set.
18. UE sends RRC message **Radio Bearer Setup Complete** to SRNC.
19. SRNC sends RANAP message Radio Access Bearer Assignment Response to CN.
    Parameters: Transport Address (Always for PS domain; for CS domain only if modified), Iu Transport Association (Always for PS domain; for CS domain only if modified).

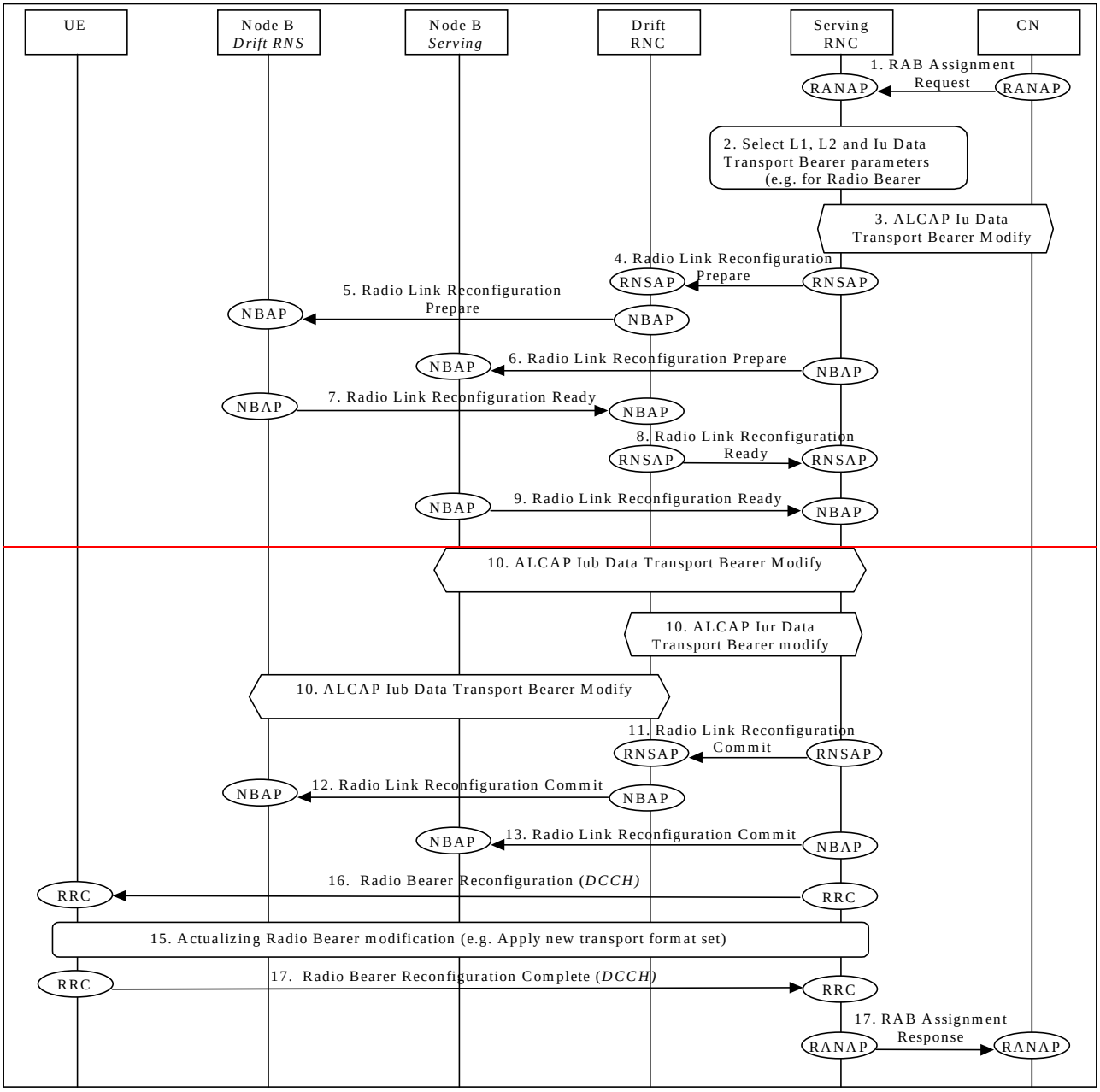
********** **Unaffected text** **********

7.8 Radio Access Bearer Modification

The following examples show modification of a radio access bearer established either on a dedicated channel (DCH) or on a common transport channel (RACH/FACH). The procedure starts from a radio access bearer assignment because does not exist a special message to modify a radio access bearer, instead an "assignment" message is used.

7.8.1 DCCH on DCH - Synchronised

This example shows modification of a radio access bearer established on a dedicated channel (DCH) with UE in macrodiversity between two RNCs. A NSAP synchronised procedure is used and a successful case is shown. For an unsuccessful case it’s important to note that a failure message can be sent in any point of the Message Sequence Chart (MSC); in particular could be in RRC reconfiguration response (# 16).


UE
Node B
Drift RNS
Node B
Serving
Drift
RNC
Serving
RNC
CN
1. RAB Assignment Request
RANAP
RANAP
2. Select L1, L2 and Iu Data Transport Bearer parameters (e.g. for Radio Bearer
3. ALCAP Iu Data Transport Bearer Modify
4. Radio Link Reconfiguration Prepare
RNSAP
RNSAP
5. Radio Link Reconfiguration Prepare
NBAP
NBAP
NBAP
6. Radio Link Reconfiguration Prepare
NBAP
NBAP
7. Radio Link Reconfiguration Ready
NBAP
NBAP
8. Radio Link Reconfiguration Ready
RNSAP
RNSAP
NBAP
9. Radio Link Reconfiguration Ready
NBAP
10. ALCAP Iub Data Transport Bearer Modify
10. ALCAP Iur Data Transport Bearer modify
10. ALCAP Iub Data Transport Bearer Modify
11. Radio Link Reconfiguration Commit
RNSAP
RNSAP
NBAP
12. Radio Link Reconfiguration Commit
NBAP
NBAP
13. Radio Link Reconfiguration Commit
NBAP
RRC
16. Radio Bearer Reconfiguration (DCCH)
RRC
15. Actualizing Radio Bearer modification (e.g. Apply new transport format set)
RRC
17. Radio Bearer Reconfiguration Complete (DCCH)
RRC
17. RAB Assignment Response
RANAP
RANAP

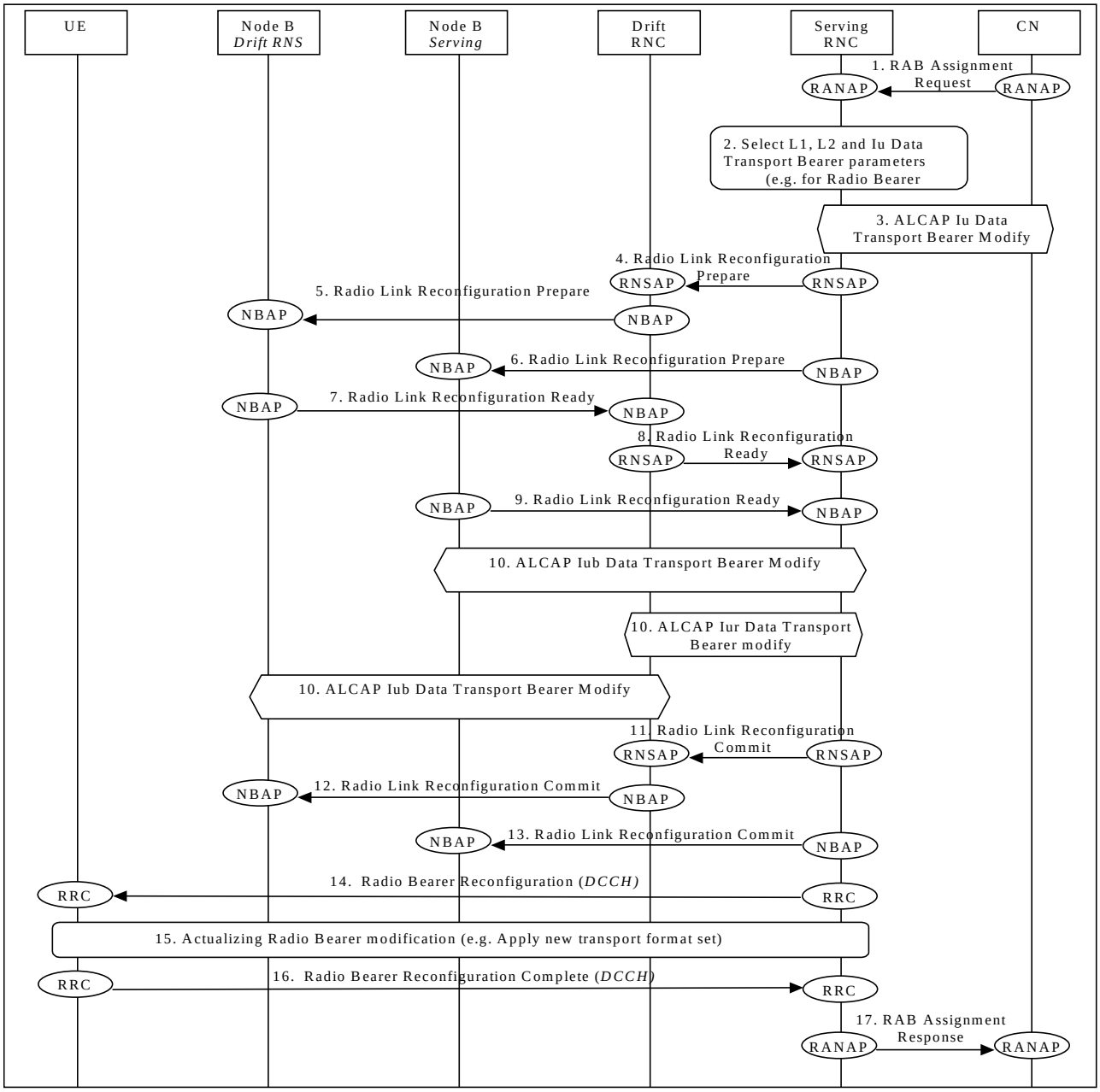


Figure 20: Radio Access Bearer Modification - DCH Modification - Synchronised

1. CN initiates modification of the radio access bearer with RANAP message **Radio Access Bearer Assignment Request.**
   Parameters: parameters to be modified at lower level e.g. Maximum Bit Rate.
2. Interworking functions. SRNC chooses which parameters (lower level) ought to be modified and what kind of procedure has to start up (i.e Radio Bearer Reconfiguration for RRC).
3. SRNC starts an Iu Data Transport Bearer Modification between the CN and the SRNC using the ALCAP protocol with AAL2 bindings carried by radio access bearer assignment message (this step is not required towards PS domain). This has to be done before Radio Reconfiguration itself because the transport channel must be ready when the radio channel will be ready.
4. SRNC requests DRNC to prepare modification of DCH carrying the radio access bearer (**Radio Link Reconfiguration Prepare**).
   Parameters: Transport Format Combination Set, UL scrambling code, etc.
5. DRNC requests its Node B to prepare modification of DCH related to the radio access bearer (**Radio Link Reconfiguration Prepare**).
6. SRNC requests its Node B to prepare modification of DCH carrying the radio access bearer (**Radio Link Reconfiguration Prepare**).

Parameters: Transport Format Combination Set, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only).

7. Node B (drift) notifies DRNC that modification preparation is ready (**Radio Link Reconfiguration Ready**).
8. DRNC notifies SRNC that modification preparation is ready (**Radio Link Reconfiguration ready**).
9. Node B (serving) notifies SRNC that modification preparation is ready (**Radio Link Reconfiguration Ready**). Note: here a **Radio Link Reconfiguration Failure** could occur.
10. SRNC initiates modify of Iub (Serving RNS) Data Transport bearer. The same does DRNC with its own Iub. SRNC initiates modify of Iur (Serving RNS) Data Transport bearer. In the case that ALCAP is implemented by Q.AAL2 (~~Q.2360.1~~Q.2630.1) it implies the release of the existing bearer and the establishment of a new one.
11. RNSAP message **Radio Link Reconfiguration Commit** is sent from SRNC to DRNC.
12. NBAP message **Radio Link Reconfiguration Commit** is sent from DRNC to Node B (drift).
13. NBAP message **Radio Link Reconfiguration Commit** is sent from SRNC to Node B (serving).
14. RRC message **Radio Bearer Reconfiguration** is sent by controlling RNC (here SRNC) to UE.
15. Both UE and Nodes B actualise modification of DCH (i.e. applying a new transport format).
16. UE sends RRC message **Radio Bearer Reconfiguration Complete** to SRNC.
17. SRNC acknowledges the modification of radio access bearer (**Radio Access Bearer Assignment Response**) towards CN.

A radio access bearer modification procedure (via radio access bearer assignment message) is shown with mapping to Radio Bearer reconfiguration. Note that this is not possible if we want to change what transport channel or logical channel you use, because RB reconfiguration does not permit a change in type of channel (see [8]).

********** **Unaffected text** **********

7.11 Hard Handover

This subclause presents some examples of hard handover procedures. These procedures are for both dedicated and common channels and may be applied in the following cases:

- intra-frequency Hard Handover (TDD mode);
- inter-frequency Hard Handover (FDD and TDD mode).

7.11.1 Backward Hard Handover

This subclause shows some examples of hard handover in the case of network initiated backward handovers.

7.11.1.1 Hard Handover via Iur (DCH State)

This subclause shows an example of Hard Handover via Iur, when the mobile is in DCH state, for both successful and unsuccessful cases.

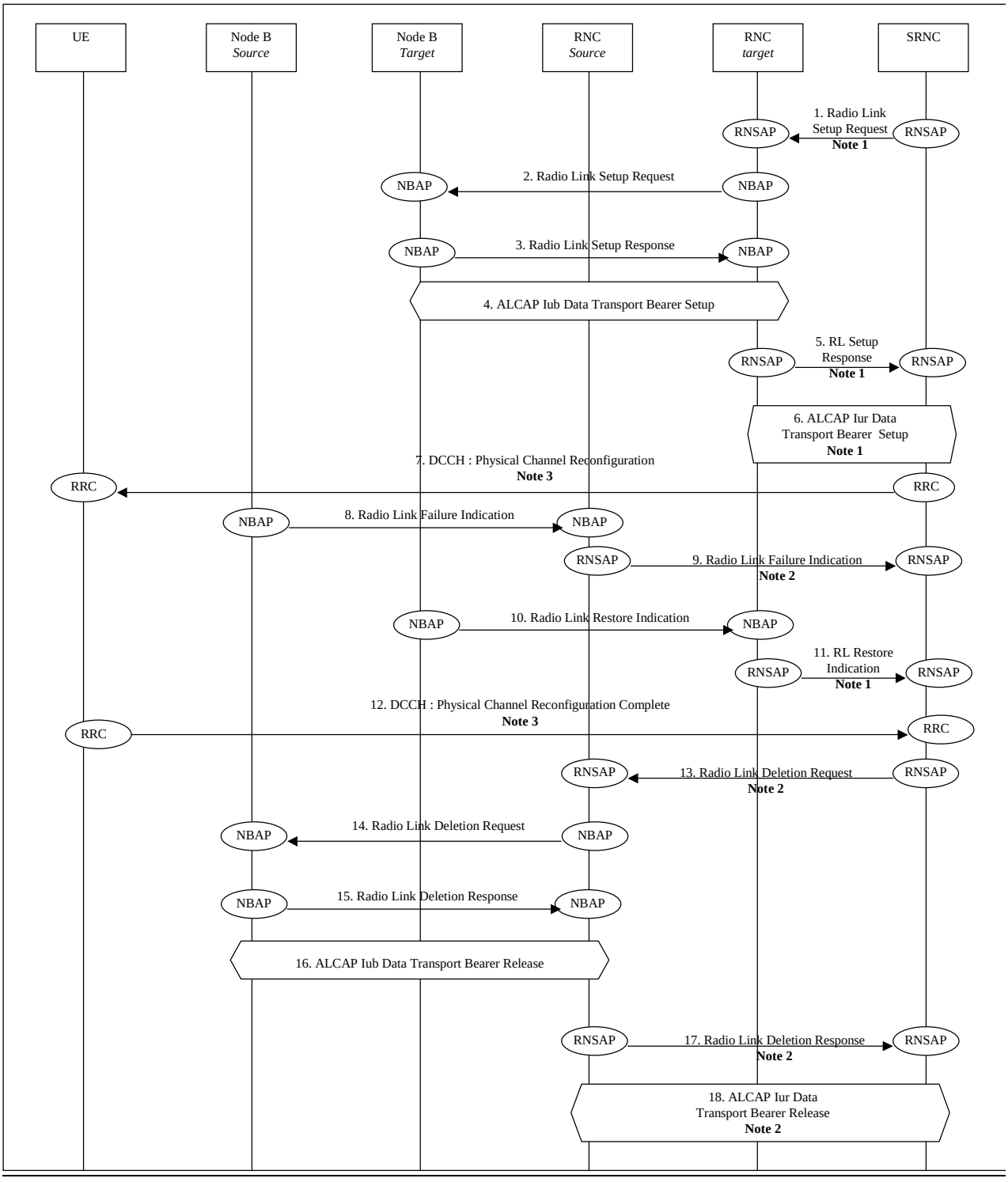


Figure 27: Hard Handover via Iur (DCH on Iur) – successful case

1. SRNC sends **Radio Link Setup Request** message to the target RNC.
   Parameters: target RNC identifier, s-RNTI, Cell id, Transport Format Set, Transport Format Combination Set. (Note 1).
2. The target RNC allocates RNTI and radio resources for the RRC connection and the Radio Link(s) (if possible), and sends the NBAP message **Radio Link Setup Request** to the target Node-B.
   Parameters: Cell id, Transport Format Set, Transport Format Combination Set, frequency, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information etc.
3. Node B allocates resources, starts PHY reception, and responds with NBAP message **Radio Link Setup Response**.
   Parameters: Signalling link termination, Transport layer addressing information for the Iub Data Transport Bearer.

4. Target RNC initiates set-up of Iub Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to the DCH. The request for set-up of Iub Data Transport bearer is acknowledged by Node B.
5. When the Target RNC has completed preparation phase, **Radio Link Setup Response** is sent to the SRNC (see note 1).
6. SRNC initiates set-up of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The request for set-up of Iur Data Transport bearer is acknowledged by Target RNC (see note 1).
7. SRNC sends a RRC message **Physical Channel Reconfiguration** to the UE.
8. When the UE switches from the old RL to the new RL, the source Node B detects a failure on its RL and sends a NBAP message **Radio Link Failure Indication** to the source RNC.
9. The source RNC sends a RNSAP message **Radio Link Failure Indication** to the SRNC (see note 2).
10. Target Node B achieves uplink sync on the Uu and notifies target RNC with NBAP message **Radio Link Restore Indication**.
11. Target RNC sends RNSAP message **Radio Link Restore Indication** to notify SRNC (see note 2) that uplink sync has been achieved on the Uu.
12. When the RRC connection is established with the target RNC and necessary radio resources have been allocated, the UE sends RRC message **Physical Channel Reconfiguration Complete** to the SRNC.
13. The SRNC sends a RNSAP message **Radio Link Deletion Request** to the source RNC (see note 2).
14. The source RNC sends NBAP message **Radio Link Deletion Request** to the source Node B.
    Parameters: Cell id, Transport layer addressing information.
15. The source Node B de-allocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.
16. The source RNC initiates release of Iub Data Transport bearer using ALCAP protocol.
17. When the source RNC has completed the release the RNSAP message Radio Link Deletion Response is sent to the SRNC (see note 2).
18. SRNC initiates release of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The request for release of Iur Data Transport bearer is acknowledged by the Source RNC (see note 2).

NOTE 1: This message is not necessary when the target RNC is the SRNC.
NOTE 2: This message is not necessary when the source RNC is the SRNC.
NOTE 3: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), clause 8.3.5.2.

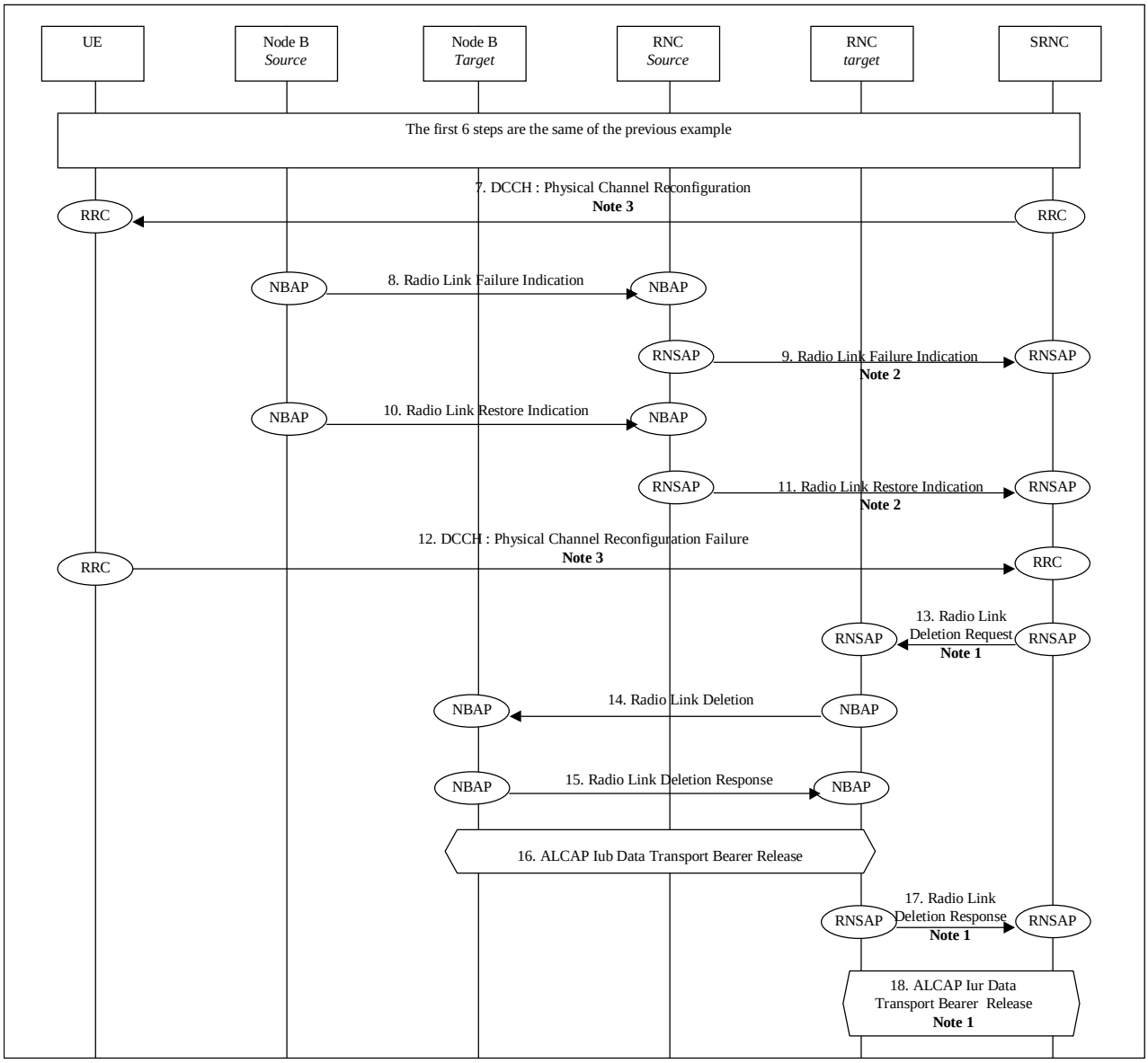


Figure 28: Hard Handover via Iur (DCH on Iur) – unsuccessful case.

The first 6 steps are the same of the previous example.

7. SRNC sends a RRC message **Physical Channel Reconfiguration** to the UE.
8. When the UE switch from the old RL to the new RL, the source Node B detect a failure on its RL and send a NBAP message **Radio Link Failure Indication** to the source RNC.
9. The SRNC sends a RNSAP message **Radio Link Failure Indication** to the source RNC (see note 2).
10. UE cannot access the target cell and switch back to ~~the new~~the old one. The source Node B detects a RL restoration and send a NBAP message **Radio Link Restoration Indication** to the source RNC.
11. The SRNC sends a RNSAP message **Radio Link Restoration Indication** to the source RNC (see note 2).
12. When the RRC connection is re-established with the source RNC the UE sends RRC message **Physical Channel Reconfiguration Failure** to the SRNC.
13. The SRNC sends a RNSAP message **Radio Link Deletion Request** to the target RNC (see note 1).
14. The target RNC sends NBAP message **Radio Link Deletion Request** to the target Node B.
    Parameters: Cell id, Transport layer addressing information.
15. The target Node B de-allocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.
16. The target RNC initiates release of Iub Data Transport bearer using ALCAP protocol.
17. When the target RNC has completed the release the RNSAP message **Radio Link Deletion Response** is sent to the SRNC (see note 1).

18. SRNC initiates release of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The Target RNC acknowledges the request for release of Iur Data Transport bearer (see note 1).

NOTE 1: This message is not necessary when the target RNC is the SRNC.

NOTE 2: This message is not necessary when the source RNC is the SRNC.

NOTE 3: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), clause 8.3.5.2.

7.11.1.2 Hard Handover with switching in the CN (UE connected to two CN nodes, DCH state)

This example shows Inter-RNS Hard Handover with switch in CN, in a situation in which the UE is connected to two CN nodes simultaneously and will be using one node B directly under the target RNC after the hard handover.

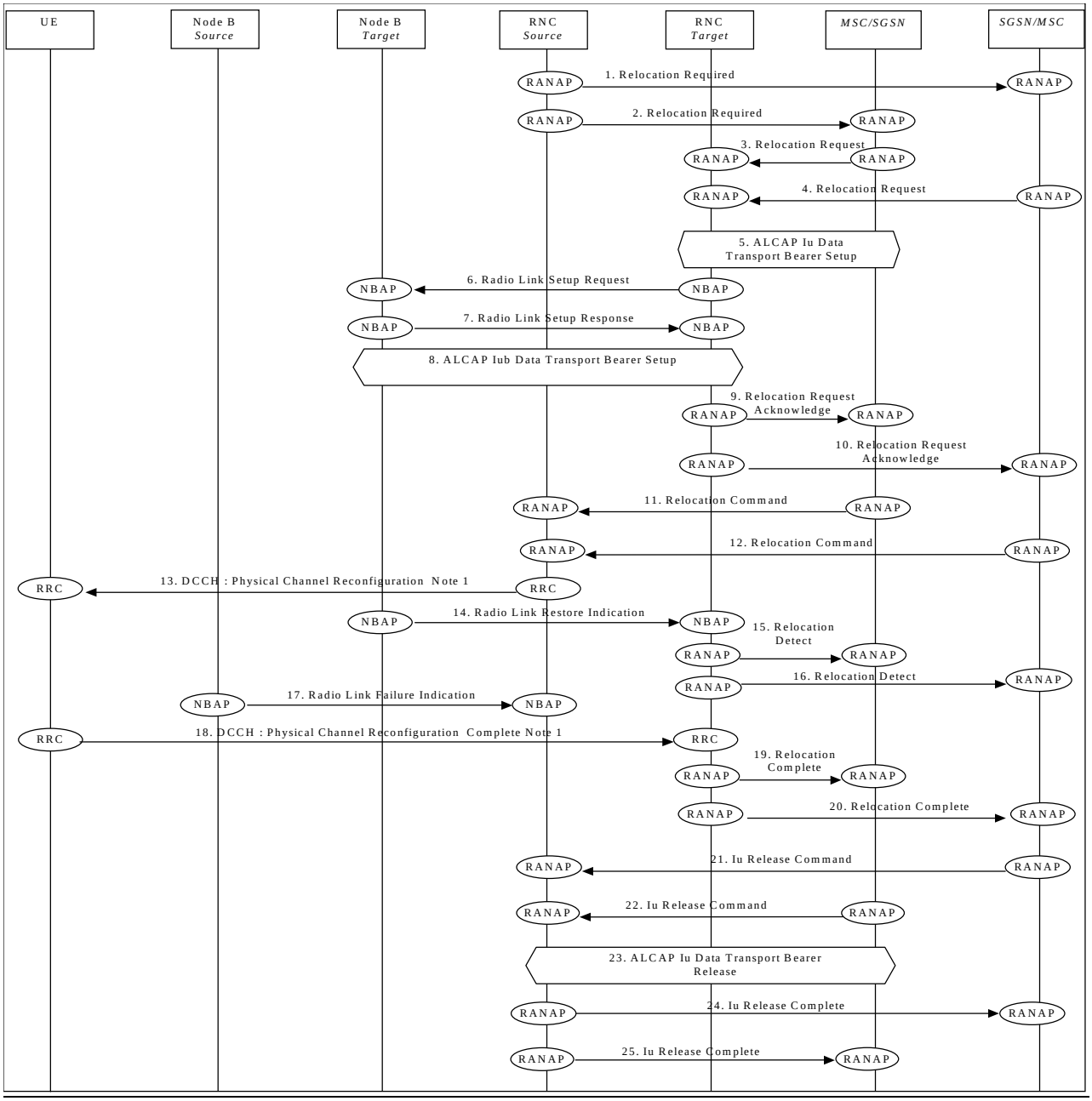


Figure 29: Hard Handover with switching in the CN (UE connected to two CN nodes, DCH state)

Serving RNC makes the decision to perform the Hard Handover via CN. Serving RNC also decides into which RNC (Target RNC) the Serving RNC functionality is to be relocated.

1./2. SRNC sends Relocation Required messages to both CN nodes.

Parameters: target RNC identifier, Information field transparent to the CN node and to be transmitted to the target RNC.
Upon reception of Relocation Required message CN element prepares itself for the switch and may also suspend data traffic between UE and itself for some bearers.

3./4. When CN is aware of preparation, CN node conveys a Relocation Request message to the target RNC to allocate resources.

Parameters: bearer ID's requested to be rerouted towards the CN node, from which the Relocation Request originated.
CN indicates in the message whether it prefers point to multipoint type of connections within CN or hard switch in CN. In this example the latter is assumed.

Target RNC allocates necessary resources within the UTRAN to support the radio links to be used after completion of the Hard Handover procedure.

5. Target RNC and CN node establish the new Iu transport bearers for each Radio Access Bearer related to the CN node.

6./7./8. The target RNC allocates RNTI and radio resources for the RRC connection and the Radio Link, then sends the NBAP message Radio Link Setup Request to the target Node-B.
Parameters: Cell id, Transport Format Set, Transport Format Combination Set, frequency, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information etc.

Node B allocates resources, starts PHY reception, and responds with NBAP message Radio Link Setup Response. Target RNC initiates set-up of Iub Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to the DCH.

9./10. When RNC has completed preparation phase, Relocation Request Acknowledge is sent to the CN elements.

Parameters: transparent field to the CN that is to be transmitted to the Source RNS.

11./12. When CN is ready for the change of SRNC, CN node sends a Relocation Command to the RNC. Message contains the transparent field provided by Target RNC.

Parameters: information provided in the Information field from the target RNC.

13. Source RNC sends a RRC message Physical Channel Reconfiguration to the UE.

14. Target Node B achieves uplink sync on the Uu and notifies target RNC with NBAP message **Radio Link Restore Indication**.

15./16 When target RNC has detected the UE, Relocation Detect message is sent to the CN nodesTarget RNC switches also the connection towards the new Iu, when UE is detected. After the switch UL traffic from node-B's is routed via the newly established MDC to the new MAC/RLC entities and finally to the correct Iu transport bearer. DL data arriving from the new Iu link is routed to newly established RLC entities, to the MAC and to the MD-splitter and Nodes B.

~~16~~17. When the UE switch from the old RL to the new RL, the source Node B detect a failure on its RL and send a NBAP message Radio Link Failure Indication to the source RNC.

18. When the RRC connection is established with the target RNC and necessary radio resources have been allocated the UE sends RRC message Physical Channel Reconfiguration Complete to the target RNC.

19./20. After a successful switch and resource allocation at target RNC, RNC sends Relocation Complete messages to the involved CN nodes.

At any phase, before the Relocation Complete message is sent, the old communication link between the CN and UE is all the time existing and working and the procedure execution can be stopped and original configuration easily restored. If any such unexceptional thing occurs a Relocation Failure message may be sent instead of any message numbered 3-10 and 13-15 described in this above.

21./22. The CN node initiates the release of the Iu connections to the source RNC by sending RANAP message Iu Release Command.

23. Upon reception of the release requests from the CN nodes the old SRNC executes all necessary procedures to release all visible UTRAN resources that were related to the RRC connection in question.

24./25. SRNC confirm the IU release to the CN nodes sending the message Iu Release Complete.

NOTE 1: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), clause 8.3.5.2.

7.11.2 Forward Hard Handover

This subclauses shows some examples of hard handover in the case of mobile initiated forward handovers.

Some examples of Cell Update procedures are shown, i.e. those procedures that update the position of the UE when a RRC connection exists and the position of the UE is known on cell level in the UTRAN. The UE is in CELL_PCH or CELL_FACH.

7.11.2.1 Cell Update with SRNS relocation

This example shows Inter-RNS Cell Update with switching in the CN (therefore with SRNS relocation) and RNTI reallocation.

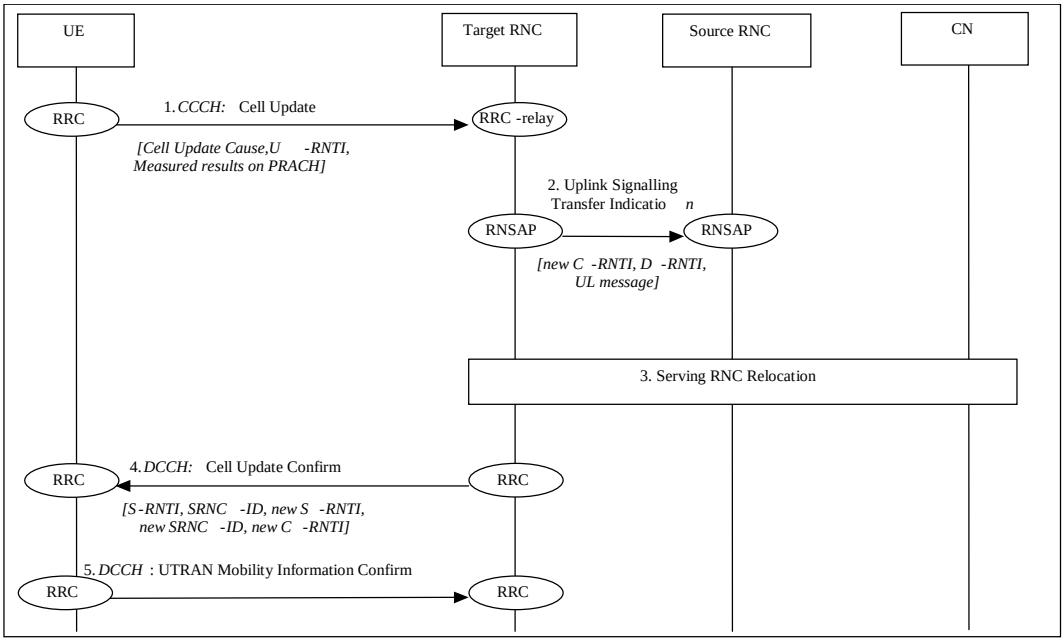


Figure 30: Cell Update with SRNS Relocation

1. UE sends a RRC message **Cell Update** to the UTRAN, after having made cell re-selection. Upon reception of a CCCH message from a UE, target RNC allocates a C-RNTI for the UE.
2. Controlling target RNC forward the received message (on CCCH) via **Uplink Signalling Transfer Indication** RNSAP message towards the SRNC. Message includes, besides target RNC-ID, also the allocated C-RNTI, which is to be used as UE identification within the C-RNC, and the D-RNTI. Upon reception of the RNSAP message SRNC decides to perform SRNS Relocation towards the target RNC.
3. Serving RNC relocation procedure is executed as defined in subclause 'SRNS Relocation Relocation (UE connected to a single CN node)'. After completing SRNS Relocation, target RNC allocates new S-RNTI for the UE, ~~UE~~ becoming the new serving RNC.
4. Target RNC responds to UE by RRC **Cell Update Confirm**, including old S-RNTI and SRNC ID as UE identifiers. Message contains also the new S-RNTI, SRNC-ID and C-RNTI.
5. UE acknowledges the RNTI reallocation by sending the RRC message **UTRAN Mobility Information Confirm**.

********** Unaffected text **********

7.12 URA Update

This subclause presents some examples of URA Update procedures, i.e. those procedures that update the UTRAN registration area of a UE when a RRC connection exists and the position of the UE is known on URA level in the UTRAN.

7.12.1 Inter-RNS URA Update with SRNS Relocation

This example shows Inter-RNS URA Update with switching in the CN (SRNS relocation).

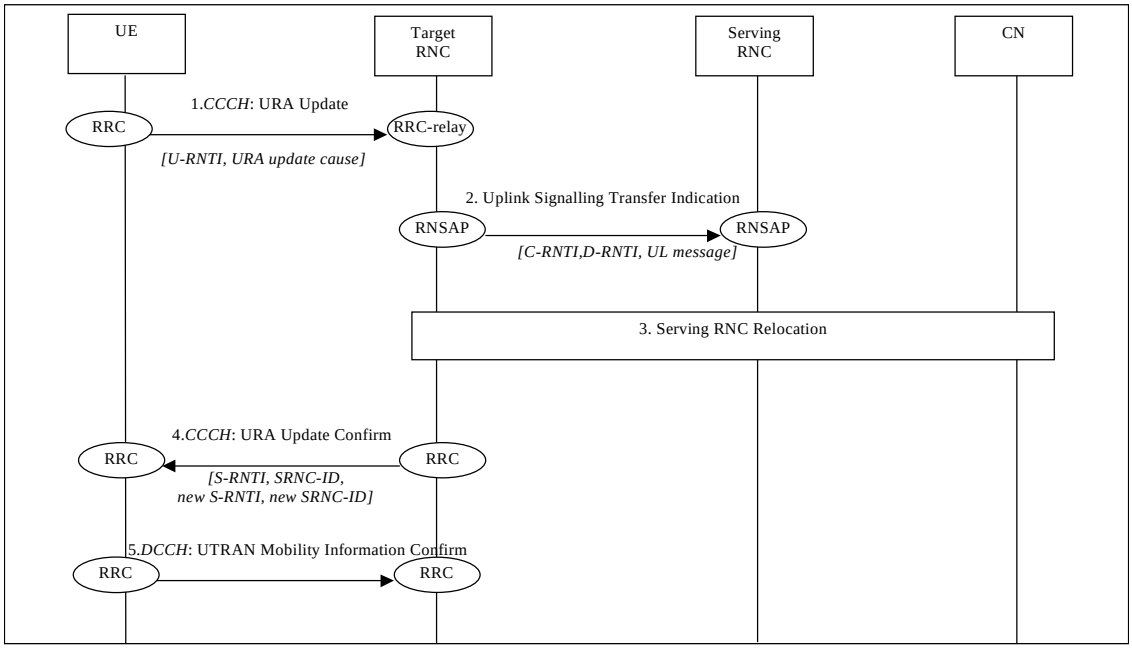


Figure 33: Inter RNS URA Update with switching in CN.

1. UE sends a RRC message **URA Update** to the UTRAN, after having made cell re-selection. Upon reception of a CCCH message from an unknown UE, the target RNC becomes a controlling RNC and it allocates a new C-RNTI and a new D-RNTI for the UE.
2. The target RNC forwards the received uplink CCCH message towards the SRNC by RNSAP **Uplink Signalling Transfer Indication** message to the old Source/Controller RNC. Message includes, besides target RNC-ID, also the allocated C-RNTI, which is to be used as UE identification within the C-RNC, and the D-RNTI. Upon reception of the RNSAP message SRNC decides to perform SRNS Relocation towards the target RNC.
3. Serving RNC relocation procedure is executed as defined in subclause 'SRNS Relocation (UE connected to a single CN node)'. After having completed SRNS Relocation, target RNC allocates new S-RNTI for the UE becoming the new serving RNC. New SRNC also deletes the allocated C-RNTI, since it is not needed for an UE in URA_PCH state.
4. Serving RNC acknowledges the message by RRC **URA Update Confirm**, including old S-RNTI and SRNC ID as UE identifiers. Message contains also the new S-RNTI and RNC-ID.
5. UE acknowledges the RNTI reallocation by sending the RRC message **UTRAN Mobility Information Confirm** on DCCH.

7.12.2 Inter-RNS URA Update via Iur without SRNS relocation

This example shows an Inter RNS URA update in DRNS without SRNS relocation. In this example target RNS, source RNS and serving RNS are all located separately from each other. Other scenarios can be easily derived from this most comprehensive signalling procedure.

Please note that this example shows the case when no ciphering is ~~requires~~required; for this case no channels on Iur are required and therefore the message flow 5 (Cell Update Confirm) is sent on CCCH. In the case that ciphering is

required, that message must be sent on the DCCH (ciphering is performed at MAC-d level) and the flow becomes similar to the one shown for the Cell Update in section "Cell Update via Iur without RNS relocation".

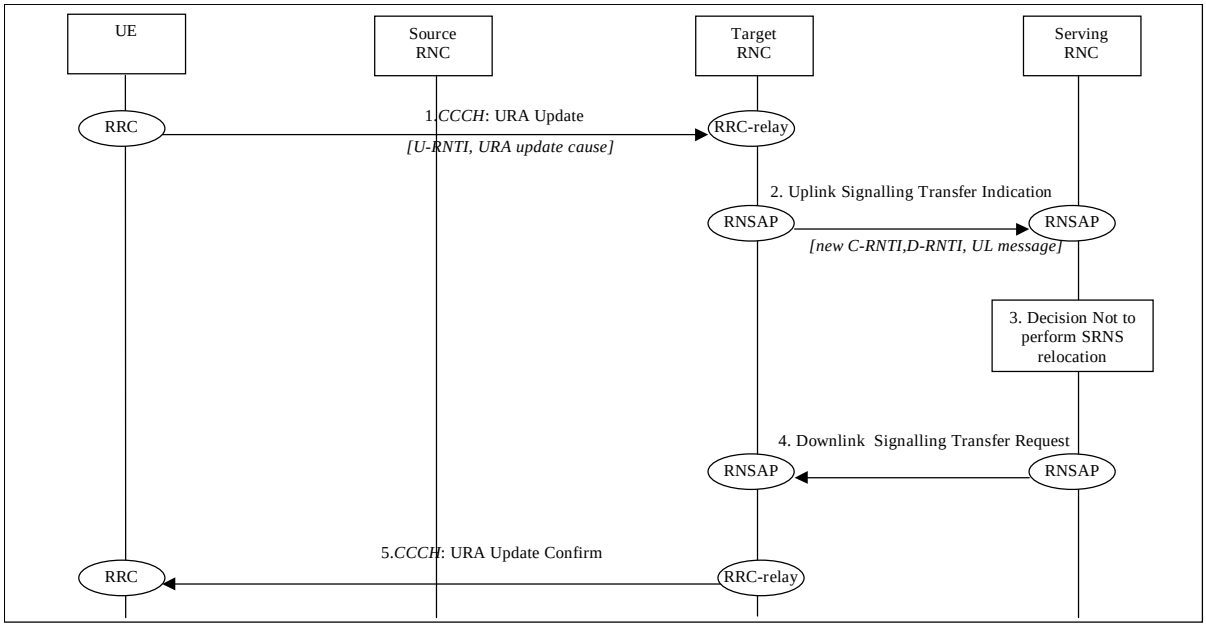


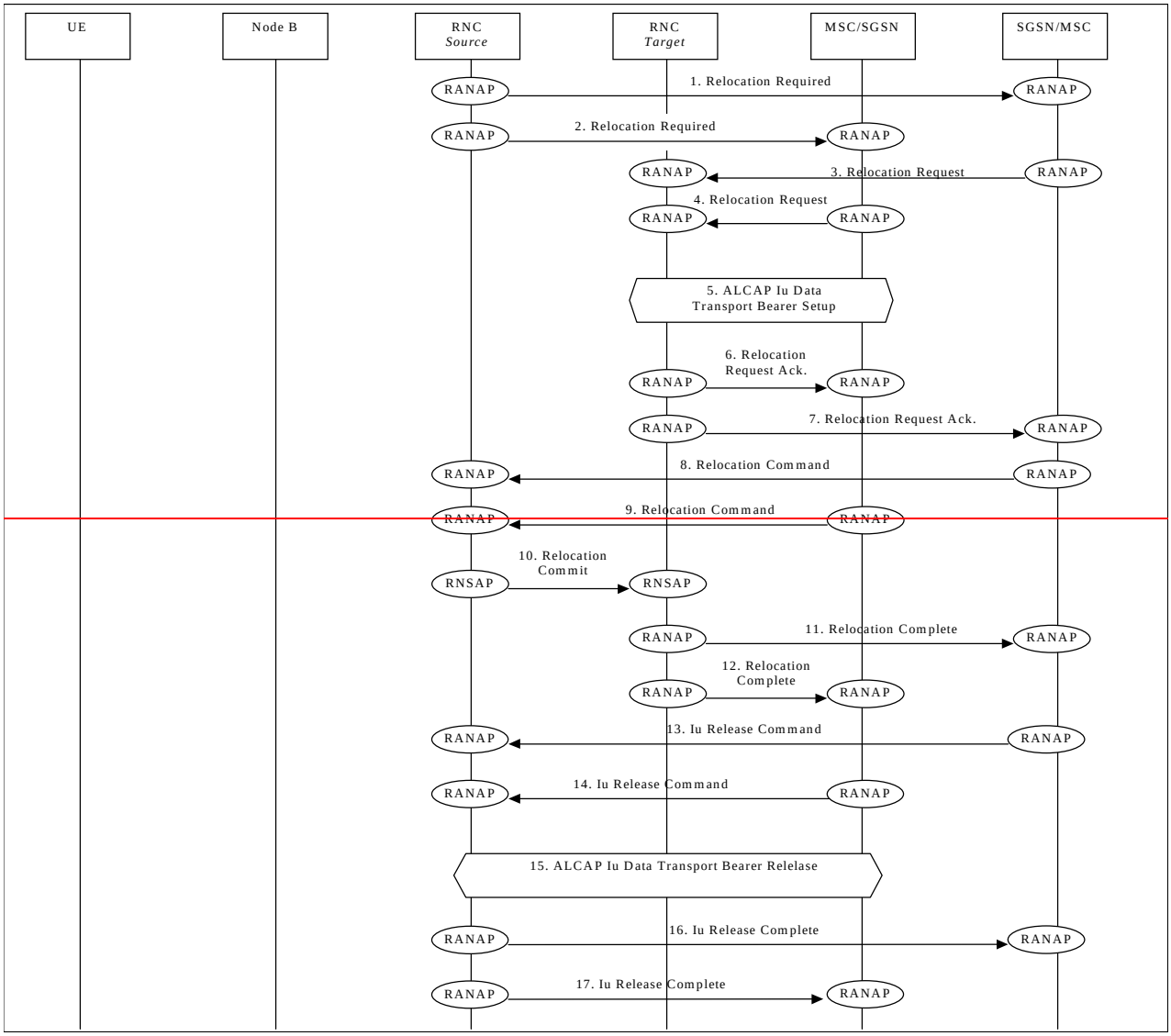
Figure 34: Inter-RNS URA Update via Iur without SRNS relocation

1. UE sends a RRC message **URA Update** to the UTRAN, after having made cell re-selection and URA has changed.
2. Upon reception of the message from a UE, Target RNC decodes the RNC ID and the S-RNTI. The UE is not registered in the target RNC (RNC ID and SRNTI unknown), thus RNC allocates C-RNTI and D-RNTI for the UE. The Target RNC forward the received Uu signalling message towards the SRNC by RNSAP **Uplink Signalling Transfer Indication** message. The message includes also the cell-ID from which the message was received and the allocated C-RNTI and D-RNTI.
3. Upon reception of the RNSAP message SRNC decides not to perform an SRNS relocation towards the target RNC. The target RNC become C-RNC while SRNC remains unchanged.
4. SRNC delivers to Target RNC information upon, eventually new, RNTIs via a **Downlink Signalling Transfer Request**, transporting a URA Update Confirm.
5. The **URA Update Confirm** is forwarded to the UE (via CCCH with new RNTIs) from the target RNC.

7.12.3 SRNS Relocation (UE connected to two CN nodes)

This example show SRNS Relocation, in situation in which the UE is connected to two CN nodes simultaneously (this means that RNC is connected to a SGSN and a MSC). It is assumed that:

- all cells in the active set are in one DRNC;
- the CN performs hard switching of the user traffic.


UE
Node B
RNC Source
RNC Target
MSC/SGSN
SGSN/MSC
RANAP
1. Relocation Required
2. Relocation Required
3. Relocation Request
4. Relocation Request
5. ALCAP Iu Data Transport Bearer Setup
6. Relocation Request Ack.
7. Relocation Request Ack.
8. Relocation Command
9. Relocation Command
10. Relocation Commit
RNSAP
11. Relocation Complete
12. Relocation Complete
13. Iu Release Command
14. Iu Release Command
15. ALCAP Iu Data Transport Bearer Relelase
16. Iu Release Complete
17. Iu Release Complete

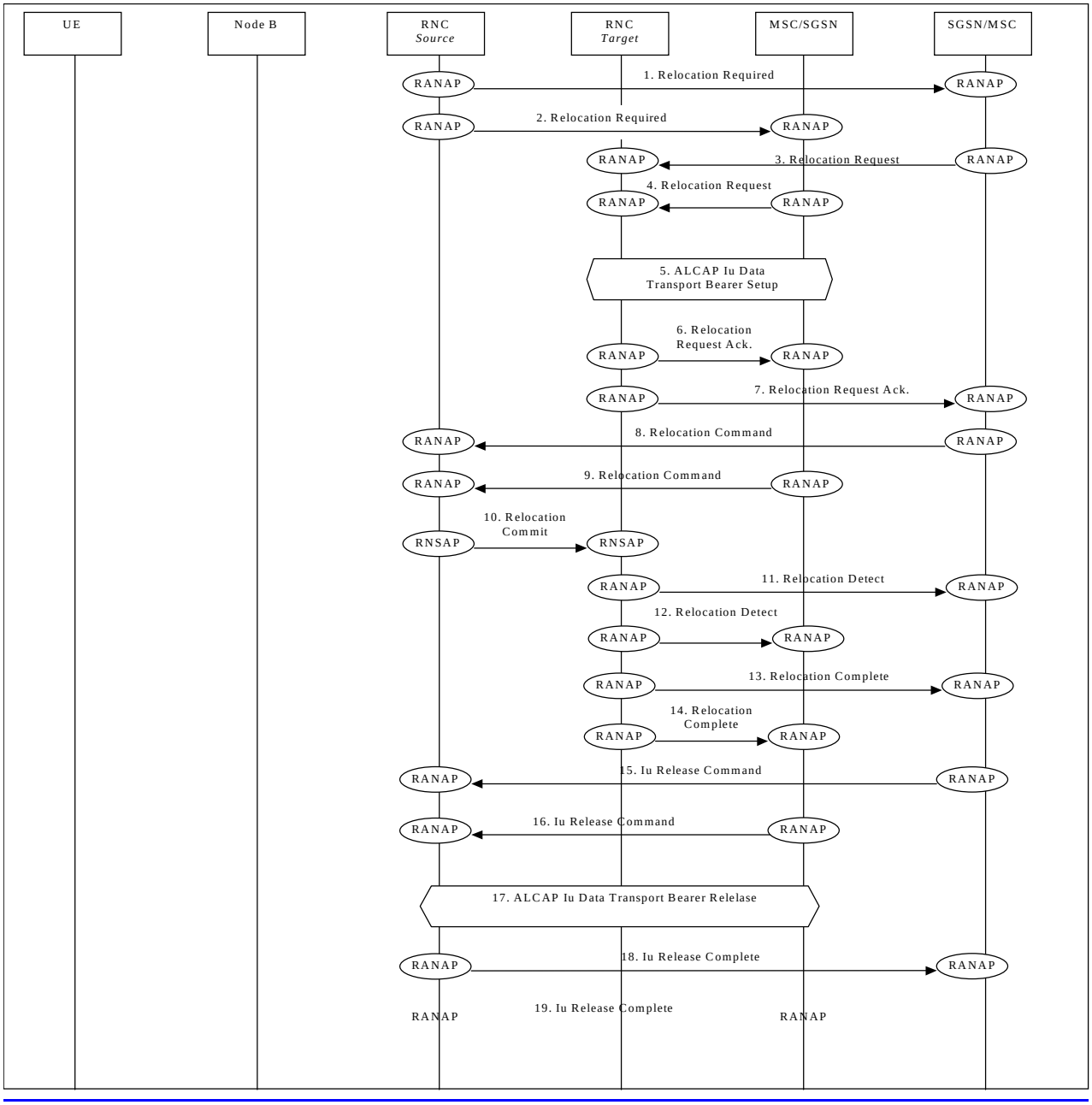


Figure 35: SRNS Relocation (UE connected to two CN nodes)

Note that the SRNC makes the decision to perform the Serving RNC relocation procedure. The Serving RNC also decides into which RNC (Target RNC) the Serving RNC functionality is to be relocated.

1./2. The source SRNC sends **Relocation Required** messages to both CN nodes.
Parameters: target RNC identifier, Information field that the CN node(s) shall pass transparently to the target RNC. This transparent field contains the UE identifier, number of CN nodes and other data.
Upon reception of **Relocation Required** message the CN element prepares itself for the switch and may also suspend user data traffic and/or signalling between UE and itself for some bearers.

3./4. When preparation is completed the CN node conveys a **Relocation Request** message to the target RNC.
Parameters: indication of which bearers should be routed towards this CN node, transparent information field sent by the source RNC, UE identifier.
The target RNC uses the UE identifier to link the requests from multiple CN nodes to each other and to the resources (e.g. Iub links) that the UE is currently using.

5. The targets RNC and CN node establish the new Iu transport bearers for each Radio Access Bearer related to that CN node.

6./7. When the source RNC and the target RNC have completed its preparation phase, **Relocation Request Acknowledge** message is sent to CN.

8./9. When the CN node is ready for the SRNC move, the CN node indicates the completion of preparation phase at the CN side for the SRNS Relocation by sending the **Relocation Command** message~~. To~~ to the source RNC~~ and the target RNC.~~.

10. When the source RNC has received **Relocation Command** messages from all the CN nodes, the source RNC sends a **Relocation Commit** message to the target RNC to request the target RNC to proceed with the Relocation.

11./12~~.~~ The target RNC sends the **Relocation Detect** message to the involved CN nodes and also executes both the DL and UL switch for all bearers at the earliest suitable time instance.

After the switch UL traffic from node-B's is routed via the newly established Macro Diversity Combiner to the new MAC/RLC entities and finally to the correct Iu transport bearer. UL data transmission to the old Iur transport bearer is ceased. Upon reception of Relocation Detect message, the CN may switch the user plane from the source RNC to the target RNC.

DL data arriving from the new Iu link is routed to newly established RLC entities, to the MAC and to the Macro Diversity Splitter and Nodes B. The DL data received from the old Iur is discarded.

~~11~~13./~~12~~14. Immediately after a successful switch at RNC, target RNC (=SRNC) sends **Relocation Complete** messages to the involved CN nodes.

If the User plane has not been switched at Relocation Detect, ~~Upon reception of messages 9 and 10,~~ the CN switches from the old Iu transport bearers to the new ones.

~~13~~15./~~14~~16. After a successful switch at the CN node, the CN node initiates the release of the Iu connection to the source RNC by sending the RANAP message **Iu Release Command**.

~~15~~17 Upon reception of the release requests from the CN nodes the old SRNC executes all necessary procedures to release all visible UTRAN resources that were related to the RRC connection in question.

~~16~~18./~~17~~19. SRNC confirm the IU release to the CN nodes sending the message **Iu Release Complete.**

At any phase, before the **Relocation Complete** message is sent, the old communication link between the CN and UE is all the time existing and working and the procedure execution can be stopped and original configuration easily restored. If any such abnormal thing occurs a **Relocation Failure** may be sent instead of any message numbered 3~~-11~~-13 described.

7.13 HO & Cell Reselection between UTRAN and GSM/BSS

This subclause presents some examples of handover procedure from UTRAN to GSM/BSS and vice versa.

The case of a UTRAN connected to UMTS CN connected to a 2G-MSC (i.e. via MAP/E interface) is shown. The case of an UTRAN connected a GSM CN trough an IWF (where RANAP is interworked with BSSMAP) is not shown, because is equivalent from the point of view of the UTRAN.

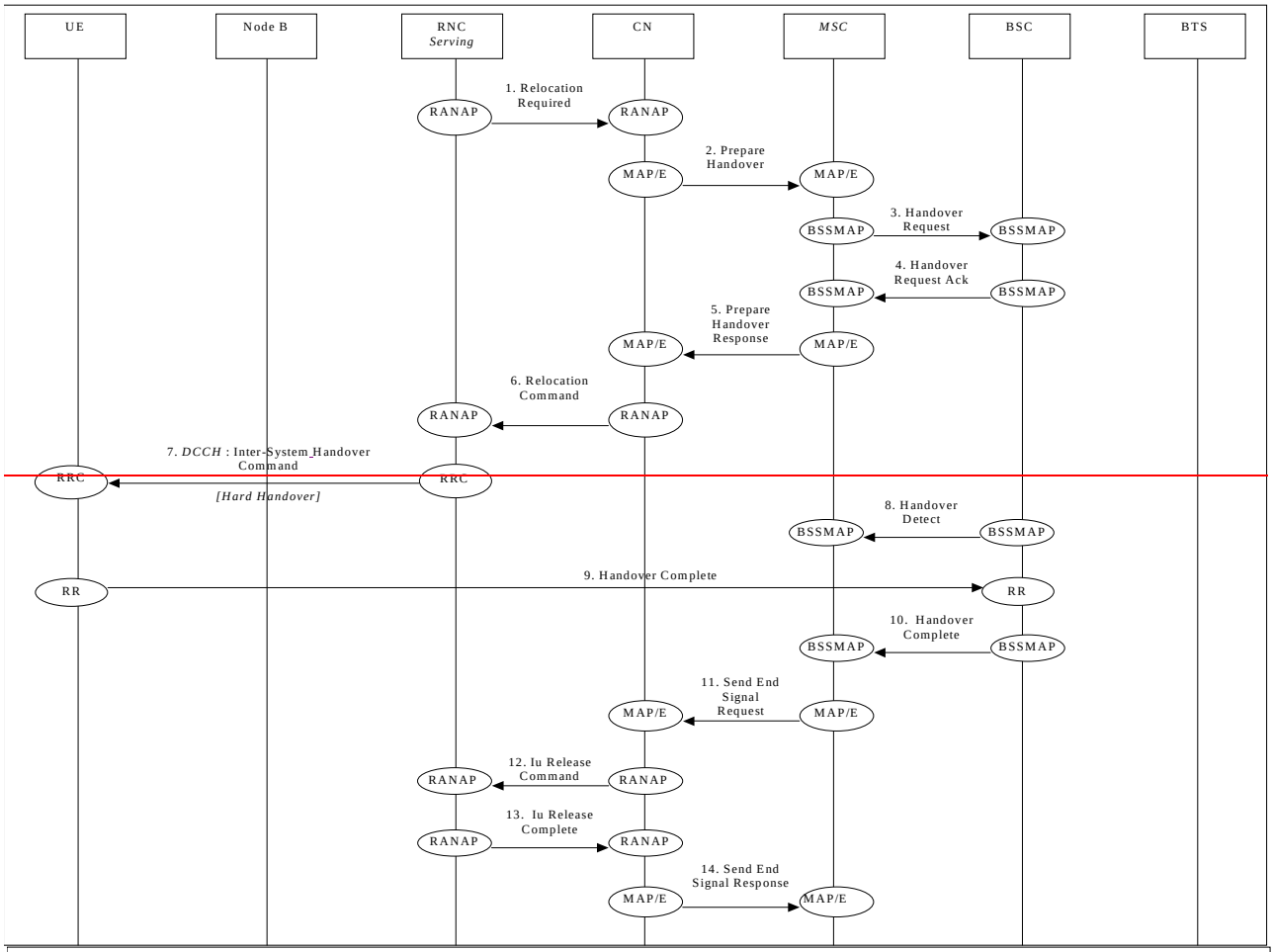
The case of HO between UTRAN and GPRS and vice versa is also considered.

7.13.1 UTRAN ⇒ GSM/BSS

7.13.1.1 UTRAN ⇒ GSM/BSS

This example shows how handover (Hard Handover) is performed from UTRAN to GSM/BSS between a UMTS CN and a 2G-MSC.

NOTE: Procedures between CN and MSC, and between MSC and BSC are out of the scope of WG3, and are only included for clarity.


UE
Node B
RNC
Serving
CN
MSC
BSC
BTS
RANAP
MAP/E
BSSMAP
RRC
RR
1. Relocation Required
2. Prepare Handover
3. Handover Request
4. Handover Request Ack
5. Prepare Handover Response
6. Relocation Command
7. DCCH : Inter-System Handover Command
[Hard Handover]
8. Handover Detect
9. Handover Complete
10. Handover Complete
11. Send End Signal Request
12. Iu Release Command
13. Iu Release Complete
14. Send End Signal Response

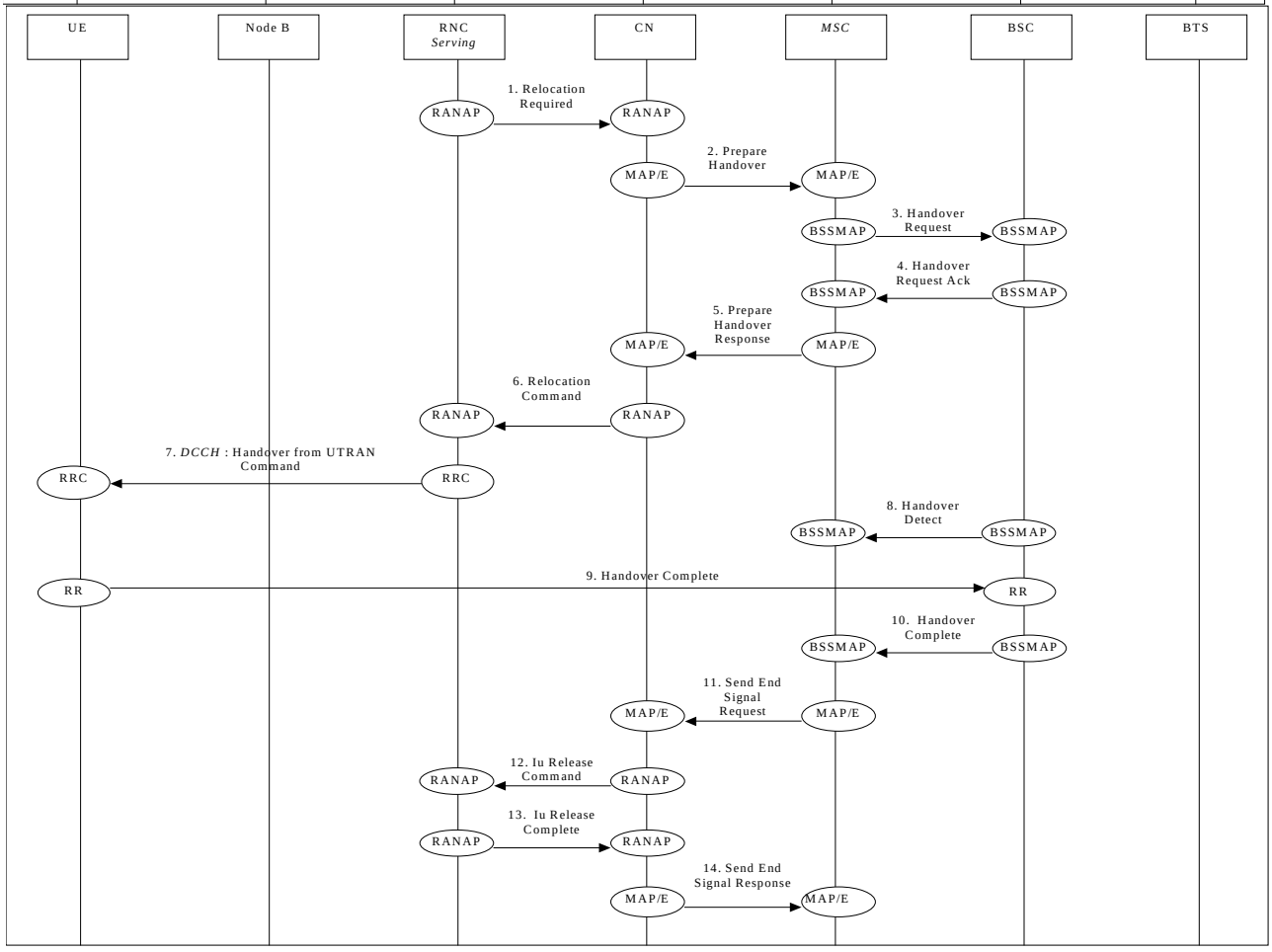

UE
Node B
RNC
Serving
CN
MSC
BSC
BTS
RANAP
MAP/E
BSSMAP
RRC
RR
1. Relocation Required
2. Prepare Handover
3. Handover Request
4. Handover Request Ack
5. Prepare Handover Response
6. Relocation Command
7. DCCH : Handover from UTRAN Command
8. Handover Detect
9. Handover Complete
10. Handover Complete
11. Send End Signal Request
12. Iu Release Command
13. Iu Release Complete
14. Send End Signal Response

Figure 36: UTRAN ⇒ GSM/BSS handover

1. Upon detection of a trigger SRNC sends RANAP message **Relocation Required** to the CN.
2. The UMTS CN will forward this request to the GSM MSC (indicated in the received message) over the MAP/E interface (MAP message **Prepare Handover**).

Steps 3 & 4 follow the normal GSM procedures and are shown only for clarity.

5. Once initial procedures are complete in GSM MSC/BSS the MSC returns MAP/E message **Prepare Handover Response**.
6. CN responds to the initial request from SRNC by sending RANAP message **Relocation Command** to the SRNC.
7. Via existing RRC connection, SRNC sends RRC message ~~Inter System Handover Command (Hard Handover)~~Handover from UTRAN command to the UE. One or several message from the other system can be included in this message.
   ~~Parameters: Handover type.~~

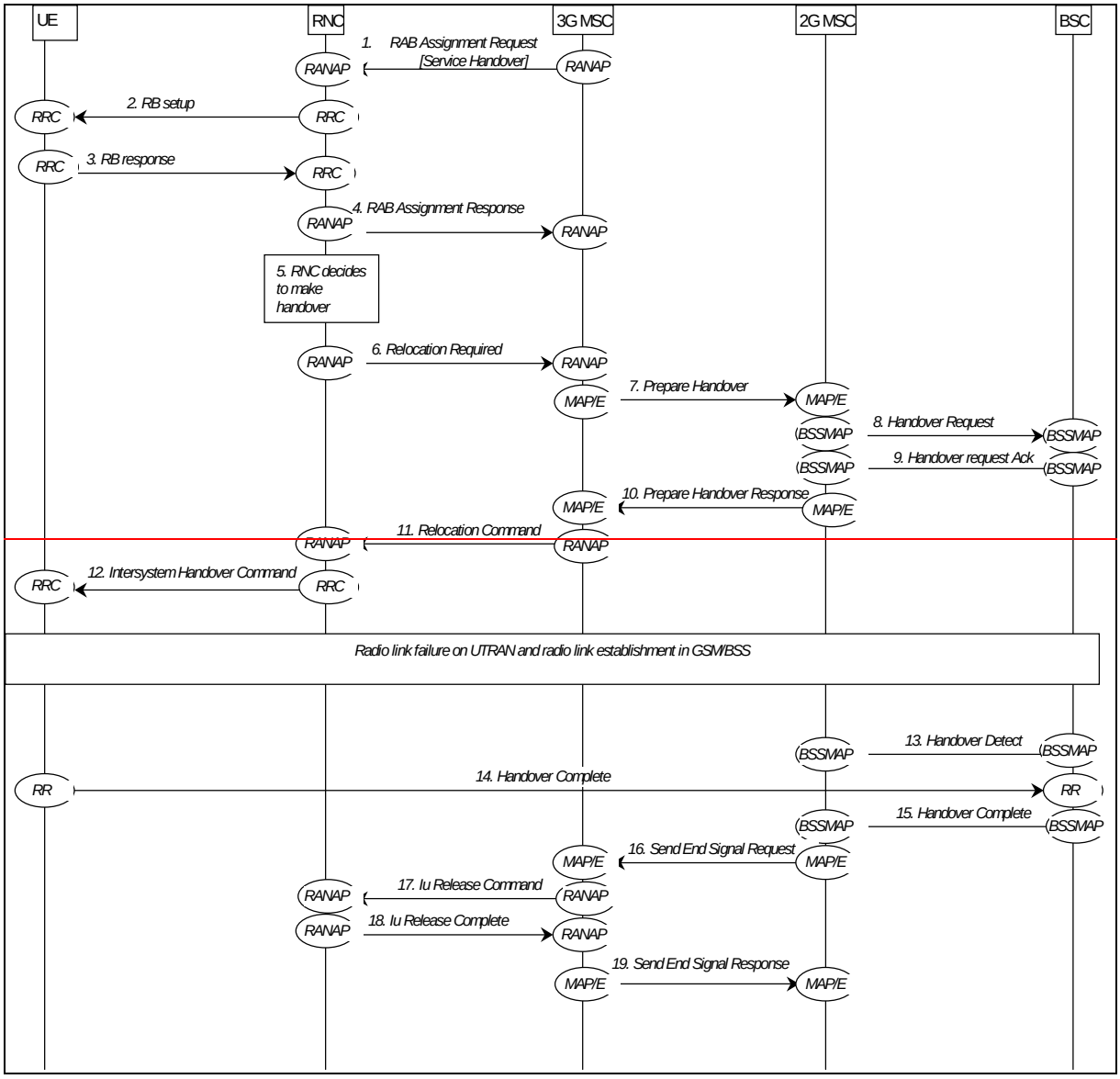
Procedures related to synchronisation etc. to GSM BSS are not shown.

Steps 8 & 10 follow normal GSM procedures and are shown only for clarity.

11. Detection of the UE within the GSM coverage results in the MSC sending MAP/E message **Send End Signal Request** to the CN.
12. CN initiates release of resources allocated by the former SRNC (**Iu Release Command**).
13. Previously allocated bearer resources are released within UMTS (e.g. using RANAP and ALCAP protocols [ALCAP not shown]) (Iu Release Complete).
14. Procedure is concluded from UMTS point of view by CN sending MAP/E message Send End Signal Response (this message is not sent until the end of the call).

7.13.1.2 Service Based Intersystem Handover

If the *Service Handover* IE is included in the RAB ASSIGNMENT REQUEST message, the service based intersystem handover from UMTS to GSM can be performed. The following example shows the signalling flow.


UE
RNC
3G MSC
2G MSC
BSC
1. RAB Assignment Request [Service Handover]
RANAP
2. RB setup
RRC
3. RB response
4. RAB Assignment Response
5. RNC decides to make handover
6. Relocation Required
7. Prepare Handover
MAP/E
BSSMAP
8. Handover Request
9. Handover request Ack
10. Prepare Handover Response
11. Relocation Command
12. Intersystem Handover Command
Radio link failure on UTRAN and radio link establishment in GSM/BSS
13. Handover Detect
RR
14. Handover Complete
15. Handover Complete
16. Send End Signal Request
17. Iu Release Command
18. Iu Release Complete
19. Send End Signal Response

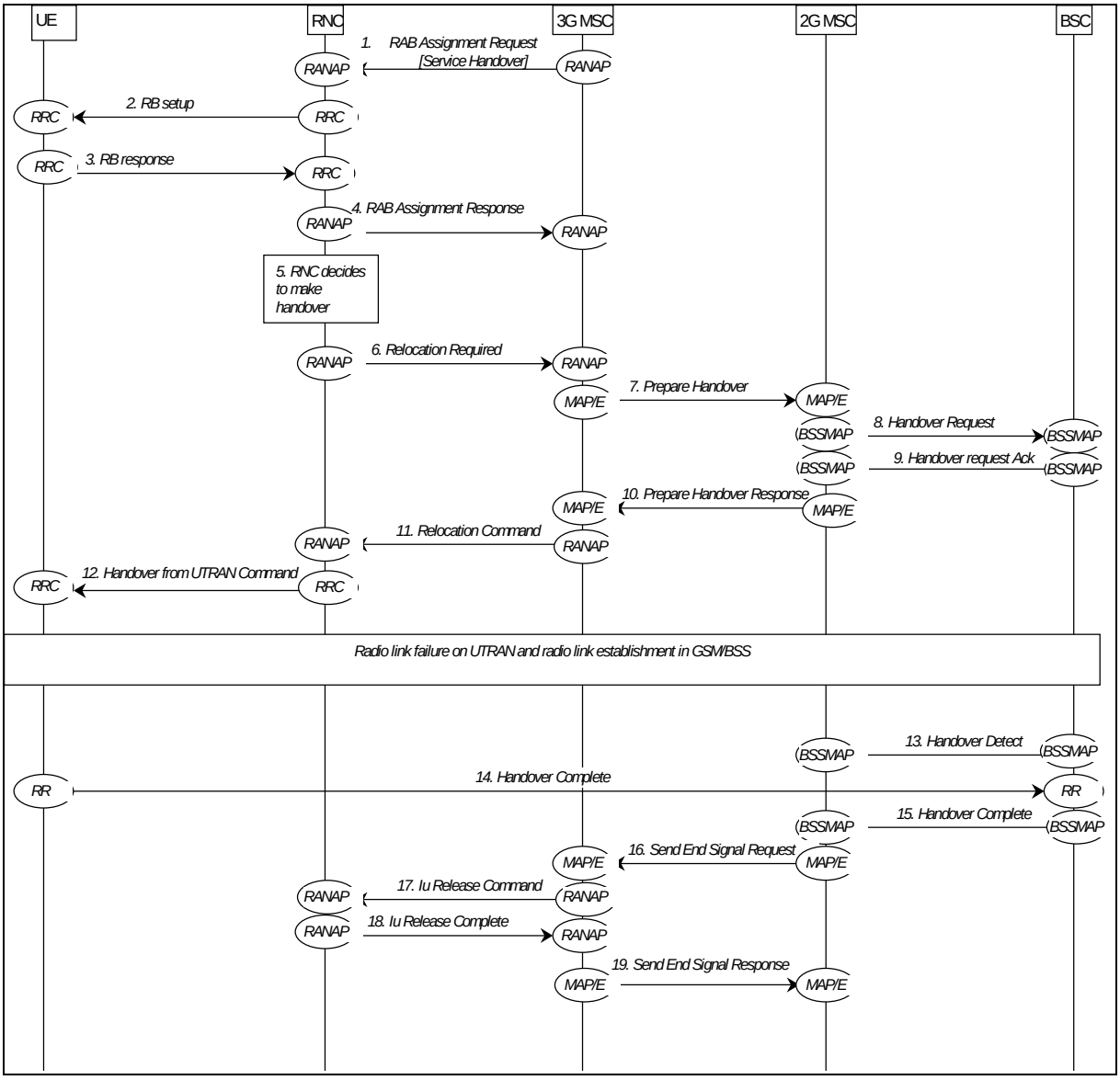


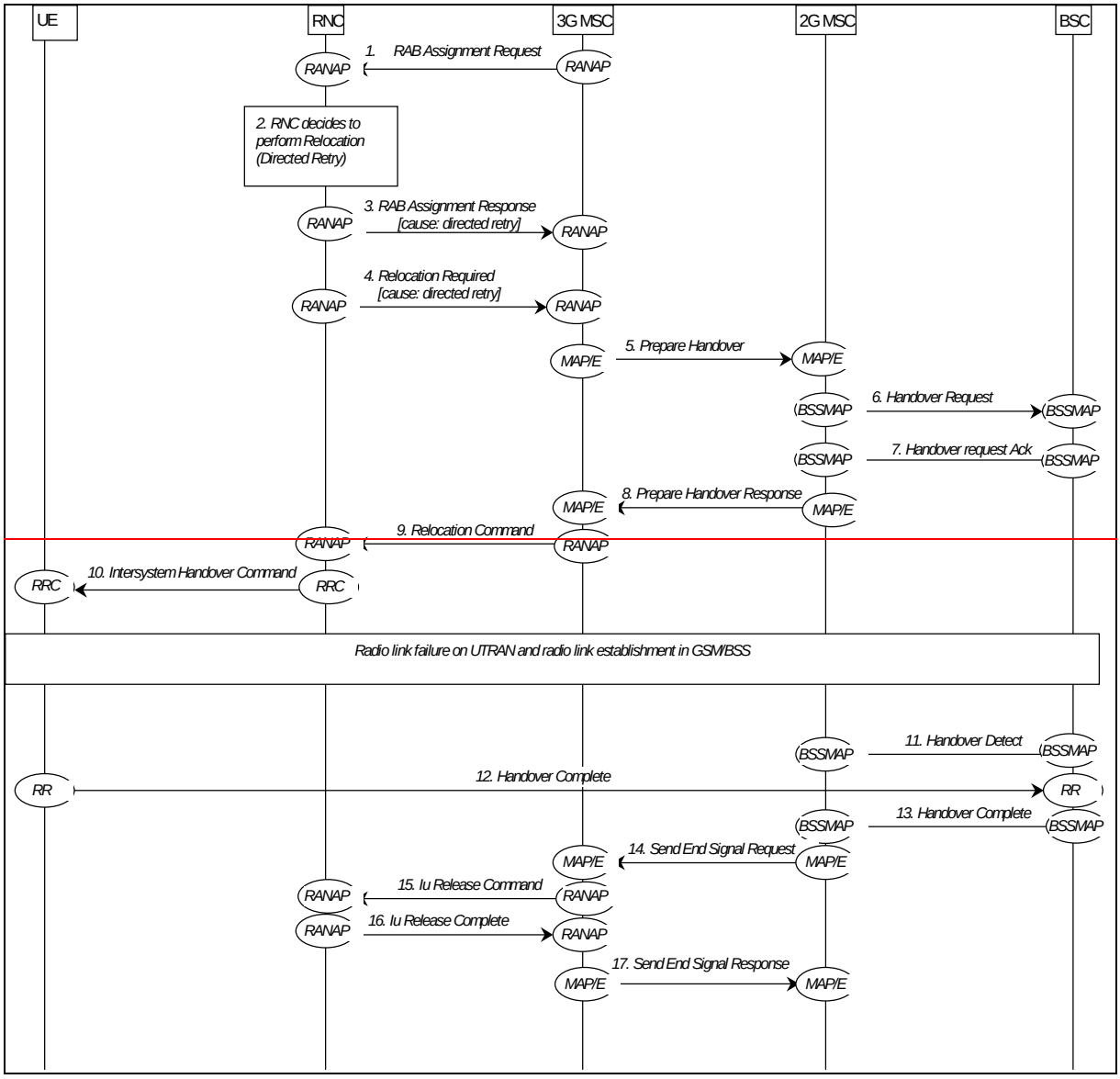
Figure 36a: Service based UTRAN to GSM/BSS Intersystem Handover

1. CN initiates establishment of the radio access bearer with RANAP message **Radio Access Bearer Assignment Request**.
   Parameters: Service Handover.
2 RRC message **Radio Bearer Setup** is sent by RNC to UE.
3 UE sends RRC message **Radio Bearer Setup Complete** to RNC.
4 RNC sends RANAP message **Radio Access Bearer Assignment Response** to CN.
5 Being based on the value assumed from *Service Handover* IE, the RNC decides to perform handover towards GSM.
6 RNC sends RANAP message **Relocation Required** to the CN.

Steps 7 to 19 are the same as 2 to 14 in subsection 7.13.1.1.

7.13.1.3 Directed Retry

Directed retry could be used to avoid the assignment phase, allowing direct assignment of resources on GSM system by CN. The following figure shows the signalling flow.


UE
RNC
3G MSC
2G MSC
BSC
RANAP
1. RAB Assignment Request
2. RNC decides to perform Relocation (Directed Retry)
3. RAB Assignment Response [cause: directed retry]
4. Relocation Required [cause: directed retry]
MAP/E
5. Prepare Handover
BSSMAP
6. Handover Request
7. Handover request Ack
8. Prepare Handover Response
9. Relocation Command
RRC
10. Intersystem Handover Command
Radio link failure on UTRAN and radio link establishment in GSM/BSS
11. Handover Detect
RR
12. Handover Complete
13. Handover Complete
14. Send End Signal Request
15. Iu Release Command
16. Iu Release Complete
17. Send End Signal Response

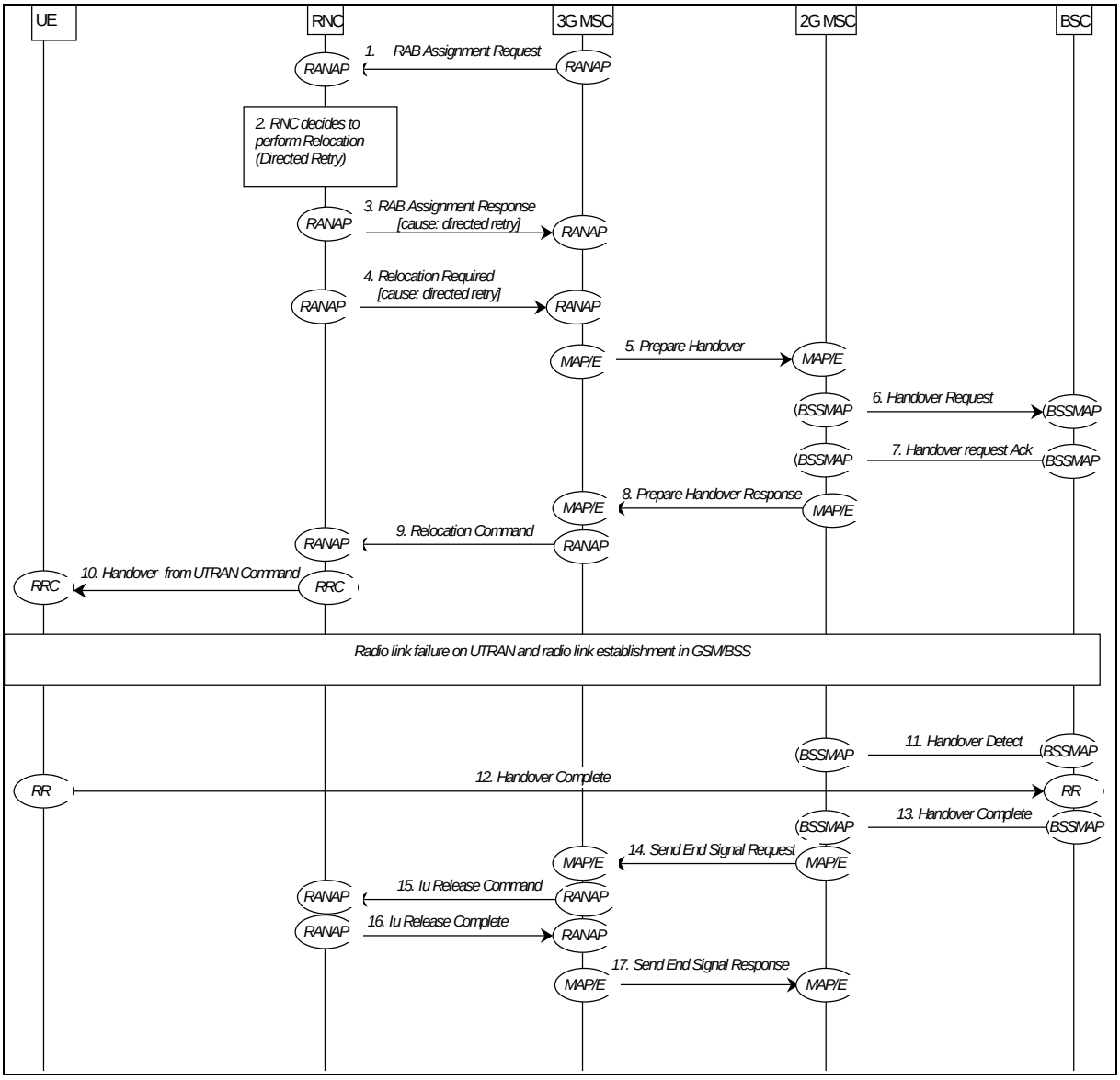


Figure 36b: Directed Retry

1. CN initiates establishment of the radio access bearer with RANAP message **Radio Access Bearer Assignment Request**.
2. RNC decides to perform relocated avoiding the Radio Bearer Setup phase.
3. RNC sends RANAP message **Radio Access Bearer Assignment Response** to CN with the RAB ID included in the list of RABs failed to setup and a cause value of "Directed Retry".
4. RNC sends RANAP message **Relocation Required** with cause value "Directed Retry".

Steps 5 to 17 are the same as 2 to 14 in subsection 7.13.1.1.

7.13.2 GSM/BSS ⇒ UTRAN

This example shows how handover (Hard Handover) is performed from GSM/BSS to UMTS between a UMTS CN and a 2G-MSC.

NOTE: Procedures between CN and MSC, and between MSC and BSC are out of the scope of WG3, and are only included for clarity.

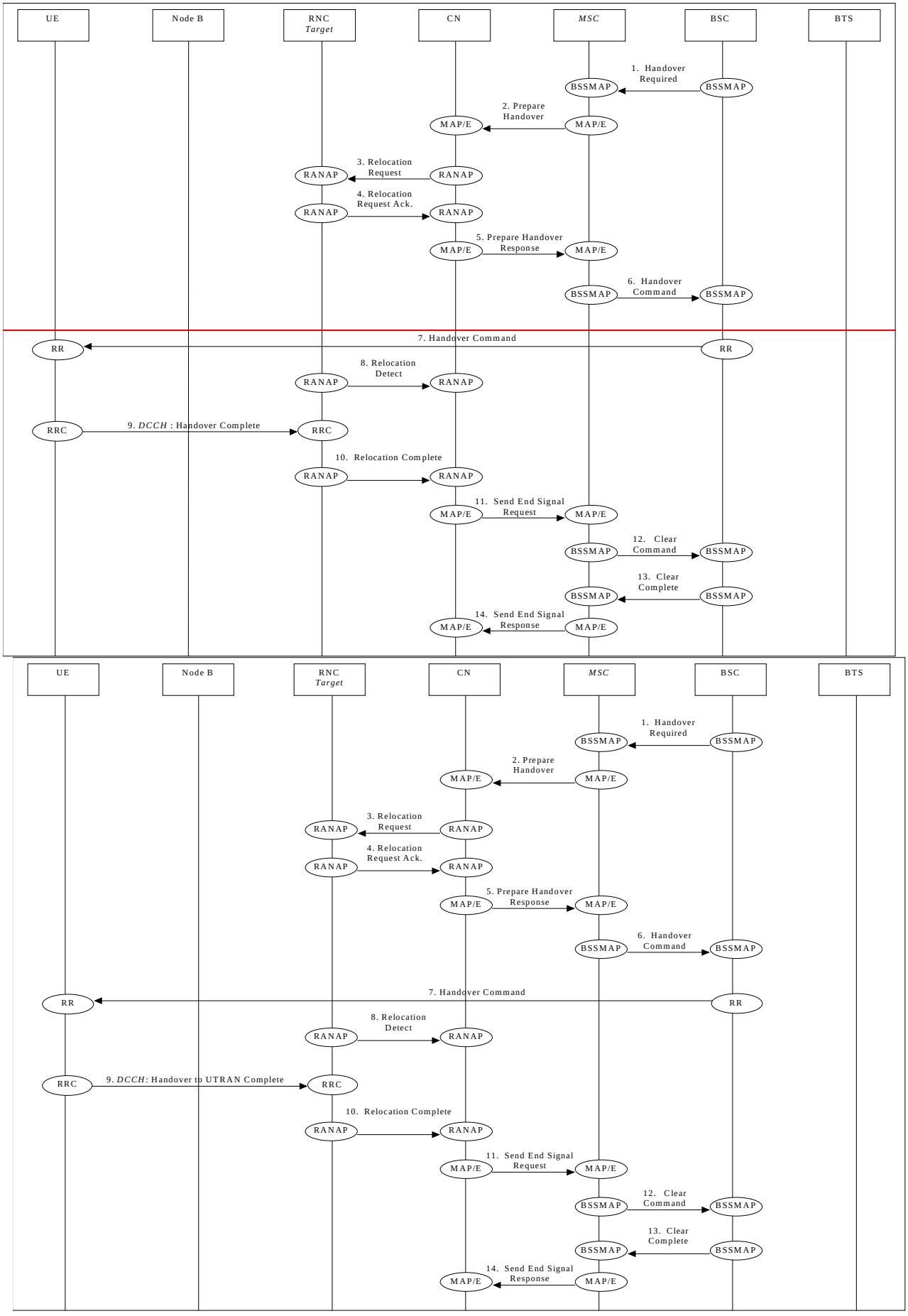


Figure 37: GSM/BSS ⇒ UTRAN handover

1. The BSC sends **Handover Required** message to the GSM MSC.

2. The MSC sends MAP/E message **Prepare Handover** to the UMTS CN.
3. The CN sends RANAP message **Relocation Request** to the Target RNC.
4. Response **Relocation Request Acknowledge** is returned to the CN by the target RNC via RANAP.
5. MAP/E message **Prepare Handover Response** is sent by the UMTS CN to the MSC.

Steps 6 & 7 follow normal GSM procedures and are shown only for clarity.

8. When target RNC has detected the UE, **Relocation Detect** message is sent to the CN node.
9. When the RRC connection is established with the target RNC and necessary radio resources have been allocated the UE sends RRC message ~~**Handover complete**~~ **Handover to UTRAN Complete** to the target RNC.
10. Once complete the target RNC sends RANAP message **Relocation Complete** to the CN.
11. CN sends MAP/E message **Send End Signal Request** to the MSC.
12. The MSC sends **Clear Command** message to the BSC.
13. The BSC responds with **Clear Complete** message to the GSM
15. The MSC sends MAP/E message **Send End Signal Response** to the UMTS CN to conclude the procedure (this message is not sent until the end of the call).

7.13.3 GPRS ⇒ UMTS Cell Reselection

This subclause shows UTRAN signalling procedures for GPRS to UTRAN Cell Reselection.

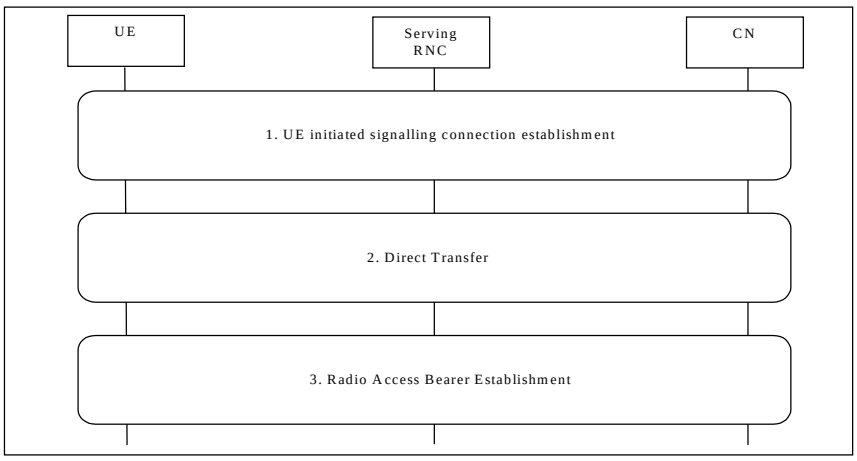


Figure 38

1. The UE selects a UTRAN cell, reads system information, and initiates establishment of a NAS signalling connection.
   See section UE Initiated Signalling Connection Establishment.
2. The NAS signalling connection between UE and CN can now be used for NAS message transfer (e.g. execution of security functions).
   See section Direct Transfer.
3. After necessary CN-GPRS preparations (e.g. UE context information retrieval), CN initiates establishment of radio access bearer(s).
   See section Radio Access Bearer Establishment.

7.13.4 UMTS ⇒ GPRS Cell Reselection, UE Initiated

This subclause shows UTRAN signalling procedures for UTRAN to GPRS cell reselection initiated by UE..

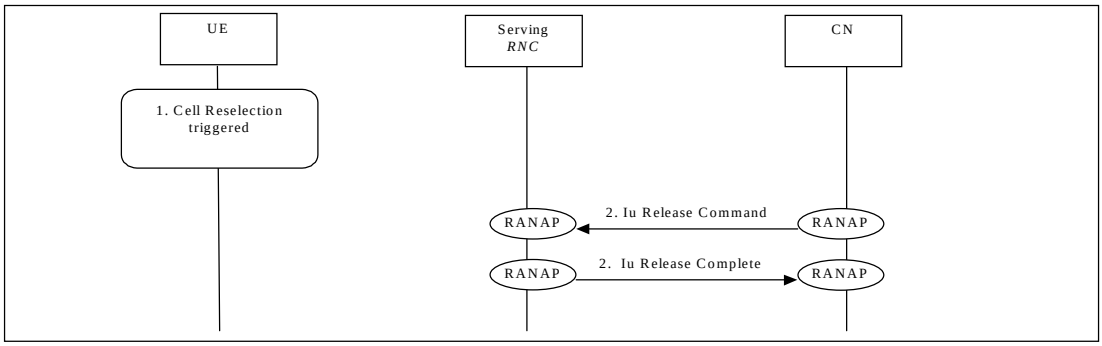


Figure: 39

1. The UE selects a GPRS cell, reads system information, and initiates establishment of UE-GPRS connection.
2. After necessary CN-GPRS preparations (e.g. UE context information retrieval), CN initiates release of Iu connection. SRNC releases the RRC connection.

7.13.5 UMTS ⇒ GPRS Cell Reselection, Network Initiated

This subclause shows UTRAN signalling procedures for UTRAN to GPRS Cell Reselection triggered by Serving RNC.

NOTE: This case can only supported if the RNC could generate GSM messages.

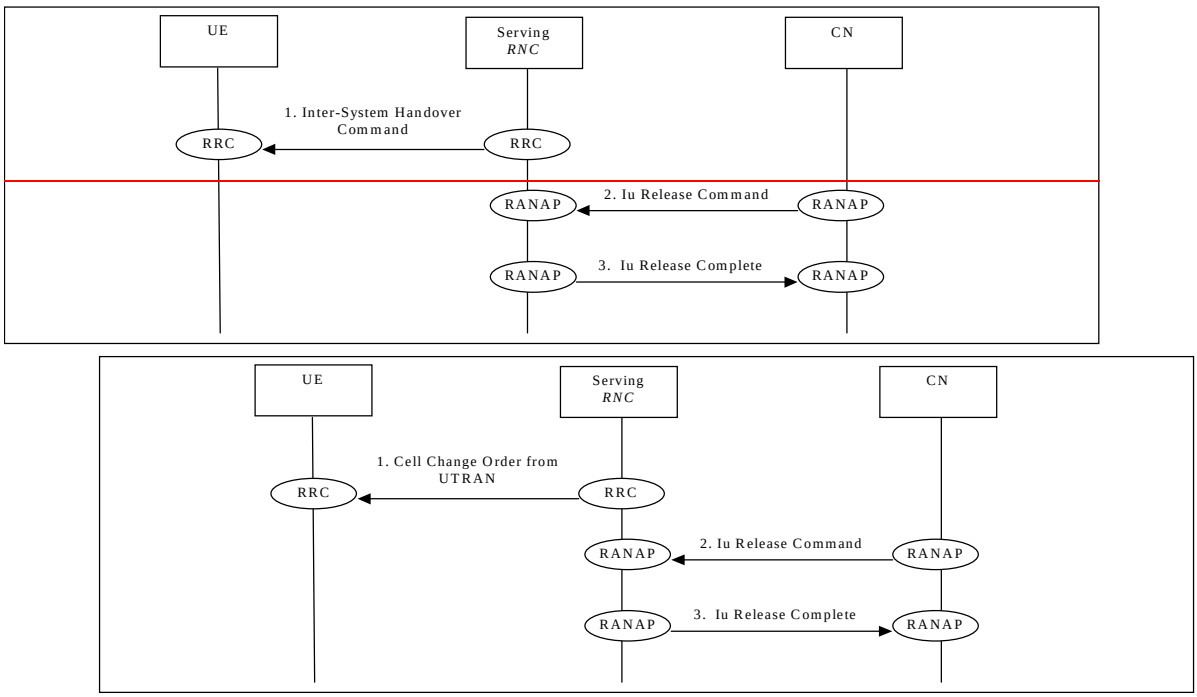


Figure 40: UTRAN to GPRS Cell Reselection

1. Based on UE measurements, SRNC triggers the handover to a GPRS cell by sending a ~~Inter System Handover Command~~Cell Change order from UTRAN to the UE. The UE initiates establishment of UE-GPRS connection.
2. After necessary CN-GPRS preparations (e.g. UE context information retrieval), CN initiates release of the RRC connection.
3. SRNC releases all resources reserved for the UE.

3GPP TSG-RAN3 #27 Meeting
Orlando, USA, February 18th – 22nd 2002

Tdoc R3-020603

CR-Form-v3

CHANGE REQUEST

⌘ **25.931** **CR** **017** ⌘ rev **1** ⌘ Current version: **4.2.0** ⌘

*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 ☐ Radio Access Network **X** Core Network ☐

Title:	⌘	DSCH-related additions to Handover scenarios
Source:	⌘	R-WG3
Work item code:	⌘	TEI
Date:	⌘	February 2002
Category:	⌘	**A**
Release:	⌘	REL-4

Use one of the following categories:
F *(essential 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: ⌘ In the present version of 25.931 there are no examples for DSCH mobility procedures.

Summary of change: ⌘ One new example is proposed for DSCH mobility procedures in Soft Handover as new subclause: 7.10.4.
Minor modifications are proposed to the existing mobility procedure for Hard Handover (subclause 7.11.1) in order to incorporate DSCH mobility.

Revision 1 changes:
- Title in subclause 7.10.4 changed to: DSCH Mobility Procedure in Soft Handover (Moving DSCH within the Active Set)
- Caption in Figure 26a changed to: DSCH Mobility Procedure in Soft Handover (moving DSCH within the active set)
- Deleting “DSCH Addition” and “DSCH Deletion” from Figure 26a.
- Source Node B and target Node B swapped in Figure 26a;
- “NBAP” replaced by “Node B” in bullet 2 explaining Figure 26a;
- text changes related to RL RECONFIGURATION PREPARE in Figure 26a.

Consequences if not approved: ⌘ A non-essential omission will remain in the specification.

Impact Analysis:

This CR has no impact on the previous version of the specification (same release) because 25.931 has purely informative character.

Clauses affected: ⌘ 7.10; 7.10.4 (new!); 7.11.1

Other specs	⌘	**X**	Other core specifications	⌘	TS 25.931 v3.5.0 CR016
affected:			Test specifications		
			O&M Specifications		
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

7.10 Soft Handover (FDD)

This subclause presents some examples of soft handover procedures. The following cases are considered:

- Radio Link Addition (Branch Addition);
- Radio link Deletion (Branch Deletion);
- Radio link Addition & Deletion (Branch Addition & Deletion - simultaneously);
- DSCH mobility procedure in Soft Handover (moving DSCH within the active set~~from one radio link to another~~).

Soft Handover applies only to FDD mode.

7.10.1 Radio Link Addition (Branch Addition)

This example shows establishment of a radio link via a Node B controlled by another RNC than the serving RNC. This is the first radio link to be established via this RNS, thus macro-diversity combining/splitting with already existing radio links within DRNS is not possible.

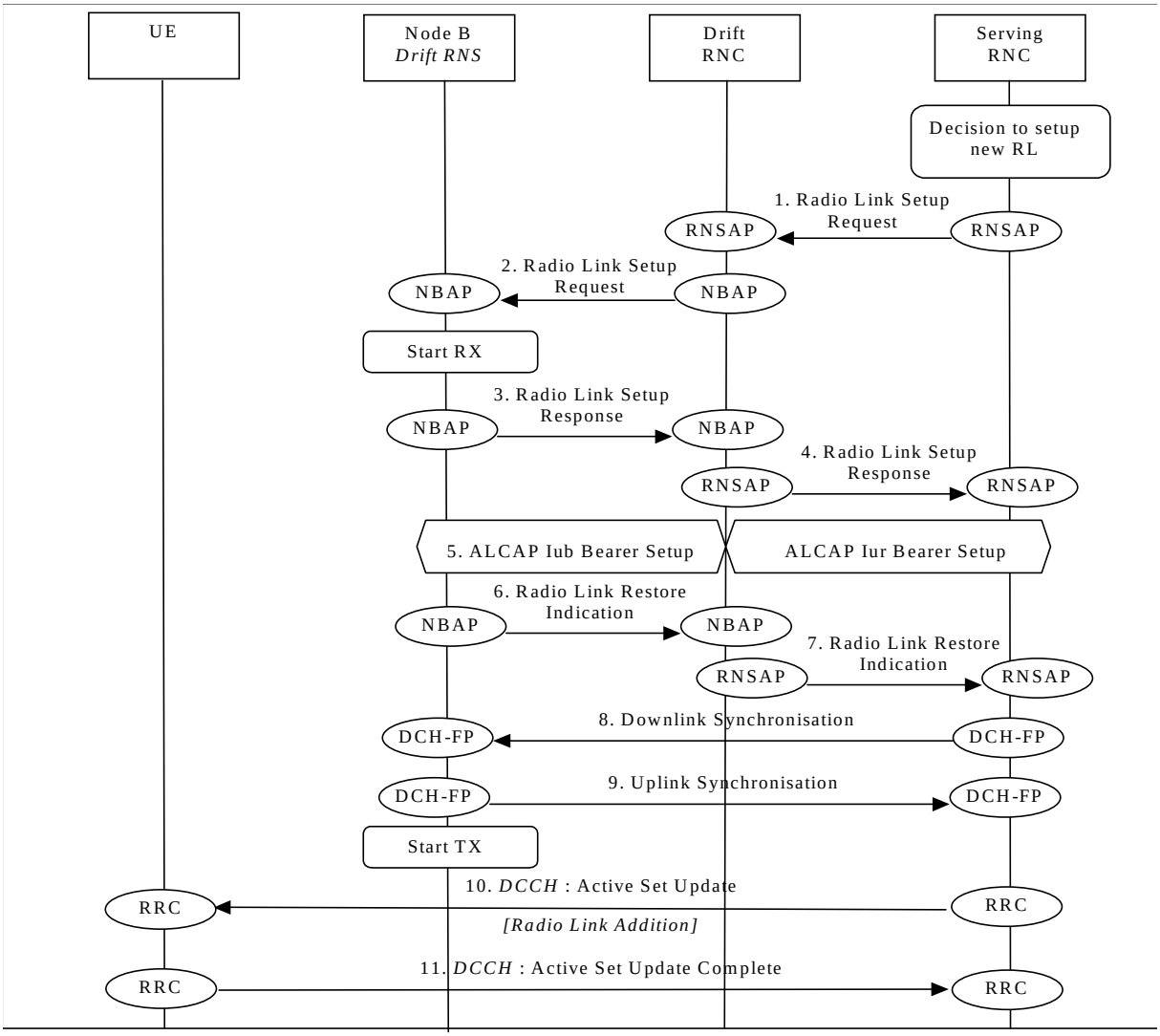


Figure 24: Soft Handover - Radio Link Addition (Branch Addition)

1. SRNC decides to setup a radio link via a new cell controlled by another RNC. SRNC requests DRNC for radio resources by sending RNSAP message **Radio Link Setup Request**. If this is the first radio link via the DRNC for this UE, a new Iur signalling connection is established. This Iur signalling connection will be used for all

RNSAP signalling related to this UE.
Parameters: Cell id, Transport Format Set per DCH, Transport Format Combination Set, frequency, UL scrambling code.

2. If requested resources are available, DRNC sends NBAP message **Radio Link Setup Request** to Node B.
   Parameters: Cell id, Transport Format Set per DCH, Transport Format Combination Set, frequency, UL scrambling code.
   Then Node B starts the UL reception.

3. Node B allocates requested resources. Successful outcome is reported in NBAP message **Radio Link Setup Response**.
   Parameters: Signalling link termination, Transport layer addressing information (AAL2 address, AAL2 Binding Identitie(s)) for Data Transport Bearer(s).

4. DRNC sends RNSAP message **Radio Link Setup Response** to SRNC.
   Parameters: Transport layer addressing information (AAL2 address, AAL2 Binding Identity) for Data Transport Bearer(s), Neighbouring cell information.

5. SRNC initiates setup of Iur/Iub Data Transport Bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to DCH.
   This may be repeated for each Iur/Iub Data Transport Bearer to be setup.

6./7. Node B achieves uplink sync on the Uu and notifies DRNC with NBAP message **Radio Link Restore Indication**. In its turn DRNC notifies SRNC with RNSAP message **Radio Link Restore Indication.**

8./9. Node B and SRNC establish synchronism for the Data Transport Bearer(s) by means of exchange of the appropriate DCH Frame Protocol frames **Downlink Synchronisation** and **Uplink Synchronisation**, relative already existing radio link(s). Then Node B starts DL transmission.

10. SRNC sends RRC message **Active Set Update** (Radio Link Addition) to UE on DCCH.
    Parameters: Update type, Cell id, DL scrambling code, Power control information, Ncell information.

11. UE acknowledges with RRC message **Active Set Update Complete**.

NOTE: The order of transmission of **Radio Link Restore Indication** messages (steps 6 and 7) is not necessarily identical to that shown in the example. These messages could be sent before the ALCAP bearer setup (step 5) or after the transport bearer synchronisation (steps 8 and 9).

7.10.2 Radio link Deletion (Branch Deletion)

This example shows deletion of a radio link belonging to a Node B controlled by another RNC than the serving RNC.

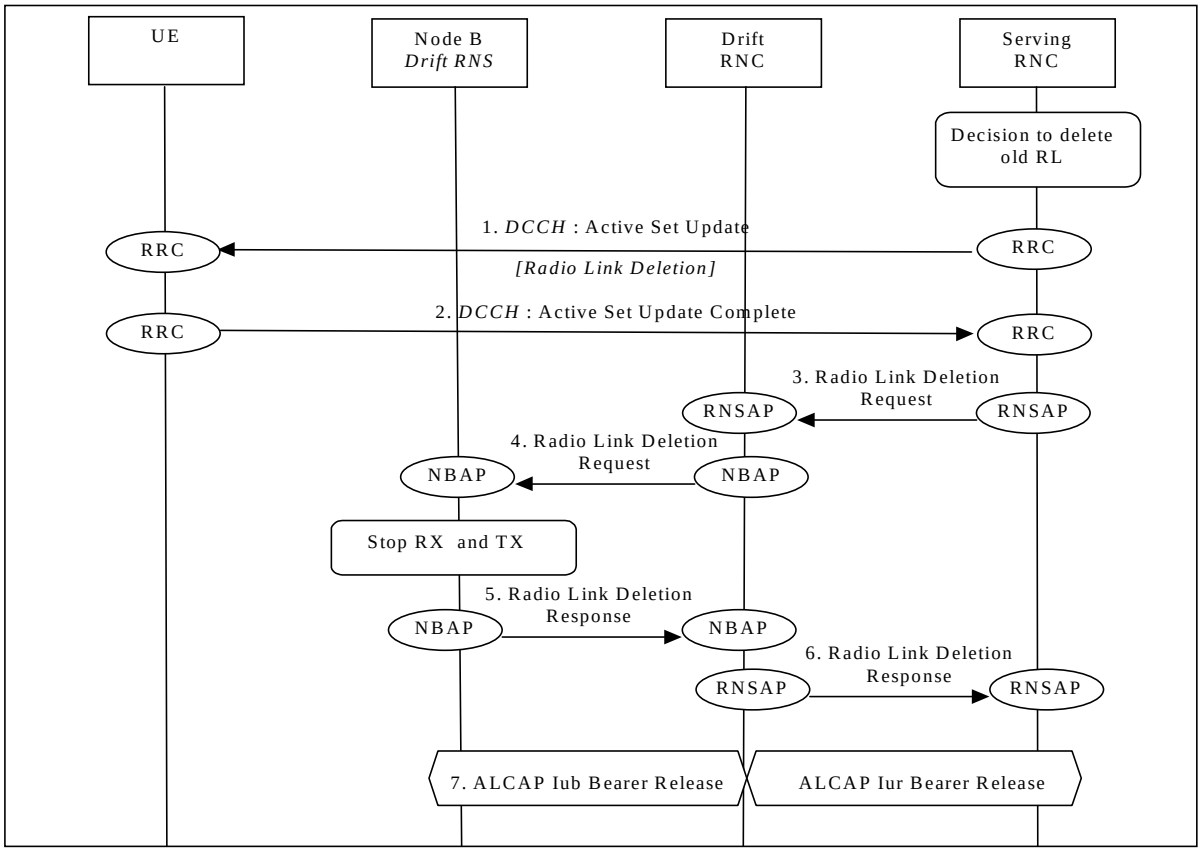


Figure 25: Soft Handover - Radio Link Deletion (Branch Deletion)

1. SRNC decides to remove a radio link via an old cell controlled by another RNC. SRNC sends RRC message **Active Set Update** (Radio Link Deletion) to UE on DCCH.
   Parameters: Update type, Cell id.

2. UE deactivates DL reception via old branch, and acknowledges with RRC message **Active Set Update Complete**.

3. SRNC requests DRNC to deallocate radio resources by sending RNSAP message **Radio Link Deletion Request**.
   Parameters: Cell id, Transport layer addressing information.

4. DRNC sends NBAP message **Radio Link Deletion Request** to Node B.
   Parameters: Cell id, Transport layer addressing information.

5. Node B deallocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.

6. DRNC sends RNSAP message **Radio Link Deletion Response** to SRNC.

7. SRNC initiates release of Iur/Iub Data Transport Bearer using ALCAP protocol.

7.10.3 Radio link Addition & Deletion (Branch Addition & Deletion - simultaneously)

This example shows simultaneous deletion of a radio link belonging to a Node B controlled by the serving RNC and the establishment of a radio link via a Node B controlled by another RNC than the serving RNC. This is the first radio link to be established via this RNS, thus macro-diversity combining/splitting with already existing radio links within DRNS is not possible.

This procedure is needed when the maximum number of branches allowed for the macrodiversity set has already been reached.

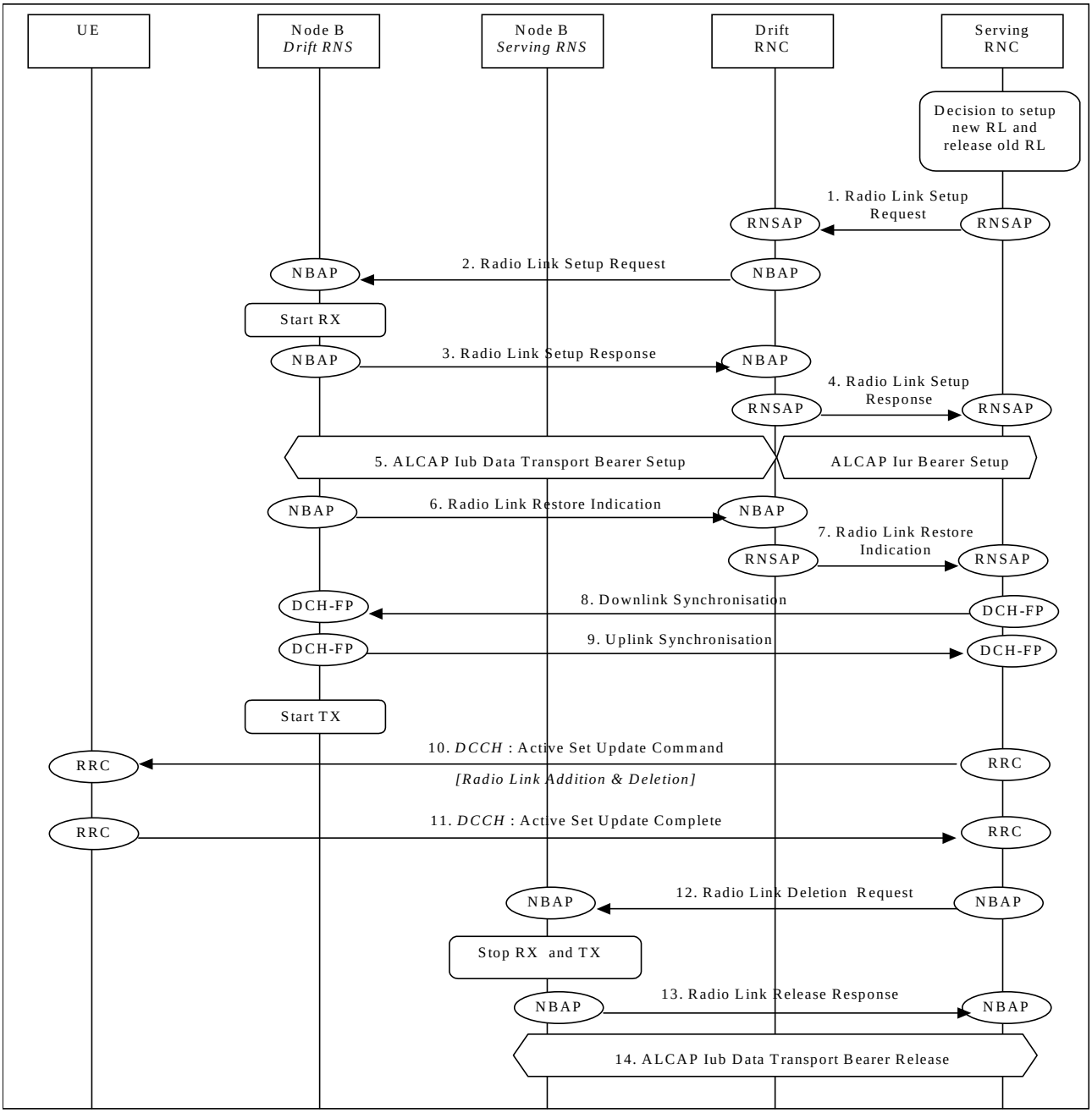


Figure 26: Soft Handover - Radio link Addition & Deletion (Branch Addition & Deletion - simultaneously)

1. ⇒ 9. See description 1. ⇒ 9. in subclause 7.10.1.

10. SRNC sends RRC message **Active Set Update** (Radio Link Addition & Deletion) to UE on DCCH. Parameters: Update type, Cell id, DL scrambling code, Power control information, Ncell information.

11. UE deactivates DL reception via old branch, activates DL reception via new branch and acknowledges with RRC message **Active Set Update Complete**.

12. ⇒ 12. See description 3. ⇒ 7. in subclause 7.10.2.

7.10.4 DSCH Mobility Procedure in Soft Handover (Moving DSCH within the Active Set)

This example shows how DSCH can be moved from one radio link to another in the case where UE is in macrodiversity on the associated DCH. At the beginning of this example the UE has:

- one radio link to a Node B controlled by the Serving RNC, and
- one radio link to a Node B controlled by another RNC than the Serving RNC.

The former radio link carries both a DCH and a DSCH, whereas the latter carries a DCH only. They are referred to as *source DSCH radio link* and *target DSCH radio link*, respectively.

Initially, the TFCI (sent on the DCH) is in macrodiversity. The TFCI2 field is carried over Iub and Iur over the same transport bearers as the associated DCH.

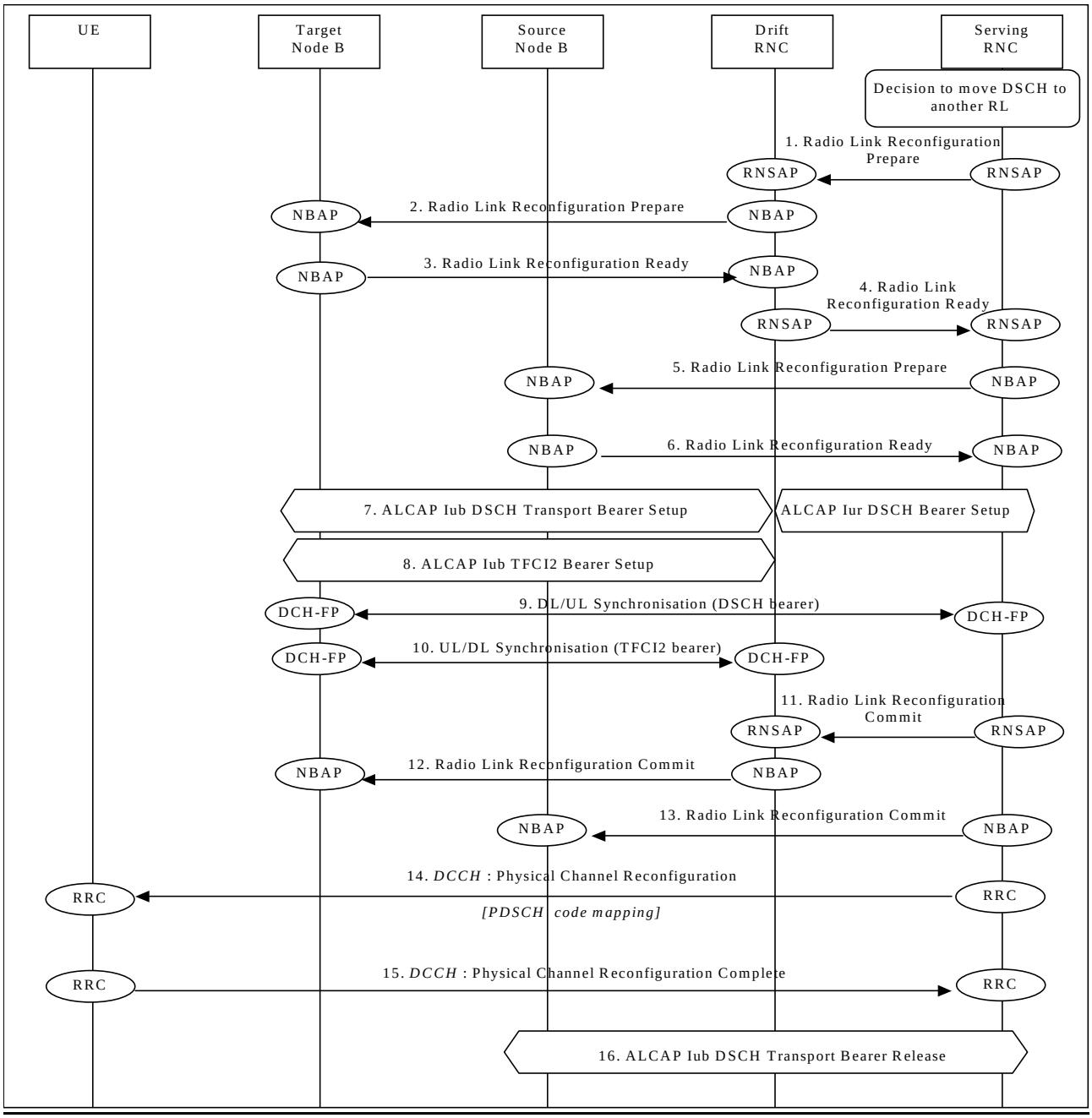


Figure 26a: DSCH mobility procedure in Soft Handover ~~–~~ (moving DSCH within the active set)~~from one radio link to another~~

1. SRNC decides to move the DSCH to the cell controlled by the DRNS i.e. to the target DSCH radio link. SRNC sends RNSAP message **Radio Link Reconfiguration Prepare** to DRNC. Parameters: new PDSCH RL ID~~DSCHs to Add~~.
2. DRNC requests from target Node B~~NBAP~~ to perform synchronised radio link reconfiguration using the **Radio Link Reconfiguration Prepare** message, adding DSCH resources on the target DSCH radio link. Parameters:

new PDSCH RL ID~~DSCH to Add~~; Transport Bearer Request Indicator; TFCI2 bearer specific information; TFCI signalling mode set to "Hard Split".

3. Target Node B returns **Radio Link Reconfiguration Ready** message to DRNC. Parameters: DSCH information response (Transport Layer Address; Binding ID); TFCI2 bearer information response (Transport Layer Address; Binding ID).

4. DRNC returns a **Radio Link Reconfiguration Ready** message to SRNC. Parameters: DSCH flow control information; PDSCH code mapping; Transport Layer Address, Binding ID.

5. SRNC requests from Source Node B to perform synchronised radio link reconfiguration using the **Radio Link Reconfiguration Prepare** message, removing DSCH resources from the source DSCH radio link. Parameters: new PDSCH RL ID~~DSCH to Delete~~; TFCI Signalling Mode set to "Hard Split".

6. Source Node B returns **Radio Link Reconfiguration Ready** message to SRNC.

7. Transport bearer for the DSCH is setup on Iur and Iub.

8. Transport bearer for the TFCI2 is setup on Iub.

9. DCH synchronisation procedure is carried out on the DSCH bearer, between SRNC and target Node B.

10. DL transport channels synchronisation procedure is carried out on the TFCI2 bearer, between DRNC and target Node B.

11-13. Exchange of **Radio Link Reconfiguration Commit** messages indicating the CFN at which the DSCH should be moved from the source DSCH radio link to the target DSCH radio link.

14. SRNC sends **Physical Channel Reconfiguration** message to UE indicating that the PDSCH channel has been moved to the target DSCH radio link. The source DSCH radio link is not deleted, however the TFCI field is not in macrodiversity anymore. Parameters: Activation time; PDSCH code mapping; PDSCH with SHO DCH Info. The latter parameter indicates that the UE must not soft combine the TFCI because the TFCI signalling mode is set to "Hard Split".

15. At the indicated time UE stops receiving DSCH on the source DSCH radio link and starts reception on the target DSCH radio link. The UE returns a **Physical Channel Reconfiguration Complete** message to SRNC.

16. The Iub Transport bearer for the DSCH is released towards the source Node B. Note that there was no TFCI2 bearer on the source DSCH radio link.

7.11.1 Backward Hard Handover

This subclause shows some examples of hard handover in the case of network initiated backward handovers.

7.11.1.1 Hard Handover via Iur (DCH State)

This subclause shows an example of Hard Handover via Iur, when the mobile is in DCH state, for both successful and unsuccessful cases. The text enclosed in brackets refers to the case when the UE has a DSCH.

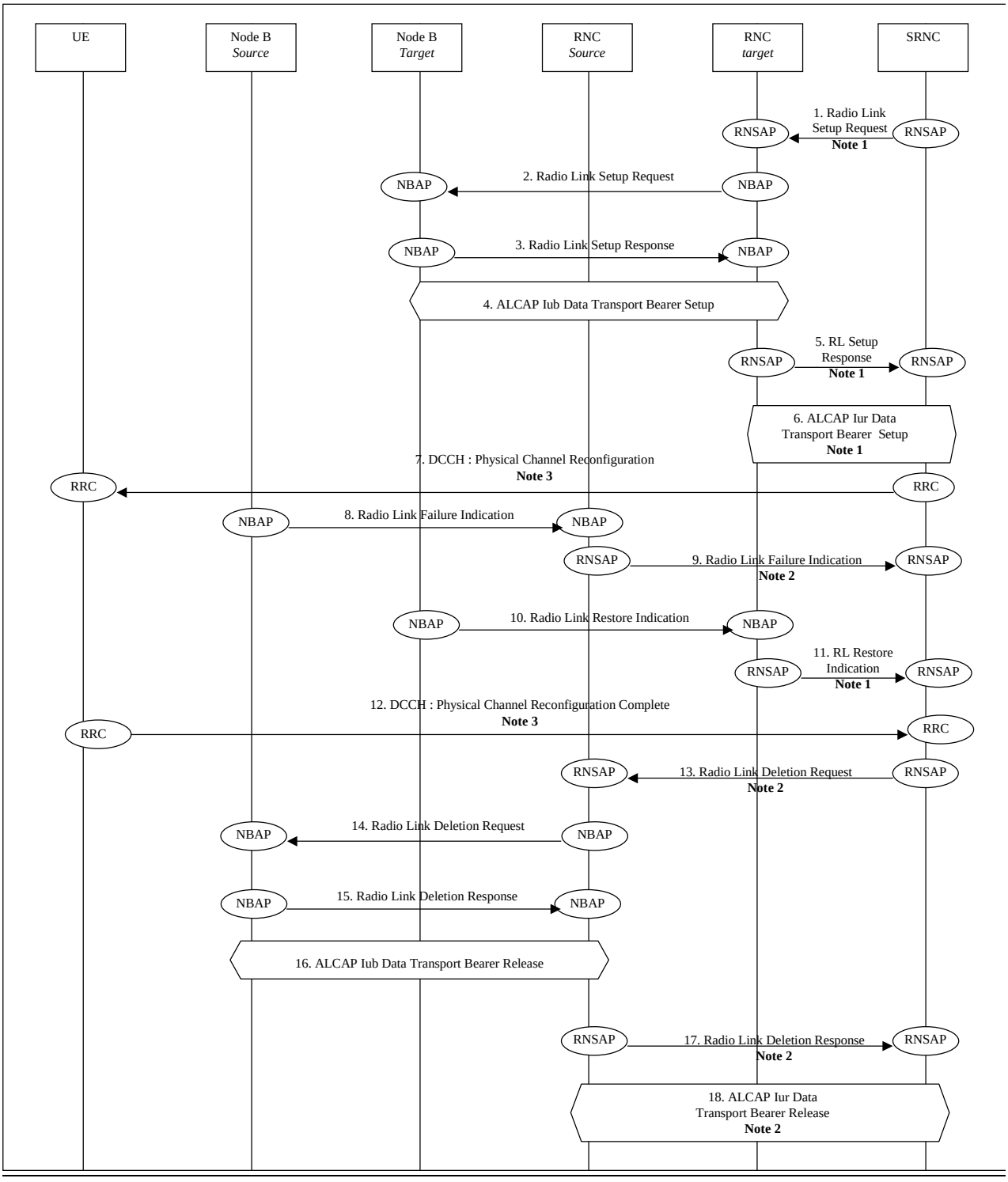


Figure 27: Hard Handover via Iur (DCH on Iur) – successful case

1. SRNC sends **Radio Link Setup Request** message to the target RNC.
   Parameters: target RNC identifier, s-RNTI, Cell id, Transport Format Set, Transport Format Combination Set, [DSCH information]. (Note 1).

2. The target RNC allocates RNTI and radio resources for the RRC connection and the Radio Link(s) (if possible), and sends the NBAP message **Radio Link Setup Request** to the target Node-B.
   Parameters: Cell id, Transport Format Set, Transport Format Combination Set, frequency, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information, [PDSCH code mapping (FDD only); TFCI2 bearer specific information (FDD only); TFCI signalling mode set to "Hard Split" (FDD only); DSCH information (TDD only)] etc.

3. Node B allocates resources, starts PHY reception, and responds with NBAP message **Radio Link Setup Response**.
   Parameters: Signalling link termination, Transport layer addressing information for the Iub Data Transport Bearer, [DSCH information response, TFCI2 bearer information response (FDD only).].

4. Target RNC initiates set-up of Iub Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to the DCH. The request for set-up of Iub Data Transport bearer is acknowledged by Node B. [A separate transport bearer is established for the DSCH. Another transport bearer is established for the TFCI2 signalling information (FDD only).]

5. When the Target RNC has completed preparation phase, **Radio Link Setup Response** is sent to the SRNC (see note 1*)*. [The message includes the DSCH information parameter.]

6. SRNC initiates set-up of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The request for set-up of Iur Data Transport bearer is acknowledged by Target RNC (see note 1*)*. [A separate transport bearer is established for the DSCH.]

7. SRNC sends a RRC message **Physical Channel Reconfiguration** to the UE.

8. When the UE switches from the old RL to the new RL, the source Node B detects a failure on its RL and sends a NBAP message **Radio Link Failure Indication** to the source RNC.

9. The source RNC sends a RNSAP message **Radio Link Failure Indication** to the SRNC (see note 2*)*.

10. Target Node B achieves uplink sync on the Uu and notifies target RNC with NBAP message **Radio Link Restore Indication**.

11. Target RNC sends RNSAP message **Radio Link Restore Indication** to notify SRNC (*Note 2)* that uplink sync has been achieved on the Uu.

12. When the RRC connection is established with the target RNC and necessary radio resources have been allocated, the UE sends RRC message **Physical Channel Reconfiguration Complete** to the SRNC.

13. The SRNC sends a RNSAP message **Radio Link Deletion Request** to the source RNC (see note 2*)*.

14. The source RNC sends NBAP message **Radio Link Deletion Request** to the source Node B.
    Parameters: Cell id, Transport layer addressing information.

15. The source Node B de-allocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.

16. The source RNC initiates release of Iub Data Transport bearer using ALCAP protocol. [The DSCH transport bearer and the TFCI2 bearer (FDD only) are released as well.]

17. When the source RNC has completed the release the RNSAP message Radio Link Deletion Response is sent to the SRNC (see note 2*)*.

18. SRNC initiates release of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The request for release of Iur Data Transport bearer is acknowledged by the Source RNC (see note 2*)*. [The DSCH transport bearer is also released.]

NOTE 1: This message is not necessary when the target RNC is the SRNC.

NOTE 2: This message is not necessary when the source RNC is the SRNC.

NOTE 3: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), subclause 8.3.5.2.

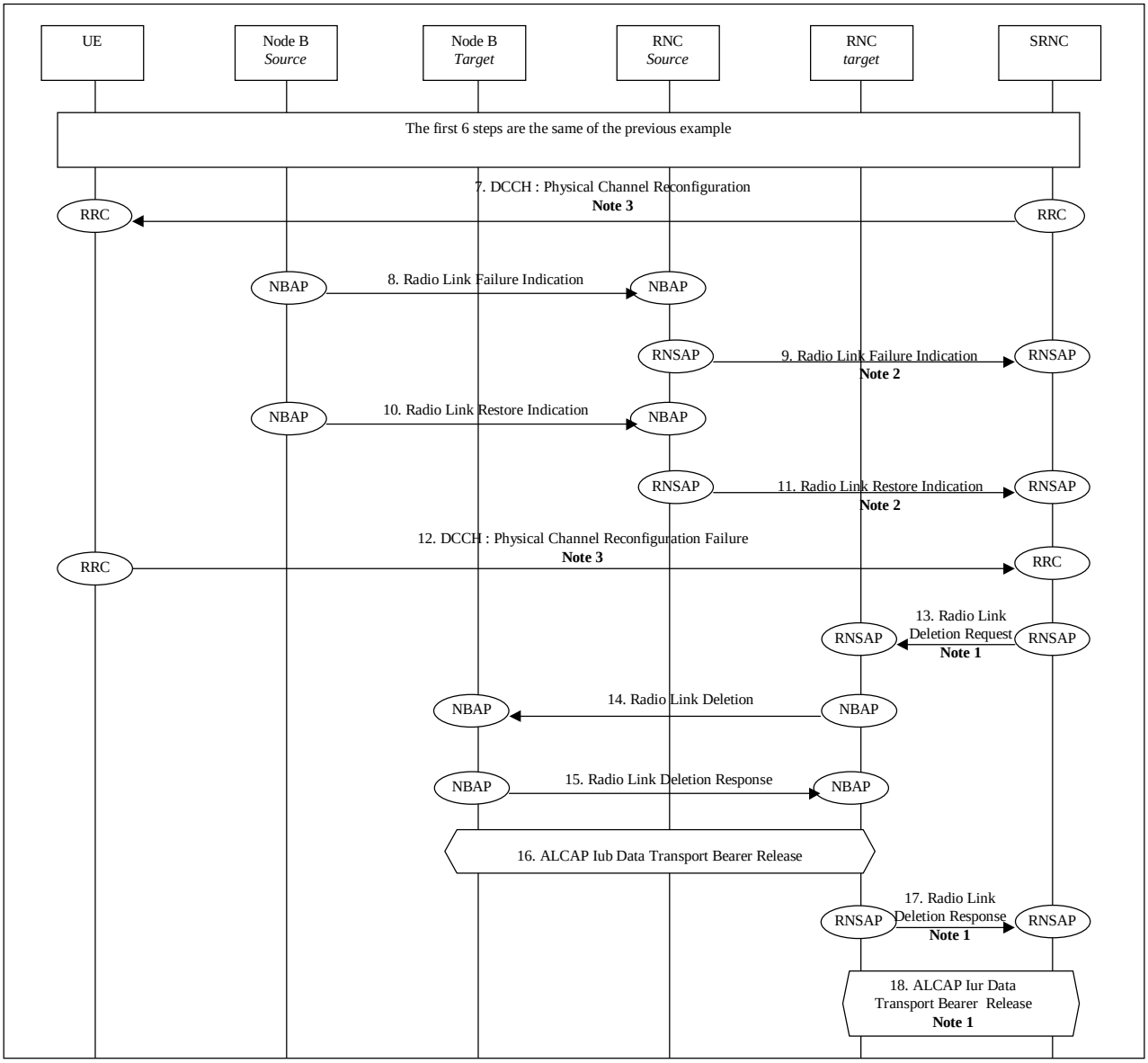


Figure 28: Hard Handover via Iur (DCH on Iur) – unsuccessful case.

The first 6 steps are the same of the previous example.

7. SRNC sends a RRC message **Physical Channel Reconfiguration** to the UE.
8. When the UE switch from the old RL to the new RL, the source Node B detect a failure on its RL and send a NBAP message **Radio Link Failure Indication** to the source RNC.
9. The SRNC sends a RNSAP message **Radio Link Failure Indication** to the source RNC (see note 2).
10. UE cannot access the target cell and switch back to the new. The source Node B detects a RL restoration and send a NBAP message **Radio Link Restoration Indication** to the source RNC.
11. The SRNC sends a RNSAP message **Radio Link Restoration Indication** to the source RNC (see note 2).
12. When the RRC connection is re-established with the source RNC the UE sends RRC message **Physical Channel Reconfiguration Failure** to the SRNC.
13. The SRNC sends a RNSAP message **Radio Link Deletion Request** to the target RNC (see note 1).

14. The target RNC sends NBAP message **Radio Link Deletion Request** to the target Node B.
    Parameters: Cell id, Transport layer addressing information.

15. The target Node B de-allocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.

16. The target RNC initiates release of Iub Data Transport bearer using ALCAP protocol. [The DSCH transport bearer and the TFCI2 bearer (FDD only) are released as well.]

17. When the target RNC has completed the release the RNSAP message **Radio Link Deletion Response** is sent to the SRNC (see note 1).

18. SRNC initiates release of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The Target RNC acknowledges the request for release of Iur Data Transport bearer (see note 1). [The DSCH transport bearer is also released.]

NOTE 1: This message is not necessary when the target RNC is the SRNC.

NOTE 2: This message is not necessary when the source RNC is the SRNC.

NOTE 3: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), subclause 8.3.5.2.

3GPP TSG-RAN3 #27 Meeting
Orlando, USA, February 18th – 22nd 2002

Tdoc R3-020602

CR-Form-v3

CHANGE REQUEST

⌘ **25.931** **CR** **016** ⌘ rev **1** ⌘ Current version: **3.5.0** ⌘

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

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

Title:	⌘	DSCH-related additions to Handover scenarios
Source:	⌘	R-WG3
Work item code:	⌘	TEI
Date:	⌘	February 2002
Category:	⌘	**F**
Release:	⌘	R99

Use one of the following categories:
F *(essential 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: ⌘ In the present version of 25.931 there are no examples for DSCH mobility procedures.

Summary of change: ⌘ One new example is proposed for DSCH mobility procedures in Soft Handover as new subclause: 7.10.4.
Minor modifications are proposed to the existing mobility procedure for Hard Handover (subclause 7.11.1) in order to incorporate DSCH mobility.

Revision 1 changes:
- Title in subclause 7.10.4 changed to: DSCH Mobility Procedure in Soft Handover (Moving DSCH within the Active Set)
- Caption in Figure 26a changed to: DSCH Mobility Procedure in Soft Handover (moving DSCH within the active set)
- Deleting “DSCH Addition” and “DSCH Deletion” from Figure 26a.
- Source Node B and target Node B swapped in Figure 26a;
- “NBAP” replaced by “Node B” in bullet 2 explaining Figure 26a;
- text changes related to RL RECONFIGURATION PREPARE in Figure 26a.

Consequences if not approved: ⌘ A non-essential omission will remain in the specification.

Impact Analysis:

This CR has no impact on the previous version of the specification (same release) because 25.931 has purely informative character.

Clauses affected: ⌘ 7.10; 7.10.4 (new!); 7.11.1

Other specs	⌘	**X**	Other core specifications	⌘	TS 25.931 v4.2.0 CR017
affected:			Test specifications		
			O&M Specifications		
Other comments:	⌘				

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.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://www.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 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.

7.10 Soft Handover (FDD)

This subclause presents some examples of soft handover procedures. The following cases are considered:

- Radio Link Addition (Branch Addition);
- Radio link Deletion (Branch Deletion);
- Radio link Addition & Deletion (Branch Addition & Deletion - simultaneously);
- DSCH mobility procedure in Soft Handover (moving DSCH within the active set~~from one radio link to another~~).

Soft Handover applies only to FDD mode.

7.10.1 Radio Link Addition (Branch Addition)

This example shows establishment of a radio link via a Node B controlled by another RNC than the serving RNC. This is the first radio link to be established via this RNS, thus macro-diversity combining/splitting with already existing radio links within DRNS is not possible.

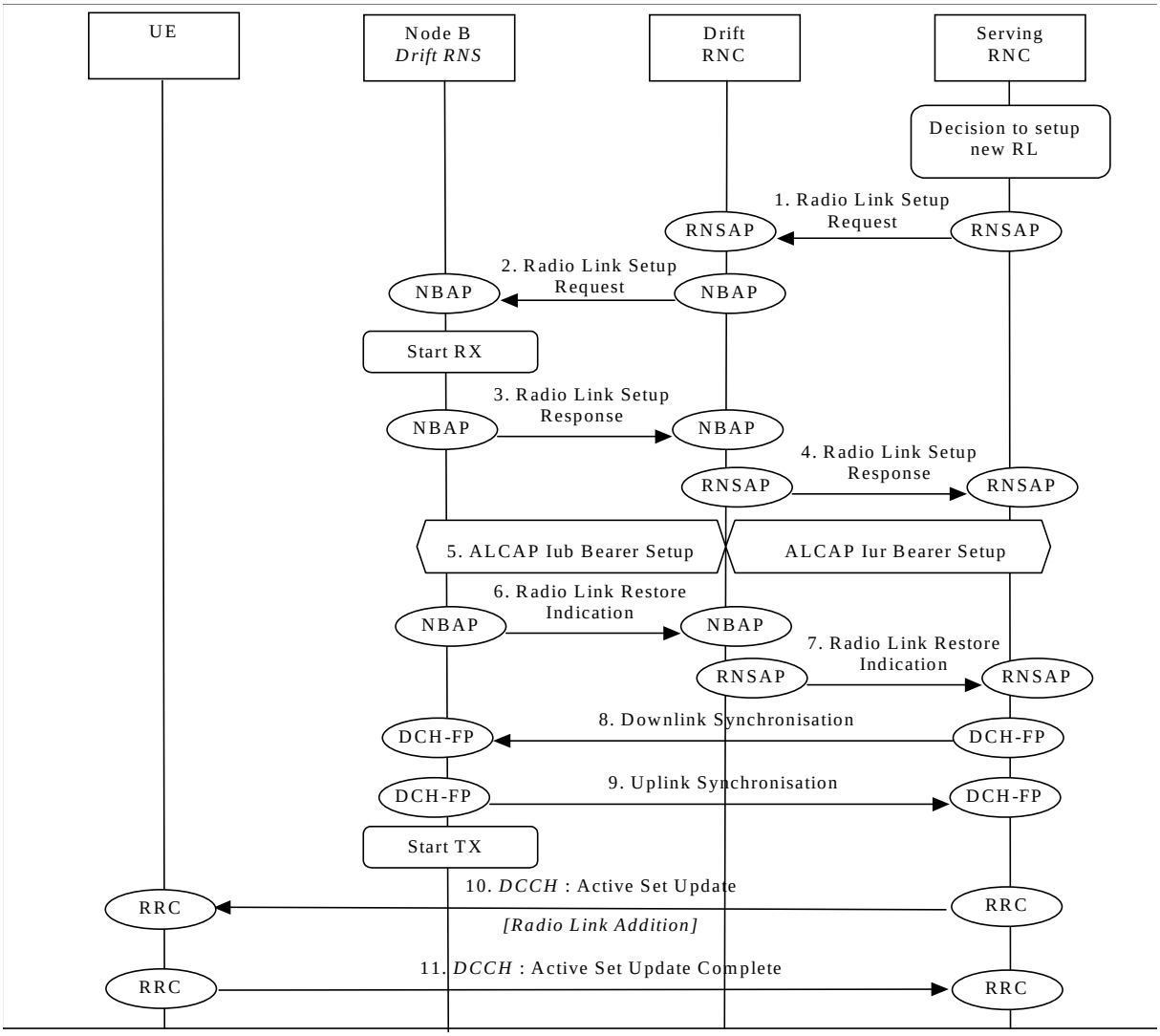


Figure 24: Soft Handover - Radio Link Addition (Branch Addition)

1. SRNC decides to setup a radio link via a new cell controlled by another RNC. SRNC requests DRNC for radio resources by sending RNSAP message **Radio Link Setup Request**. If this is the first radio link via the DRNC for this UE, a new Iur signalling connection is established. This Iur signalling connection will be used for all

RNSAP signalling related to this UE.
Parameters: Cell id, Transport Format Set per DCH, Transport Format Combination Set, frequency, UL scrambling code.

2. If requested resources are available, DRNC sends NBAP message **Radio Link Setup Request** to Node B.
Parameters: Cell id, Transport Format Set per DCH, Transport Format Combination Set, frequency, UL scrambling code.
Then Node B starts the UL reception.

3. Node B allocates requested resources. Successful outcome is reported in NBAP message **Radio Link Setup Response**.
Parameters: Signalling link termination, Transport layer addressing information (AAL2 address, AAL2 Binding Identitie(s)) for Data Transport Bearer(s).

4. DRNC sends RNSAP message **Radio Link Setup Response** to SRNC.
Parameters: Transport layer addressing information (AAL2 address, AAL2 Binding Identity) for Data Transport Bearer(s), Neighbouring cell information.

5. SRNC initiates setup of Iur/Iub Data Transport Bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to DCH.
This may be repeated for each Iur/Iub Data Transport Bearer to be setup.

6./7. Node B achieves uplink sync on the Uu and notifies DRNC with NBAP message **Radio Link Restore Indication**. In its turn DRNC notifies SRNC with RNSAP message **Radio Link Restore Indication.**

8./9. Node B and SRNC establish synchronism for the Data Transport Bearer(s) by means of exchange of the appropriate DCH Frame Protocol frames **Downlink Synchronisation** and **Uplink Synchronisation**, relative already existing radio link(s). Then Node B starts DL transmission.

10. SRNC sends RRC message **Active Set Update** (Radio Link Addition) to UE on DCCH.
Parameters: Update type, Cell id, DL scrambling code, Power control information, Ncell information.

11. UE acknowledges with RRC message **Active Set Update Complete**.

NOTE: The order of transmission of **Radio Link Restore Indication** messages (steps 6 and 7) is not necessarily identical to that shown in the example. These messages could be sent before the ALCAP bearer setup (step 5) or after the transport bearer synchronisation (steps 8 and 9).

7.10.2 Radio link Deletion (Branch Deletion)

This example shows deletion of a radio link belonging to a Node B controlled by another RNC than the serving RNC.

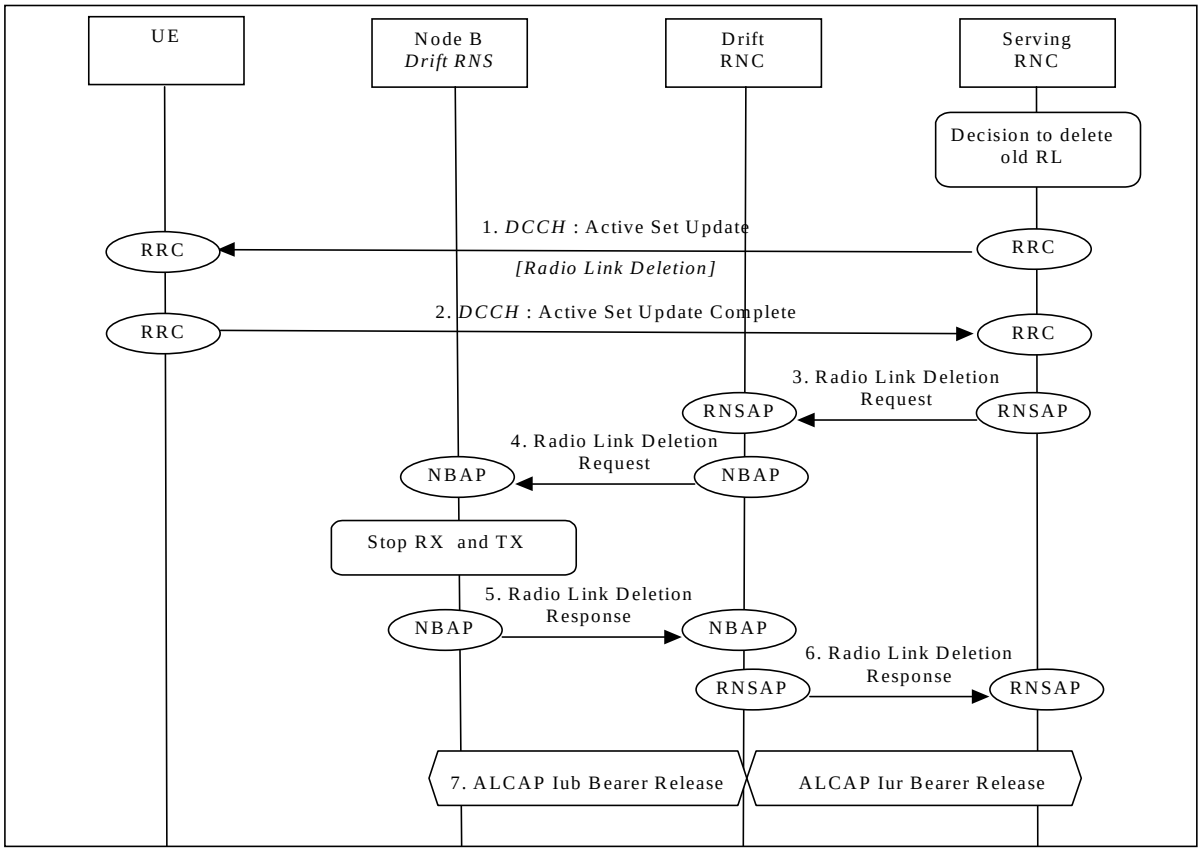


Figure 25: Soft Handover - Radio Link Deletion (Branch Deletion)

1. SRNC decides to remove a radio link via an old cell controlled by another RNC. SRNC sends RRC message **Active Set Update** (Radio Link Deletion) to UE on DCCH.
   Parameters: Update type, Cell id.

2. UE deactivates DL reception via old branch, and acknowledges with RRC message **Active Set Update Complete**.

3. SRNC requests DRNC to deallocate radio resources by sending RNSAP message **Radio Link Deletion Request**.
   Parameters: Cell id, Transport layer addressing information.

4. DRNC sends NBAP message **Radio Link Deletion Request** to Node B.
   Parameters: Cell id, Transport layer addressing information.

5. Node B deallocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.

6. DRNC sends RNSAP message **Radio Link Deletion Response** to SRNC.

7. SRNC initiates release of Iur/Iub Data Transport Bearer using ALCAP protocol.

7.10.3 Radio link Addition & Deletion (Branch Addition & Deletion - simultaneously)

This example shows simultaneous deletion of a radio link belonging to a Node B controlled by the serving RNC and the establishment of a radio link via a Node B controlled by another RNC than the serving RNC. This is the first radio link to be established via this RNS, thus macro-diversity combining/splitting with already existing radio links within DRNS is not possible.

This procedure is needed when the maximum number of branches allowed for the macrodiversity set has already been reached.

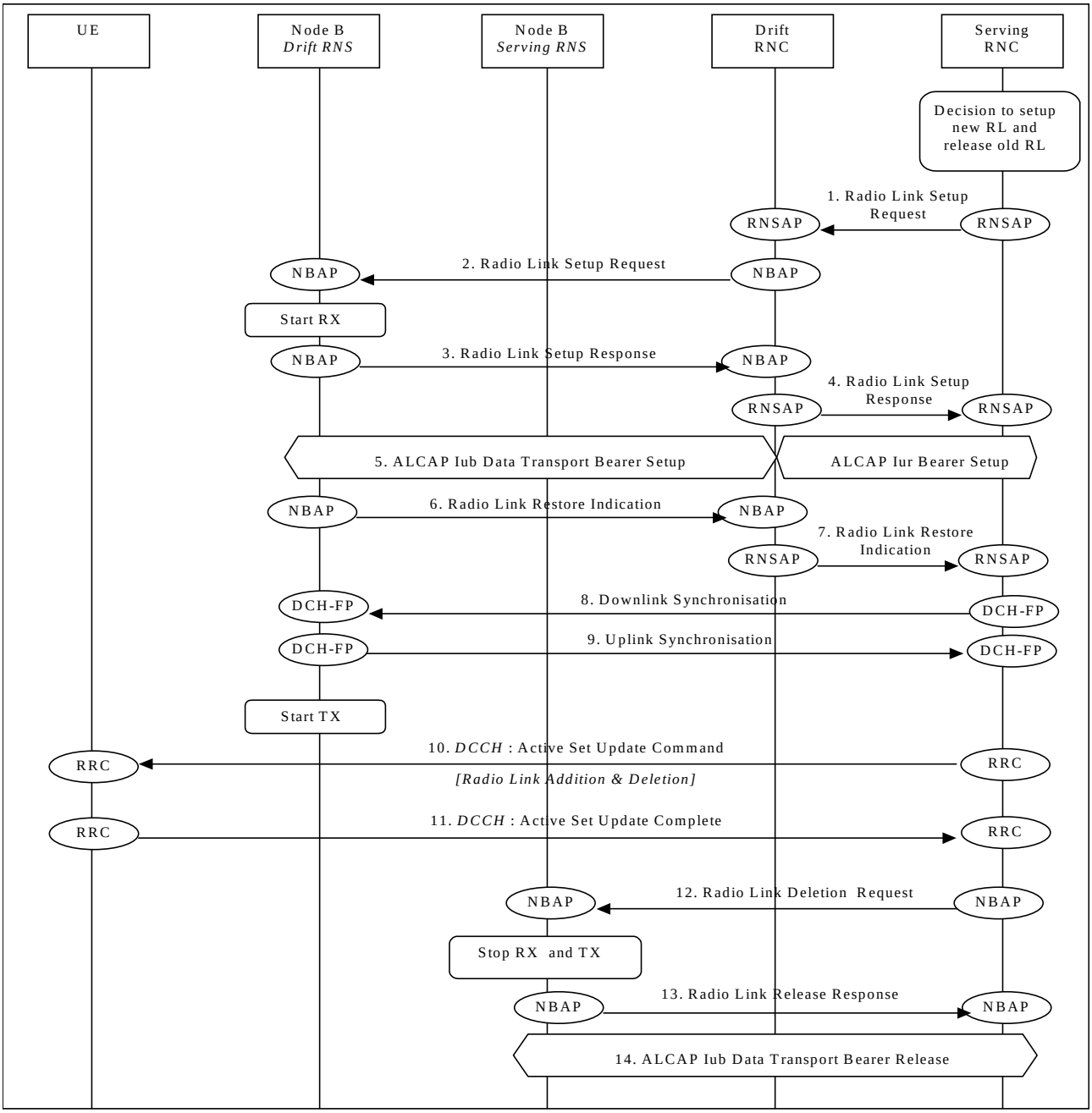


Figure 26: Soft Handover - Radio link Addition & Deletion (Branch Addition & Deletion - simultaneously)

1. ⇒ 9. See description 1. ⇒ 9. in subclause 7.10.1.

10. SRNC sends RRC message **Active Set Update** (Radio Link Addition & Deletion) to UE on DCCH. Parameters: Update type, Cell id, DL scrambling code, Power control information, Ncell information.

11. UE deactivates DL reception via old branch, activates DL reception via new branch and acknowledges with RRC message **Active Set Update Complete**.

12. ⇒ 12. See description 3. ⇒ 7. in subclause 7.10.2.

7.10.4 DSCH Mobility Procedure in Soft Handover (Moving DSCH within the Active Set)

This example shows how DSCH can be moved from one radio link to another in the case where UE is in macrodiversity on the associated DCH. At the beginning of this example the UE has:

- one radio link to a Node B controlled by the Serving RNC, and
- one radio link to a Node B controlled by another RNC than the Serving RNC.

The former radio link carries both a DCH and a DSCH, whereas the latter carries a DCH only. They are referred to as *source DSCH radio link* and *target DSCH radio link*, respectively.

Initially, the TFCI (sent on the DCH) is in macrodiversity. The TFCI2 field is carried over Iub and Iur over the same transport bearers as the associated DCH.

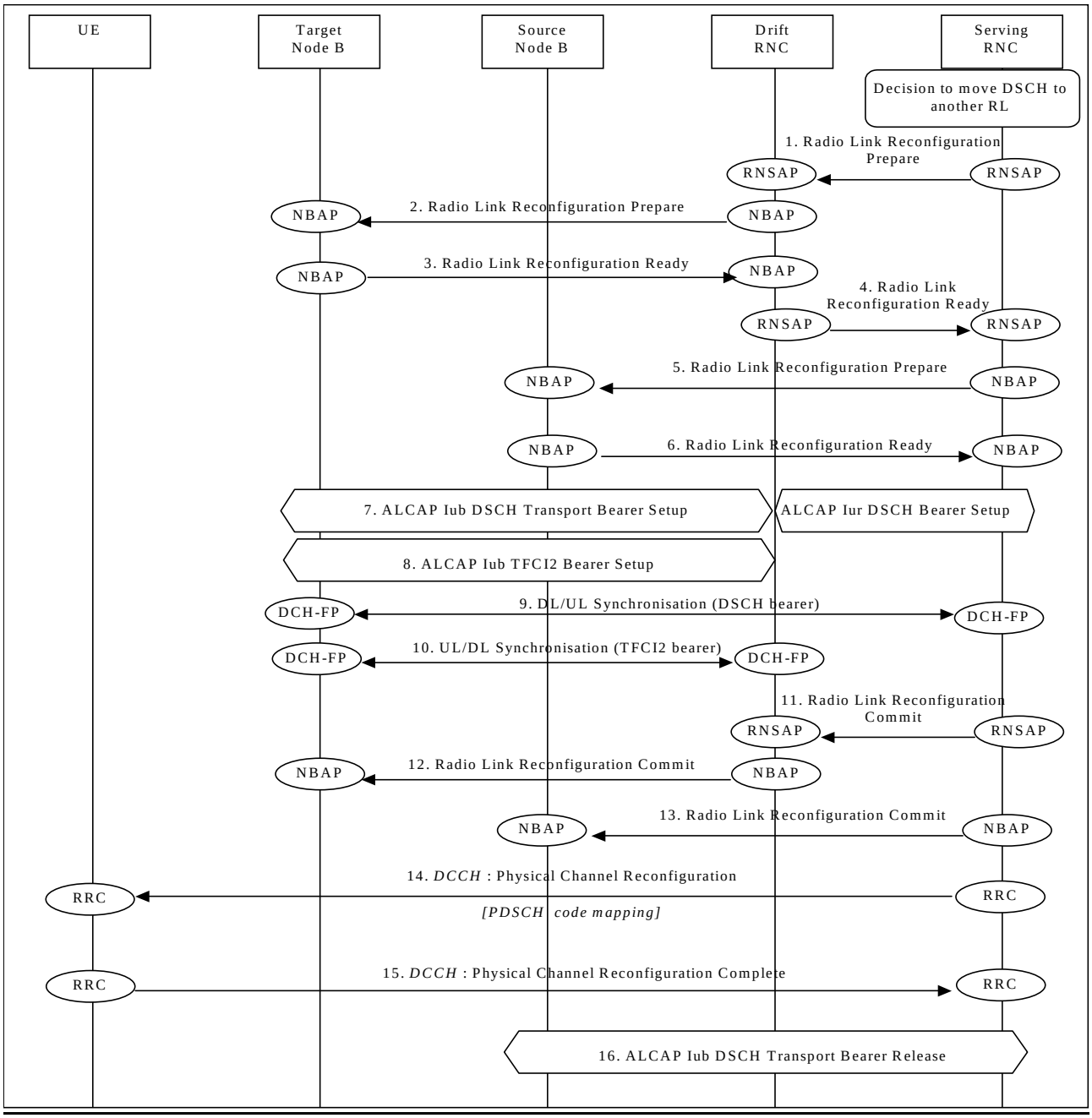


Figure 26a: DSCH mobility procedure in Soft Handover ~~–~~ (moving DSCH within the active set)~~from one radio link to another~~

1. SRNC decides to move the DSCH to the cell controlled by the DRNS i.e. to the target DSCH radio link. SRNC sends RNSAP message **Radio Link Reconfiguration Prepare** to DRNC. Parameters: new PDSCH RL ID~~DSCHs to Add~~.
2. DRNC requests from target Node B~~NBAP~~ to perform synchronised radio link reconfiguration using the **Radio Link Reconfiguration Prepare** message, adding DSCH resources on the target DSCH radio link. Parameters:

new PDSCH RL ID~~DSCH to Add~~; Transport Bearer Request Indicator, TFCI2 bearer specific information; TFCI signalling mode set to "Hard Split".

3. Target Node B returns **Radio Link Reconfiguration Ready** message to DRNC. Parameters: DSCH information response (Transport Layer Address; Binding ID); TFCI2 bearer information response (Transport Layer Address; Binding ID).

4. DRNC returns a **Radio Link Reconfiguration Ready** message to SRNC. Parameters: DSCH flow control information; PDSCH code mapping; Transport Layer Address, Binding ID.

5. SRNC requests from Source Node B to perform synchronised radio link reconfiguration using the **Radio Link Reconfiguration Prepare** message, removing DSCH resources from the source DSCH radio link. Parameters: new PDSCH RL ID~~DSCH to Delete~~; TFCI signalling mode set to "Hard Split".

6. Source Node B returns **Radio Link Reconfiguration Ready** message to SRNC.

7. Transport bearer for the DSCH is setup on Iur and Iub.

8. Transport bearer for the TFCI2 is setup on Iub.

9. DCH synchronisation procedure is carried out on the DSCH bearer, between SRNC and target Node B.

10. DL transport channels synchronisation procedure is carried out on the TFCI2 bearer, between DRNC and target Node B.

11-13. Exchange of **Radio Link Reconfiguration Commit** messages indicating the CFN at which the DSCH should be moved from the source DSCH radio link to the target DSCH radio link.

14. SRNC sends **Physical Channel Reconfiguration** message to UE indicating that the PDSCH channel has been moved to the target DSCH radio link. The source DSCH radio link is not deleted, however the TFCI field is not in macrodiversity anymore. Parameters: Activation time; PDSCH code mapping; PDSCH with SHO DCH Info. The latter parameter indicates that the UE must not soft combine the TFCI because the TFCI signalling mode is set to "Hard Split".

15. At the indicated time UE stops receiving DSCH on the source DSCH radio link and starts reception on the target DSCH radio link. The UE returns a **Physical Channel Reconfiguration Complete** message to SRNC.

16. The Iub Transport bearer for the DSCH is released towards the source Node B. Note that there was no TFCI2 bearer on the source DSCH radio link.

7.11.1 Backward Hard Handover

This subclause shows some examples of hard handover in the case of network initiated backward handovers.

7.11.1.1 Hard Handover via Iur (DCH State)

This subclause shows an example of Hard Handover via Iur, when the mobile is in DCH state, for both successful and unsuccessful cases. The text enclosed in brackets refers to the case when the UE has a DSCH.

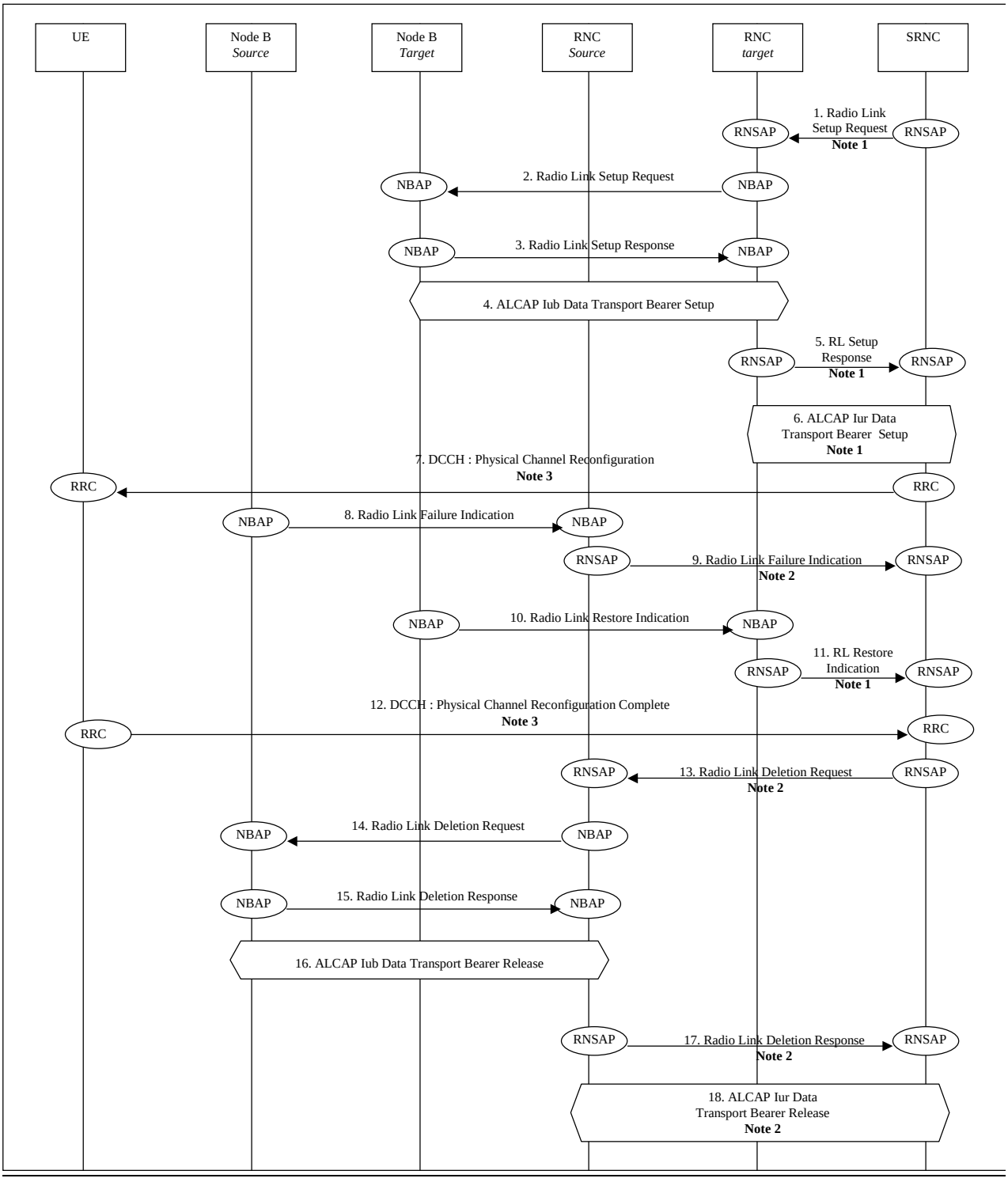


Figure 27: Hard Handover via Iur (DCH on Iur) – successful case

1. SRNC sends **Radio Link Setup Request** message to the target RNC.
   Parameters: target RNC identifier, s-RNTI, Cell id, Transport Format Set, Transport Format Combination Set, [DSCH information]. (Note 1).

2. The target RNC allocates RNTI and radio resources for the RRC connection and the Radio Link(s) (if possible), and sends the NBAP message **Radio Link Setup Request** to the target Node-B.
   Parameters: Cell id, Transport Format Set, Transport Format Combination Set, frequency, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information, [PDSCH code mapping (FDD only); TFCI2 bearer specific information (FDD only); TFCI signalling mode set to "Hard Split" (FDD only); DSCH information (TDD only)] etc.

3. Node B allocates resources, starts PHY reception, and responds with NBAP message **Radio Link Setup Response**.
   Parameters: Signalling link termination, Transport layer addressing information for the Iub Data Transport Bearer, [DSCH information response, TFCI2 bearer information response (FDD only).].

4. Target RNC initiates set-up of Iub Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to the DCH. The request for set-up of Iub Data Transport bearer is acknowledged by Node B. [A separate transport bearer is established for the DSCH. Another transport bearer is established for the TFCI2 signalling information (FDD only).]

5. When the Target RNC has completed preparation phase, **Radio Link Setup Response** is sent to the SRNC (see note 1*)*. [The message includes the DSCH information parameter.]

6. SRNC initiates set-up of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The request for set-up of Iur Data Transport bearer is acknowledged by Target RNC (see note 1*)*. [A separate transport bearer is established for the DSCH.]

7. SRNC sends a RRC message **Physical Channel Reconfiguration** to the UE.

8. When the UE switches from the old RL to the new RL, the source Node B detects a failure on its RL and sends a NBAP message **Radio Link Failure Indication** to the source RNC.

9. The source RNC sends a RNSAP message **Radio Link Failure Indication** to the SRNC (see note 2*)*.

10. Target Node B achieves uplink sync on the Uu and notifies target RNC with NBAP message **Radio Link Restore Indication**.

11. Target RNC sends RNSAP message **Radio Link Restore Indication** to notify SRNC (*Note 2)* that uplink sync has been achieved on the Uu.

12. When the RRC connection is established with the target RNC and necessary radio resources have been allocated, the UE sends RRC message **Physical Channel Reconfiguration Complete** to the SRNC.

13. The SRNC sends a RNSAP message **Radio Link Deletion Request** to the source RNC (see note 2*)*.

14. The source RNC sends NBAP message **Radio Link Deletion Request** to the source Node B.
    Parameters: Cell id, Transport layer addressing information.

15. The source Node B de-allocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.

16. The source RNC initiates release of Iub Data Transport bearer using ALCAP protocol. [The DSCH transport bearer and the TFCI2 bearer (FDD only) are released as well.]

17. When the source RNC has completed the release the RNSAP message Radio Link Deletion Response is sent to the SRNC (see note 2*)*.

18. SRNC initiates release of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The request for release of Iur Data Transport bearer is acknowledged by the Source RNC (see note 2*)*. [The DSCH transport bearer is also released.]

NOTE 1: This message is not necessary when the target RNC is the SRNC.

NOTE 2: This message is not necessary when the source RNC is the SRNC.

NOTE 3: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), subclause 8.3.5.2.

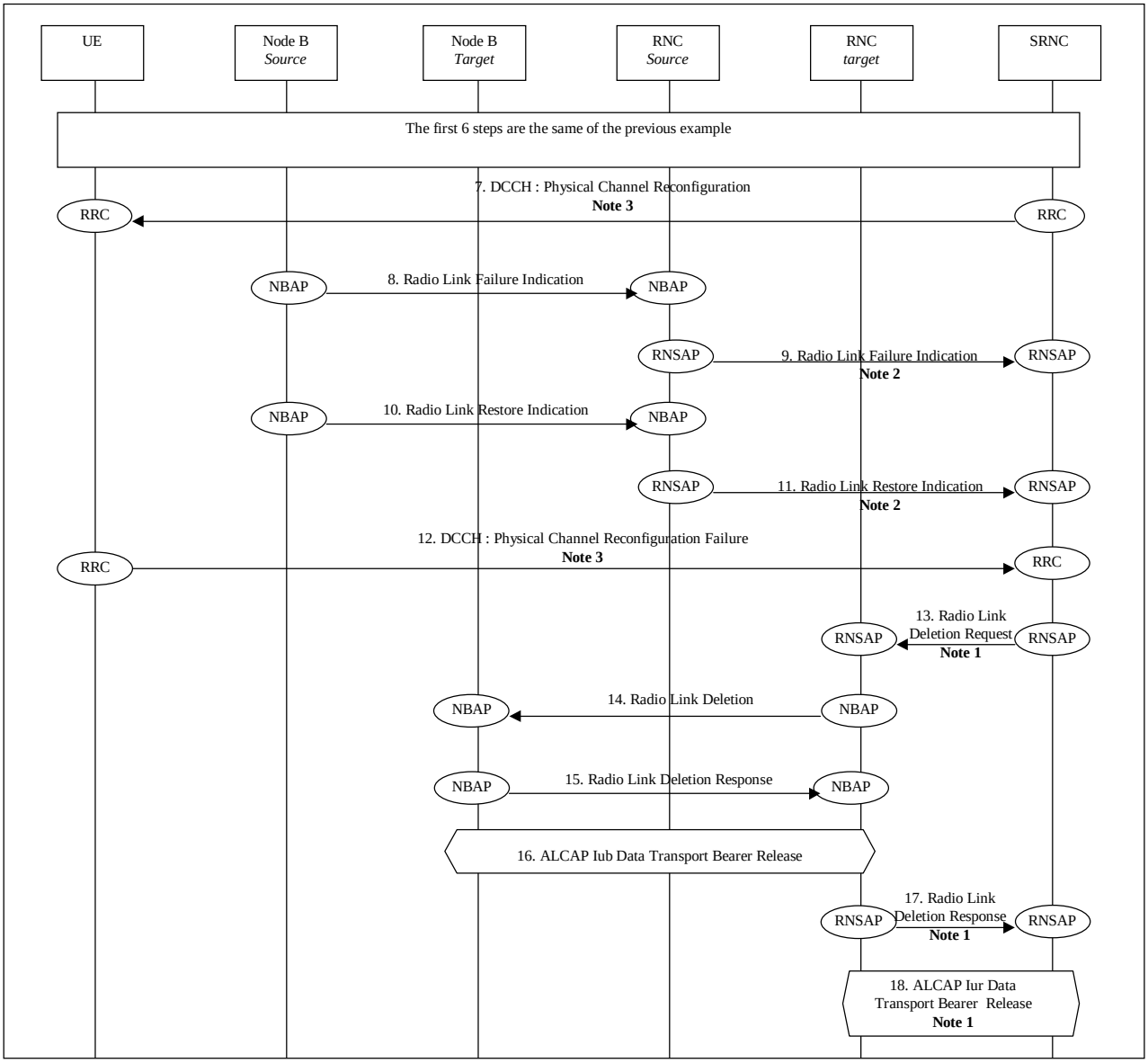


Figure 28: Hard Handover via Iur (DCH on Iur) – unsuccessful case.

The first 6 steps are the same of the previous example.

7. SRNC sends a RRC message **Physical Channel Reconfiguration** to the UE.
8. When the UE switch from the old RL to the new RL, the source Node B detect a failure on its RL and send a NBAP message **Radio Link Failure Indication** to the source RNC.
9. The SRNC sends a RNSAP message **Radio Link Failure Indication** to the source RNC (see note 2).
10. UE cannot access the target cell and switch back to the new. The source Node B detects a RL restoration and send a NBAP message **Radio Link Restoration Indication** to the source RNC.
11. The SRNC sends a RNSAP message **Radio Link Restoration Indication** to the source RNC (see note 2).
12. When the RRC connection is re-established with the source RNC the UE sends RRC message **Physical Channel Reconfiguration Failure** to the SRNC.
13. The SRNC sends a RNSAP message **Radio Link Deletion Request** to the target RNC (see note 1).

14. The target RNC sends NBAP message **Radio Link Deletion Request** to the target Node B.
    Parameters: Cell id, Transport layer addressing information.

15. The target Node B de-allocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.

16. The target RNC initiates release of Iub Data Transport bearer using ALCAP protocol. [The DSCH transport bearer and the TFCI2 bearer (FDD only) are released as well.]

17. When the target RNC has completed the release the RNSAP message **Radio Link Deletion Response** is sent to the SRNC (see note 1).

18. SRNC initiates release of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The Target RNC acknowledges the request for release of Iur Data Transport bearer (see note 1). [The DSCH transport bearer is also released.]

NOTE 1: This message is not necessary when the target RNC is the SRNC.

NOTE 2: This message is not necessary when the source RNC is the SRNC.

NOTE 3: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), subclause 8.3.5.2.

3GPP TSG-RAN WG3 Meeting #27 ***Tdoc R3-020308***
Orlando, USA, 18th-22nd February 2002

CR-Form-v4

CHANGE REQUEST

⌘ **25.931** **CR** **015** ⌘ rev **-** ⌘ Current version: **4.2.0** ⌘

*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 **X**

Title:	⌘	Corrections and updates
Source:	⌘	R-WG3
Work item code:	⌘	TEI
Date:	⌘	February 2002
Category:	⌘	**A**
Release:	⌘	REL-4

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: ⌘ Several inaccuracies and errors are present both in the tables gathering the protocol messages mentioned in the document and in the examples on signalling procedures.

Some obsolete RRC messages are present (Intersystem Handover Command, Handover Complete).

Relocation Detect message is missing from the SRNS procedure example

The section dedicated to RRC Connection RACH/FACH Establishment points to a non-existing example in the 25.433 specification. The erroneous reference should be replaced by the example itself.

Summary of change: ⌘

- SRNS Relocation procedure has been added in table 1 with regard to the Relocation Detect message
- Paging message has been deleted from NBAP message table
- Physical Shared Channel Reconfiguration Response message has been inserted into NBAP message table
- Radio Link Addition Request & Response messages have been deleted from RNSAP and NBAP message table
- System Information Broadcast Request & Response have been substituted by System Information Update Request & Response in the NBAP message table
- Handover from UTRAN Command message has been inserted into RRC message table
- In section 7.3.1 the obsolete 'Initial UE Capability' IE has been removed from the RRC Connection Request message and the 'UE Radio Access Capability' IE has been added in the RRC Connection Setup Complete message.
- A figure depicting the RRC Connection RACH/FACH establishment procedure is

	added in 7.3.2 and the text is changed accordingly. • The example in 7.6.2 (DCH establishment) has been clarified for both CS an PS domain • Reference to Q.AAL2 has been corrected • In the Hard Handover Failure example (fig.28), the 'new cell' has been exchanged with the 'old one'. • In figure 35 explanation text, (SRNS Relocation), the Relocation Command message is not to be sent to the target RNC. The Relocation Detect message has been added • Intersystem Handover Command has been replaced by the Handover from UTRAN Command and Handover Complete has been replaced by Handover to UTRAN Complete in the intersystem handover procedure examples • Intersystem Handover Command has been replaced by Cell Change Order from UTRAN in the UMTS→ GPRS Cell Reselection example • Some typos have been corrected *Impact Analysis:* Impact assessment towards the previous version of the specification (same release): This CR has no impact with the previous version of the specification (same release) because 25.931 has purely informative character.
Consequences if not approved: ⌘	Inaccuracies and errors will remain in the TR

Clauses affected:	⌘	4.2; 4.4; 4.5; 4.7; 7.3.1; 7.3.2; 7.6.2; 7.8.1.2; 7.11.1.1; 7.11.1.2; 7.11.2.1; 7.12.2; 7.12.3; 7.13.1.1; 7.13.1.2; 7.13.1.3; 7.13.2; 7.13.5		
Other specs affected:	⌘	[X] Other core specifications [ ] Test specifications [ ] O&M Specifications	⌘	25.931 v3.5.0 CR xxx
Other comments:	⌘			

4.2 RANAP Procedures & Messages

For a detailed description of RANAP procedures and messages refer to [3]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 1

Message Name	UTRAN Procedure	Direction
Direct Transfer	Uplink Direct Transfer Downlink Direct Transfer	RNC ⇒ CN CN ⇒ RNC
Initial UE Message	NAS Signalling Connection Establishment	RNC ⇒ CN
Iu Release Command	RRC Connection Release Hard HO with switching in the CN SRNS Relocation UTRAN ⇒ GSM/BSS handover	CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC
Iu Release Complete	RRC Connection Release Hard HO with switching in the CN SRNS Relocation UTRAN ⇒ GSM/BSS handover	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Paging	Paging for a UE in RRC Idle Mode Paging for a UE in RRC Connected Mode	CN ⇒ RNC CN ⇒ RNC
Radio Access Bearer Assignment Request	Radio Access Bearer Establishment Radio Access Bearer Release Radio Access Bearer Modification	CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC
Radio Access Bearer Assignment Response	Radio Access Bearer Establishment Radio Access Bearer Release Radio Access Bearer Modification	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Relocation Command	Hard HO with switching in the CN SRNS Relocation UTRAN ⇒ GSM/BSS handover	CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC
Relocation Complete	Hard HO with switching in the CN SRNS Relocation GSM/BSS handover ⇒ UTRAN	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Relocation Detect	Hard HO with switching in the CN SRNS Relocation GSM/BSS handover ⇒ UTRAN	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Relocation Failure	SRNS Relocation	RNC ⇒ CN
Relocation Request	Hard HO with switching in the CN SRNS Relocation GSM/BSS handover ⇒ UTRAN	CN ⇒ RNC CN ⇒ RNC CN ⇒ RNC
Relocation Request Acknowledge	Hard HO with switching in the CN SRNS Relocation GSM/BSS handover ⇒ UTRAN	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN
Relocation Required	Hard HO with switching in the CN SRNS Relocation UTRAN ⇒ GSM/BSS handover	RNC ⇒ CN RNC ⇒ CN RNC ⇒ CN

4.3 SABP Procedures & Messages

For a detailed description of SABP procedures and messages refer to [9]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 2

Message Name	UTRAN Procedure	Direction
Write-replace	Service Area Broadcast	CN ⇒ RNC
Write-replace Complete	Service Area Broadcast	RNC ⇒ CN
Write-Replace Failure	Service Area Broadcast	RNC ⇒ CN

4.4 RNSAP Procedures & Messages

For a detailed description of RNSAP procedures and messages refer to [4]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 3

Message Name	UTRAN Procedure	Direction
Common Transport Channel Resources Release	Cell Update	SRNC ⇒ DRNC
Common Transport Channel Resources Initialisation Request	Cell Update	SRNC ⇒ DRNC
Common Transport Channel Resources Initialisation Response	Cell Update	DRNC ⇒ SRNC
DL Power Control Request	Downlink Power Control	SRNC ⇒ DRNC
Downlink Signalling Transfer Request	RRC Connection Re-establishment URA Update	SRNC ⇒ DRNC SRNC ⇒ DRNC
~~Radio Link Addition Request~~	~~RRC Connection Release~~ ~~Soft Handover~~ ~~Hard Handover~~	~~SRNC ⇒ DRNC~~ ~~SRNC ⇒ DRNC~~ ~~SRNC ⇒ DRNC~~
~~Radio Link Addition Response~~	~~RRC Connection Release~~ ~~Soft Handover~~ ~~Hard Handover~~	~~DRNC ⇒ SRNC~~ ~~DRNC ⇒ SRNC~~ ~~DRNC ⇒ SRNC~~
Radio Link Deletion Request	RRC Connection Re-establishment Soft Handover Hard Handover	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Deletion Response	RRC Connection Re-establishment Soft Handover Hard Handover	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Radio Link Failure Indication	Hard Handover	DRNC ⇒ SRNC
Radio Link Reconfiguration Request	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Reconfiguration Commit	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Reconfiguration Prepare	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Reconfiguration Ready	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Radio Link Reconfiguration Response	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Radio Link Restore Indication	Soft Handover Hard Handover Channel and Mobile State Switching on Iur	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Radio Link Setup Request	RRC Connection Re-establishment Hard Handover USCH/DSCH Configuration and Capacity Allocation [TDD]	SRNC ⇒ DRNC SRNC ⇒ DRNC SRNC ⇒ DRNC
Radio Link Setup Response	RRC Connection Re-establishment Hard Handover USCH/DSCH Configuration and Capacity Allocation [TDD]	DRNC ⇒ SRNC DRNC ⇒ SRNC DRNC ⇒ SRNC
Relocation Commit	SRNS Relocation URA Update	Source RNC ⇒ Target RNC
Uplink Signalling Transfer Indication	RRC Connection Re-establishment URA Update	DRNC ⇒ SRNC DRNC ⇒ SRNC

4.5 NBAP Procedures & Messages

For a detailed description of NBAP procedures and messages refer to [5]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 4

Message Name	UTRAN Procedure	Direction
DL Power Control Request	Downlink Power Control	RNC ⇒ Node B
~~Paging~~	~~Paging~~	~~RNC ⇒ Node B~~
Physical Shared Channel Reconfiguration Request	USCH/DSCH Configuration and Capacity Allocation [TDD]	RNC ⇒ Node B
Physical Shared Channel Reconfiguration ~~Request~~Response	USCH/DSCH Configuration and Capacity Allocation [TDD]	Node B ⇒ RNC
~~Radio Link Addition Request~~	~~Hard Handover~~ ~~Soft Handover~~	~~RNC ⇒ Node B~~ ~~RNC ⇒ Node B~~
~~Radio Link Addition Response~~	~~Hard Handover~~ ~~Soft Handover~~	~~RNC ⇒ Node B~~ ~~RNC ⇒ Node B~~
Radio Link Deletion	RRC Connection Release RRC Connection Re-establishment Hard Handover Soft Handover	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Deletion Response	RRC Connection Release RRC Connection Re-establishment Hard Handover Soft Handover	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
Radio Link Failure Indication	Hard Handover	Node B ⇒ RNC
Radio Link Reconfiguration Commit	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Reconfiguration Prepare	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Reconfiguration Ready	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration Radio Access Bearer Modification	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
Radio Link Reconfiguration Request	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Reconfiguration Response	Radio Access Bearer Establishment Radio Access Bearer Release Physical Channel Reconfiguration Transport Channel Reconfiguration	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
Radio Link Restore Indication	RRC Connection Establishment RRC Connection Re-establishment Soft Handover Hard Handover Channel and Mobile State Switching on Iur	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
Radio Link Setup Request	RRC Connection Establishment RRC Connection Re-establishment Hard Handover Soft Handover USCH/DSCH Configuration and Capacity Allocation [TDD]	RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B RNC ⇒ Node B
Radio Link Setup Response	RRC Connection Establishment RRC Connection Re-establishment Hard Handover Soft Handover USCH/DSCH Configuration and Capacity Allocation [TDD]	Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC Node B ⇒ RNC
System Information ~~Broadcast~~ Update Request	System Information Broadcasting Service Area Broadcast	RNC ⇒ Node B RNC ⇒ Node B
System Information ~~Broadcast~~	System Information Broadcasting	Node B ⇒ RNC

Message Name	UTRAN Procedure	Direction
Update Response	Service Area Broadcast	Node B ⇒ RNC

4.6 ALCAP

ALCAP is a generic name to indicate the protocol(s) used to establish data transport bearers on the Iu, Iur and Iub interfaces. Q.2630.2 (Q AAL2) is one of the selected protocols to be used as ALCAP. Q.2630.2 adds new optional capabilities to Q.2630.1.

The following should be noted:

- data transport bearers may be dynamically established using ALCAP or preconfigured;
- transport bearers may be established before or after allocation of radio resources.

4.6.1 Q2630.2 (Q.AAL 2)

The following figure is showing an example of use of Q.2630.2 in the UTRAN context, for the different interfaces.

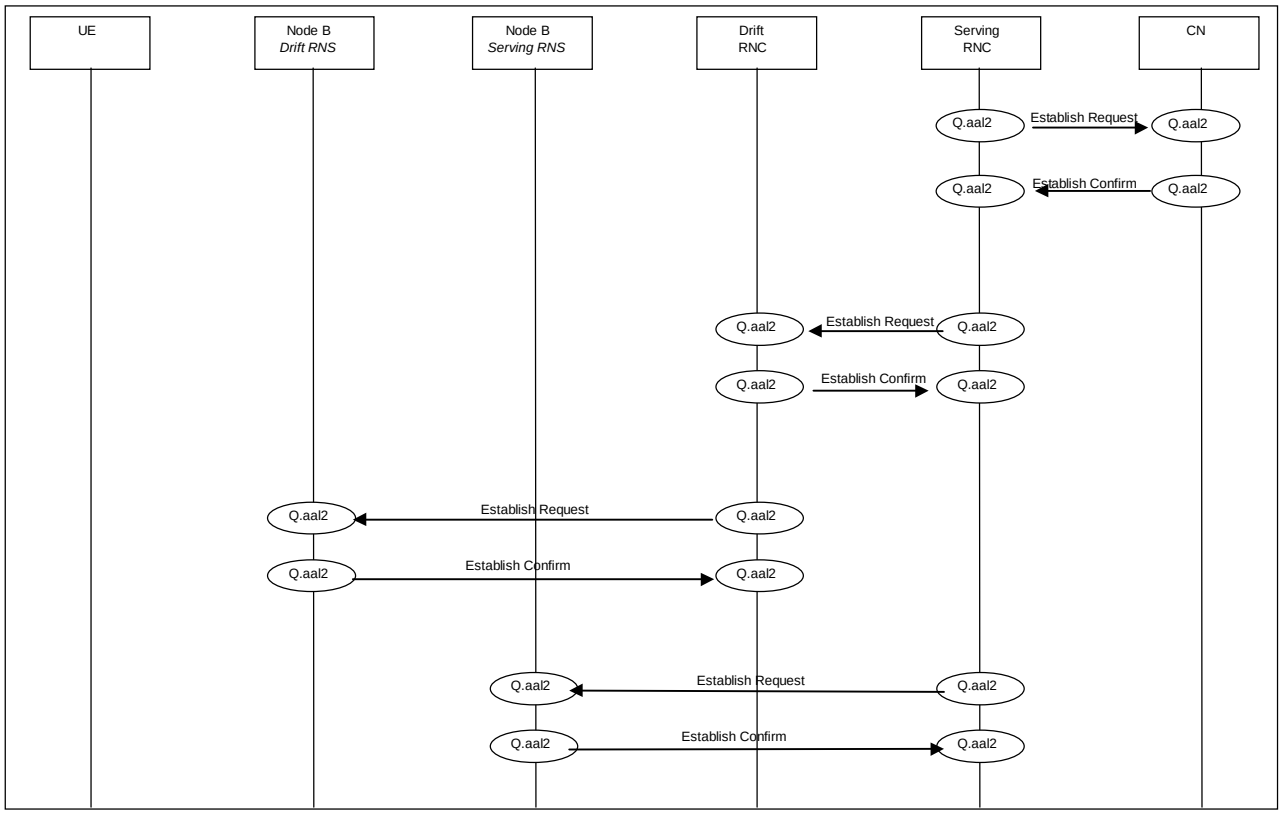


Figure 2: Example on Q.2630.2

4.7 RRC Procedures & Messages

For a detailed description of RRC procedures and messages refer to [8]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 5

Message Name	UTRAN Procedure	Direction
Active Set Update	Soft Handover	RNC ⇒ UE
Active Set Update Complete	Soft Handover	UE ⇒ RNC
Cell Update	RRC Connection Re-establishment Cell Update	UE ⇒ RNC UE ⇒ RNC
Cell Update Confirm	RRC Connection Re-establishment Cell Update	RNC ⇒ UE RNC ⇒ UE
Direct Transfer	NAS Signalling Conn. Establishment	UE ⇔ RNC
Downlink Direct Transfer	Downlink Direct Transfer	RNC ⇒ UE
Initial Direct Transfer	NAS Signalling Connection Establishment	UE ⇒ RNC
Measurement Control	Downlink Power Control	RNC ⇒ UE
Measurement Report	Downlink Power Control	UE ⇒ RNC
Paging Type 1	Paging for a UE in RRC Idle Mode and RRC connected mode (CELL_PCH and URA_PCH states) Paging for a UE in RRC Connected Mode	RNC ⇒ UE
Paging Type 2	Paging for a UE in RRC Connected Mode (CELL_DCH and CELL_FACH states)	RNC ⇒ UE
Physical Channel Reconfiguration	Physical Channel Reconfiguration Hard Handover	RNC ⇒ UE RNC ⇒ UE
Physical Channel Reconfiguration Allocation	USCH/DSCH Configuration and Capacity Allocation [TDD]	RNC ⇒ UE
Physical Channel Reconfiguration Complete	Physical Channel Reconfiguration Hard Handover	UE ⇒ RNC UE ⇒ RNC
PUSCH Capacity Request	USCH/DSCH Configuration and Capacity Allocation [TDD]	UE ⇒ RNC
RB Reconfiguration	USCH/DSCH Configuration and Capacity Allocation [TDD]	RNC ⇒ UE
RB Reconfiguration Complete	USCH/DSCH Configuration and Capacity Allocation [TDD]	UE ⇒ RNC
RB Release	Radio Access Bearer Release	RNC ⇒ UE
RB Release Complete	Radio Access Bearer Release	UE ⇒ RNC
RB Setup	Radio Access Bearer Establishment	RNC ⇒ UE
RB Setup Complete	Radio Access Bearer Establishment	UE ⇒ RNC
RRC Connection Release	RRC Connection Release	RNC ⇒ UE
RRC Connection Release Complete	RRC Connection Release	UE ⇒ RNC
RRC Connection Request	RRC Connection Establishment.	UE ⇒ RNC
RRC Connection Setup	RRC Connection Establishment	RNC ⇒ UE
RRC Connection Setup Complete	RRC Connection Establishment	UE ⇒ RNC
System Information	System Information Broadcasting	Node B ⇒ UE
Transport Channel Reconfiguration	Physical Channel Reconfiguration	RNC ⇒ UE
Transport Channel Reconfiguration Complete	Physical Channel Reconfiguration	UE ⇒ RNC
UE Capability Information	NAS Signalling Conn. Establishment.	UE ⇒ RNC
Uplink Direct Transfer	Uplink Direct Transfer	UE ⇒ RNC
URA Update	Cell Update	UE ⇒ RNC
URA Update Confirm	Cell Update	RNC ⇒ UE
UTRAN Mobility Information Confirm	RRC Connection Re-establishment Cell Update URA Update	UE ⇒ RNC UE ⇒ RNC UE ⇒ RNC
Handover from UTRAN Command	UTRAN to GSM/BSS handover	RNC ⇒ UE
Handover to UTRAN Complete	GSM /BSS to UTRAN handover	UE ⇒ RNC
Cell Change Order from UTRAN	UMTS to GPRS Cell Reselection	RNC ⇒ UE

4.8 BMC Procedures & Messages

For a detailed description of BMC procedures and messages refer to [11] and [12]. Only Messages mentioned in the present document are shown. For each message is also given the list of example procedures where the message is used, as provided by this document.

Table 6

Message Name	UTRAN Procedure	Direction
CBS Message	Service Area Broadcast	Node B ⇒ UE

********** Unaffected text **********

7.3.1 DCH Establishment

This example shows establishment of an RRC connection in dedicated transport channel (DCH) state.

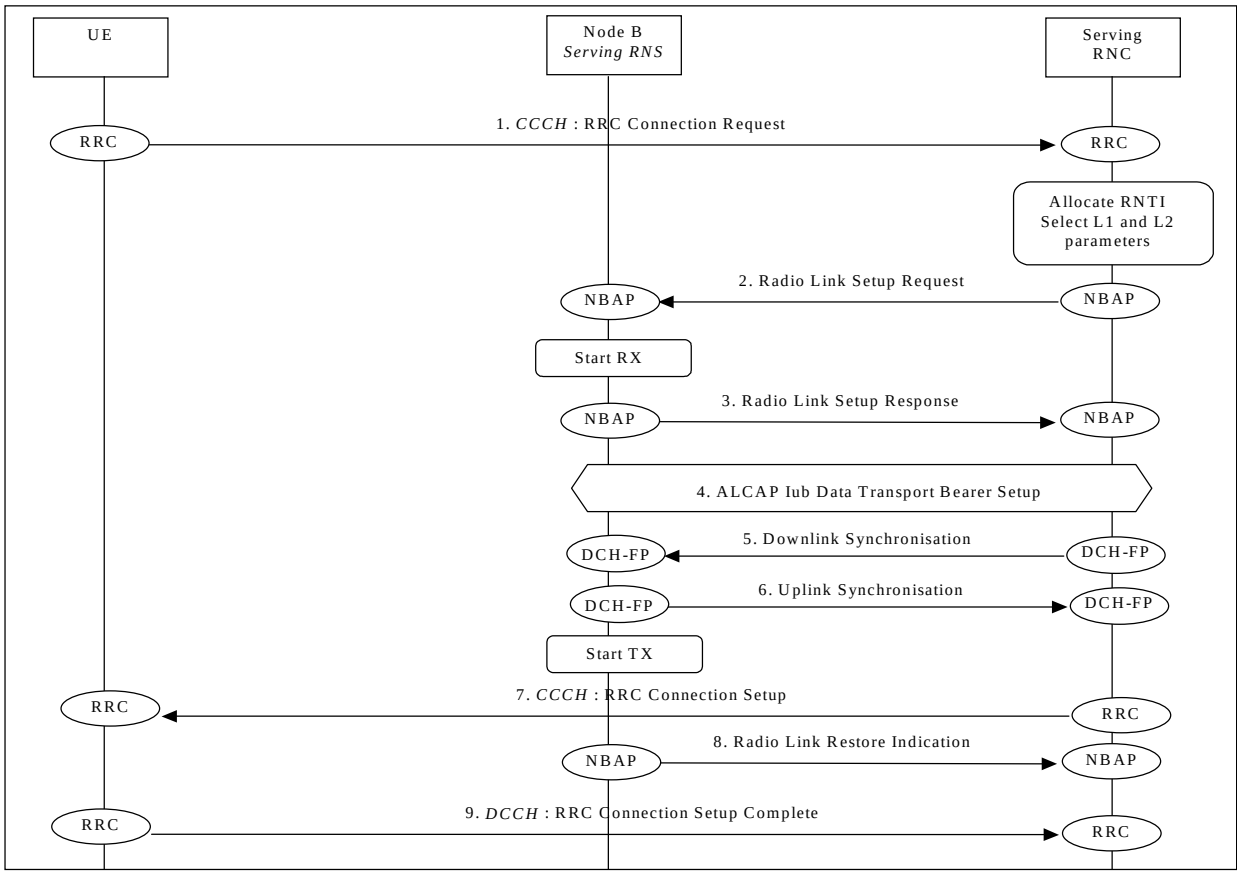


Figure 8: RRC Connection Establishment - DCH Establishment

1. The UE initiates set-up of an RRC connection by sending **RRC** ~~message~~ **Connection Request** message on CCCH.
   Parameters: Initial UE Identity, Establishment cause~~, Initial UE Capability~~.

2. The SRNC decides to use a DCH for this RRC connection, allocates U-RNTI and radio resources for the RRC connection. When a DCH is to be set-up, NBAP message **Radio Link Setup Request** is sent to Node B.
   Parameters: Cell id, Transport Format Set, Transport Format Combination Set, frequency, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information.

3. Node B allocates resources, starts PHY reception, and responds with NBAP message **Radio Link Setup Response**.
   Parameters: Signalling link termination, Transport layer addressing information (AAL2 address, AAL2 Binding Identity) for the Iub Data Transport Bearer.

4. SRNC initiates set-up of Iub Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to the DCH. The request for set-up of Iub Data Transport bearer is acknowledged by Node B.

5./6.The Node B and SRNC establish synchronism for the Iub and Iur Data Transport Bearer by means of exchange of the appropriate DCH Frame Protocol frames **Downlink Synchronisation** and **Uplink Synchronisation**. Then Node B starts DL transmission.

7. Message **RRC Connection Setup** is sent on CCCH from SRNC to UE.
   Parameters: Initial UE Identity, U-RNTI, Capability update Requirement, Transport Format Set, Transport Format Combination Set, frequency, DL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information.

8. Node B achieves uplink sync and notifies SRNC with NBAP message **Radio Link Restore Indication**.

9. Message **RRC Connection Setup Complete** is sent on DCCH from UE to SRNC.
   Parameters: Integrity information, ciphering information, UE radio access capability.

7.3.2 RACH/FACH Establishment

~~An Example of procedure for establishment of an RRC connection in common transport channel (RACH/FACH) state is specified in subclause 8.2.1 of [5].~~ This example shows establishment of an RRC connection on the RACH/FACH common transport channel. A prerequisite for this example is that the necessary Iub Data Transport bearer for the RACH/FACH is established prior to this procedure.

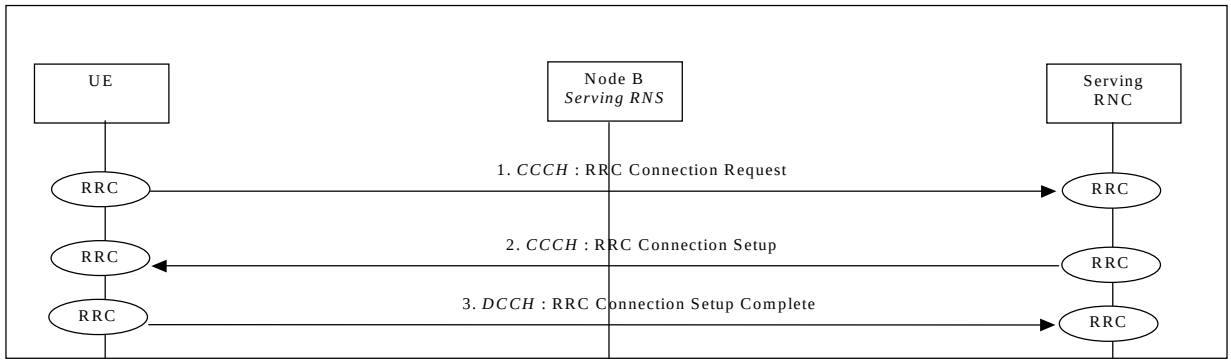


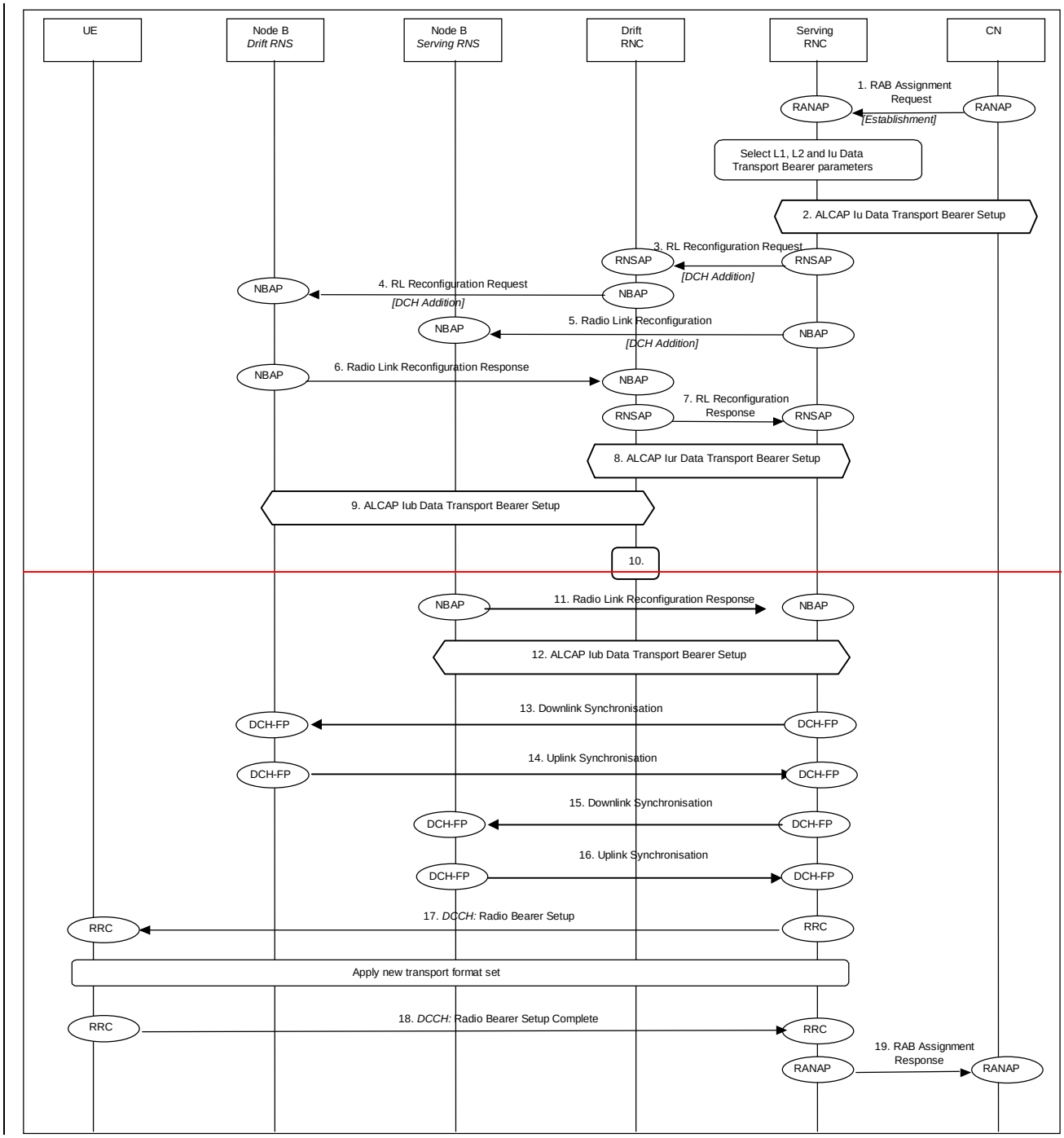
Figure 8b: RRC Connection Establishment – RACH/FACH Establishment

1. The UE initiates set-up of an RRC connection by sending **RRC** ~~message~~ **Connection Request** message on CCCH.
   Parameters: Initial UE Identity, Establishment cause.
2. The SRNC decides to use RACH/FACH for this RRC connection and allocates both U-RNTI and C-RNTI identifiers. Message **RRC Connection Setup** is sent on CCCH.
   Parameters: Initial UE Identity, U-RNTI, C-RNTI, Capability update Requirement, frequency (optionally).
3. UE sends **RRC Connection Setup Complete** on a DCCH logical channel mapped on the RACH transport channel.
   Parameters: Integrity information, ciphering information, UE radio access capability.

********** **Unaffected text** **********

7.6.2 DCH - DCH Establishment - Unsynchronised ~~(PS Core Network)~~

This example shows the establishment of a radio access bearer (DCH) in dedicated transport channel (DCH) RRC state. The UE communicates via two Nodes B. One Node B is controlled by SRNC, one Node B is controlled by DRNC. The reconfiguration time does not require to be synchronised among Node-Bs, SRNC and UE.


UE
Node B
Drift RNS
Node B
Serving RNS
Drift
RNC
Serving
RNC
CN
1. RAB Assignment Request
RANAP
RANAP
[Establishment]
Select L1, L2 and Iu Data Transport Bearer parameters
2. ALCAP Iu Data Transport Bearer Setup
3. RL Reconfiguration Request
RNSAP
RNSAP
[DCH Addition]
NBAP
4. RL Reconfiguration Request
[DCH Addition]
NBAP
NBAP
5. Radio Link Reconfiguration
[DCH Addition]
NBAP
NBAP
6. Radio Link Reconfiguration Response
NBAP
7. RL Reconfiguration Response
RNSAP
RNSAP
8. ALCAP Iur Data Transport Bearer Setup
9. ALCAP Iub Data Transport Bearer Setup
10.
NBAP
11. Radio Link Reconfiguration Response
NBAP
12. ALCAP Iub Data Transport Bearer Setup
13. Downlink Synchronisation
DCH-FP
DCH-FP
DCH-FP
14. Uplink Synchronisation
DCH-FP
15. Downlink Synchronisation
DCH-FP
DCH-FP
16. Uplink Synchronisation
DCH-FP
DCH-FP
RRC
17. DCCH: Radio Bearer Setup
RRC
Apply new transport format set
RRC
18. DCCH: Radio Bearer Setup Complete
RRC
RANAP
19. RAB Assignment Response
RANAP

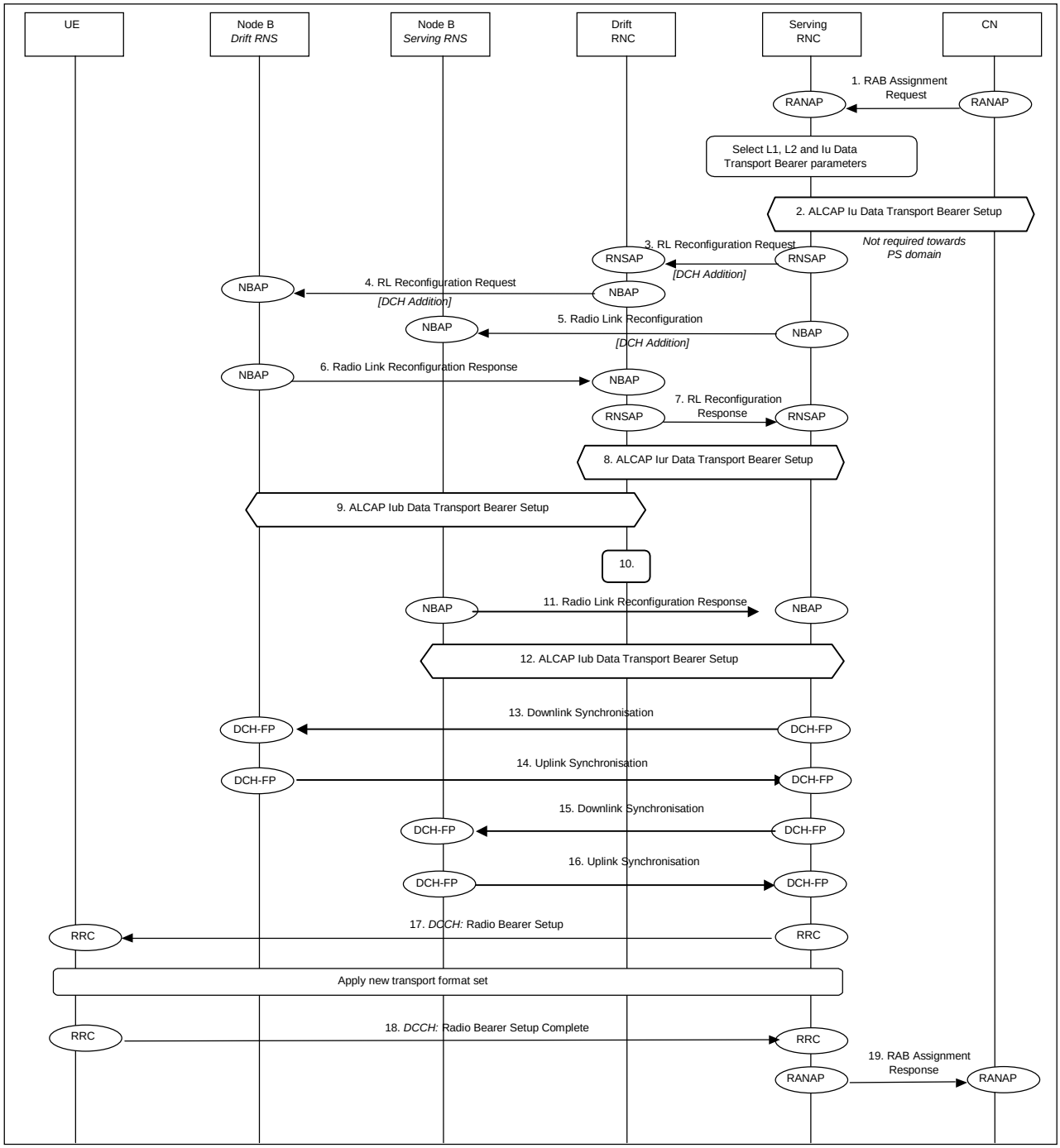


Figure 14: Radio Access Bearer Establishment - DCH - DCH Establishment – Unsynchronised

1. CN initiates establishment of the radio access bearer with RANAP **Radio Access Bearer Assignment Request** message.
   Parameters: radio access bearer parameters, User Plane Mode, Transport Address, Iu Transport Association.
2. SRNC performs mapping of the radio access bearer QoS parameters to AAL2 link characteristics and initiates set-up of Iu Data Transport bearer using ALCAP protocol (this step is not required towards PS domain).
   Parameters: Served User Generated Reference, AAL2 link characteristics …
3. SRNC decided that there are no need for a synchronous RL reconfiguration, and requests DRNC to setup a new DCH sending the **RL Reconfiguration Request** message. The modification shall be done immediately without waiting for the command message.
   Parameters: Bearer ID, Transport Format Set, Transport Format Combination Set, Power control information.
4. DRNC requests its Node B to establish of a new DCH in the existing Radio Link sending the **RL Reconfiguration Request** message.
   Parameters: Bearer ID, Transport Format Set, Transport Format Combination Set, Power control information.

5. SRNC requests its Node B setup a new DCH in the existing Radio Link sending the **RL Reconfiguration Request** message.
   Parameters: Bearer ID, Transport Format Set, Transport Format Combination Set, Power control information.
6. Node B allocates resources and notifies DRNC that the setup is done sending the **RL Reconfiguration Response** message.
   Parameters: Transport layer addressing information (AAL2 address, AAL2 Binding Id) for Iub Data Transport Bearer.
7. DRNC notifies SRNC that the setup is done sending the **RL Reconfiguration Response** message.
   Parameters: Transport layer addressing information (AAL2 address, AAL2 Binding Id) for Iub Data Transport Bearer.
8. SRNC initiates setup of Iur Data Transport Bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to DCH.
9. SRNC initiates setup of Iub Data Transport Bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to DCH.
10. DRNC performs bridging of Iub and Iur Data Transport bearers.
11. Node B allocates resources and notifies SRNC that the setup is sending the **RL Reconfiguration Response**.
    Parameters: Transport layer addressing information (AAL2 address, AAL2 Binding Id) for Iub Data Transport Bearer.
12. SRNC initiates setup of Iub Data Transport Bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to DCH.

13./14./15./16. The Nodes B and SRNC establish synchronism for the Iub and Iur Data Transport Bearer by means of exchange of the appropriate DCH Frame Protocol frames **Downlink Synchronisation** and **Uplink Synchronisation**.

17. RRC message **Radio Bearer Setup** is sent by SRNC to UE.
    Parameters: Transport Format Set, Transport Format Combination Set.
18. UE sends RRC message **Radio Bearer Setup Complete** to SRNC.
19. SRNC sends RANAP message Radio Access Bearer Assignment Response to CN.
    Parameters: Transport Address (Always for PS domain; for CS domain only if modified), Iu Transport Association (Always for PS domain; for CS domain only if modified).

********** **Unaffected text** **********

7.8 Radio Access Bearer Modification

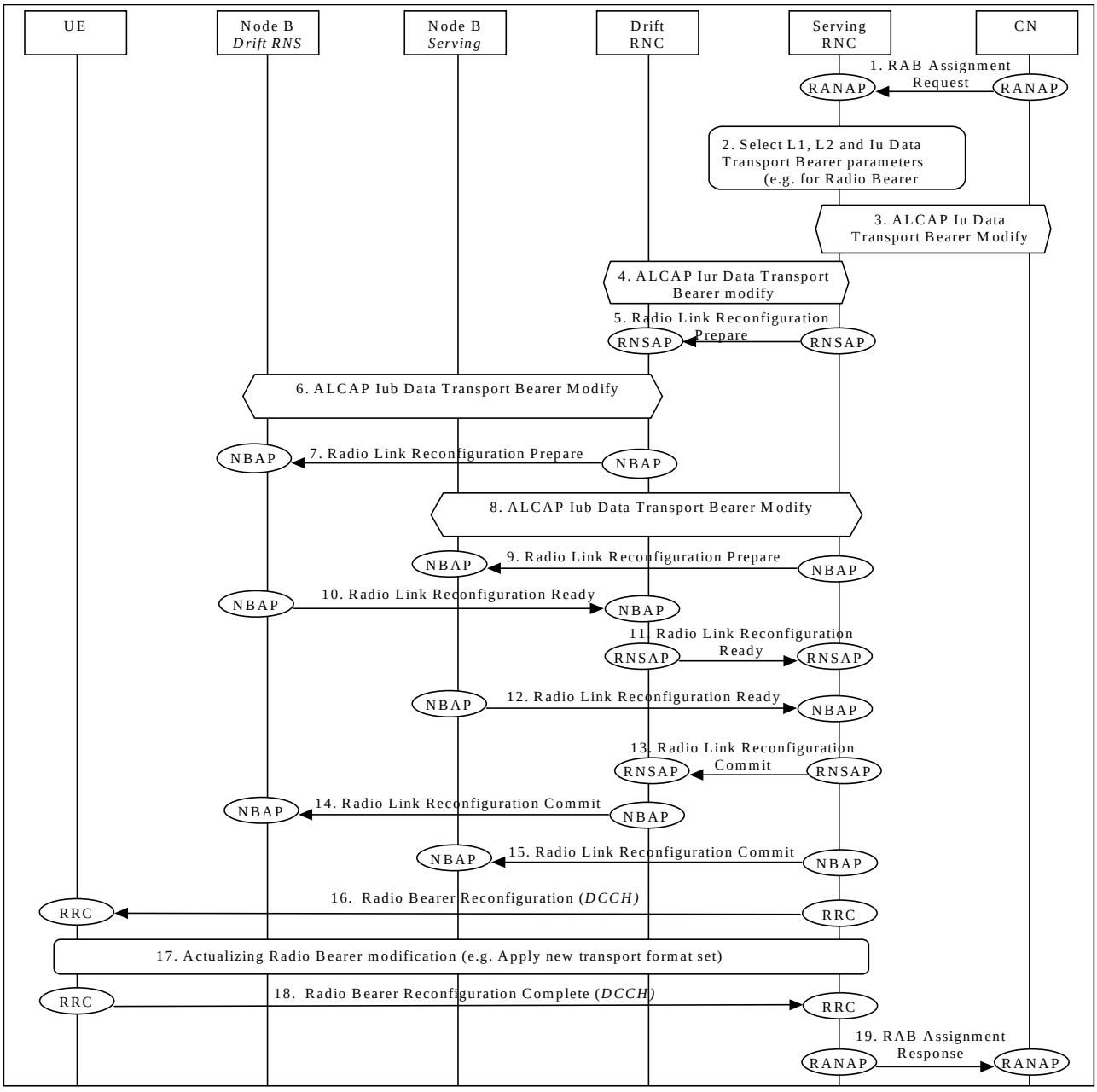
The following examples show modification of a radio access bearer established either on a dedicated channel (DCH) or on a common transport channel (RACH/FACH). The procedure starts from a radio access bearer assignment because does not exist a special message to modify a radio access bearer, instead an “assignment” message is used.

7.8.1 DCCH on DCH - Synchronised

This example shows modification of a radio access bearer established on a dedicated channel (DCH) with UE in macrodiversity between two RNCs. A NSAP synchronised procedure is used and a successful case is shown. For an unsuccessful case it’s important to note that a failure message can be sent in any point of the Message Sequence Chart (MSC); in particular could be in RRC reconfiguration response.

A radio access bearer modification procedure (via radio access bearer assignment message) is shown with mapping to Radio Bearer reconfiguration. Note that this is not possible if the used transport channel or logical channel is changed because the Radio Bearer reconfiguration does not permit a change in type of channel (see [8]).

7.8.1.1 Synchronised DCH modification, Bandwidth increase



–

Figure 20: Radio Access Bearer Modification, Synchronised DCH modification, Bandwidth increase

1. CN initiates modification of the radio access bearer with RANAP message **Radio Access Bearer Assignment Request.**
   Parameters: parameters to be modified at lower level e.g. Maximum Bit Rate.
2. Interworking functions. SRNC chooses which parameters (lower level) ought to be modified and what kind of procedure has to start up (i.e Radio Bearer Reconfiguration for RRC).
3. SRNC starts an Iu Data Transport Bearer Modification between the CN and the SRNC using the ALCAP protocol with AAL2 bindings carried by radio access bearer assignment message (this step is not required towards PS domain). This has to be done before Radio Reconfiguration itself because the transport channel must be ready when the radio channel will be ready.
4. SRNC initiates modify of Iur (Serving RNS) Data Transport bearer. In the case that ALCAP is implemented by Q.AAL2 (Q.2630.2 but without modification) it implies the release of the existing bearer and the establishment of a new one.
5. SRNC requests DRNC to prepare modification of DCH carrying the radio access bearer (**Radio Link Reconfiguration Prepare**).
   Parameters: Transport Format Combination Set, UL scrambling code, Transport Bearer Request Indicator, etc.

6. DRNC initiates modify of Iub Data Transport bearer. In the case that ALCAP is implemented by Q.AAL2 (Q.2630.2 but without modification procedure) it implies the release of the existing bearer and the establishment of a new one.
7. DRNC requests its Node B to prepare modification of DCH related to the radio access bearer (**Radio Link Reconfiguration Prepare**).
8. SRNC initiates modify of Iub (Serving RNS) Data Transport bearer. In the case that ALCAP is implemented by Q.AAL2 (Q.2630.2 but without modification procedure) it implies the release of the existing bearer and the establishment of a new one.
9. SRNC requests its Node B to prepare modification of DCH carrying the radio access bearer (**Radio Link Reconfiguration Prepare**).
   Parameters: Transport Format Combination Set, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Transport Bearer Request Indicator.
10. Node B (drift) notifies DRNC that modification preparation is ready (**Radio Link Reconfiguration Ready**).
11. DRNC notifies SRNC that modification preparation is ready (**Radio Link Reconfiguration ready**).
12. Node B (serving) notifies SRNC that modification preparation is ready (**Radio Link Reconfiguration Ready**). Note: here a **Radio Link Reconfiguration Failure** could occur.
13. RNSAP message **Radio Link Reconfiguration Commit** is sent from SRNC to DRNC.
14. NBAP message **Radio Link Reconfiguration Commit** is sent from DRNC to Node B (drift).
15. NBAP message **Radio Link Reconfiguration Commit** is sent from SRNC to Node B (serving).
16. RRC message **Radio Bearer Reconfiguration** is sent by controlling RNC (here SRNC) to UE.
17. Both UE and Nodes B actualise modification of DCH (i.e. applying a new transport format).
18. UE sends RRC message **Radio Bearer Reconfiguration Complete** to SRNC.
19. SRNC acknowledges the modification of radio access bearer (**Radio Access Bearer Assignment Response**) towards CN.

7.8.1.2 Synchronised DCH modification, Bandwidth decrease

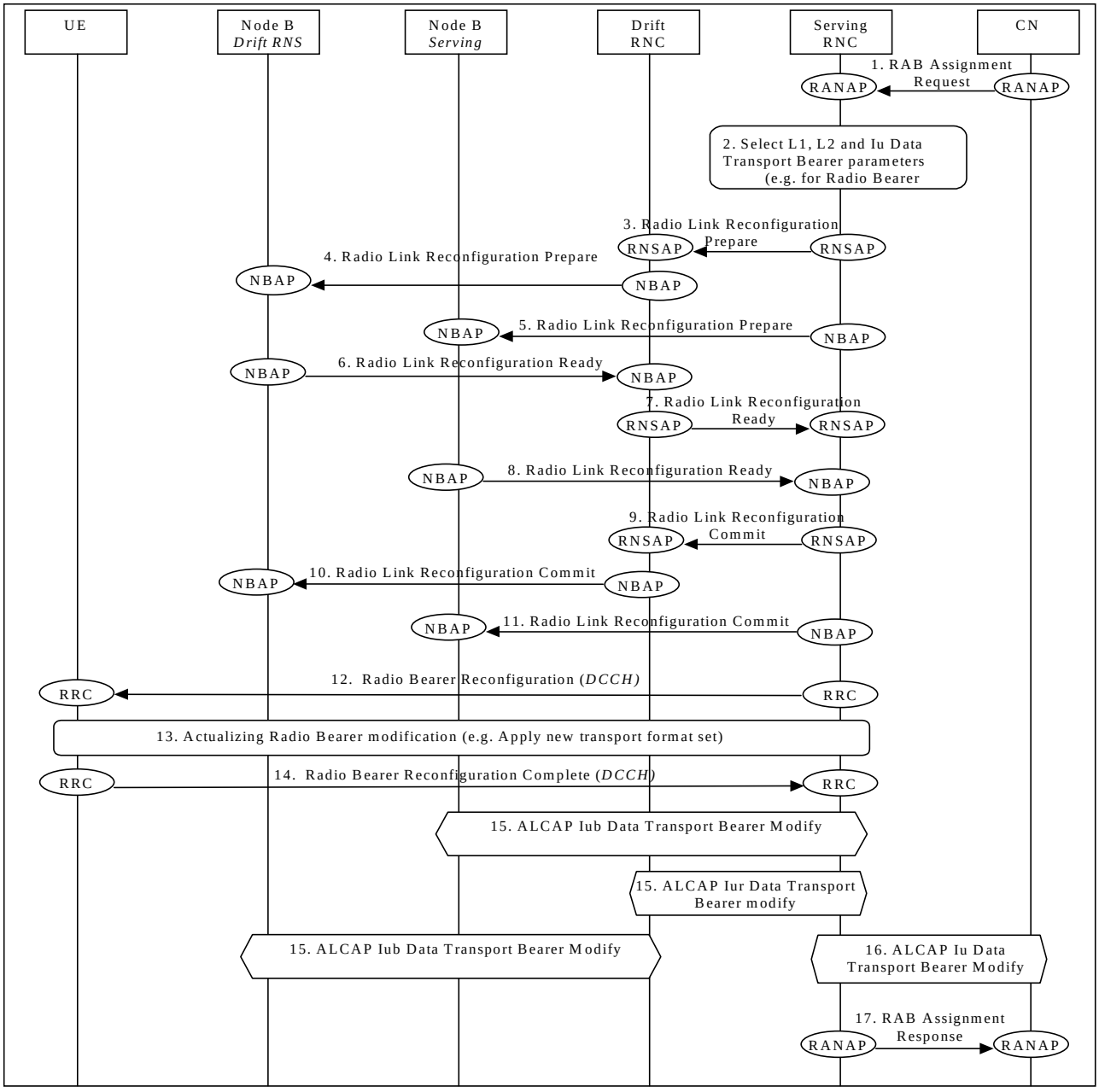


Figure 20a: Radio Access Bearer Modification, Synchronised DCH Modification, Bandwidth decrease

1. CN initiates modification of the radio access bearer with RANAP message **Radio Access Bearer Assignment Request.**
   Parameters: parameters to be modified at lower level e.g. Maximum Bit Rate.
2. Interworking functions. SRNC chooses which parameters (lower level) ought to be modified and what kind of procedure has to start up (i.e Radio Bearer Reconfiguration for RRC).
3. SRNC requests DRNC to prepare modification of DCH carrying the radio access bearer (**Radio Link Reconfiguration Prepare**).
   Parameters: Transport Format Combination Set, UL scrambling code, Transport Bearer Request Indicator, etc.
4. DRNC requests its Node B to prepare modification of DCH related to the radio access bearer (**Radio Link Reconfiguration Prepare**).
5. SRNC requests its Node B to prepare modification of DCH carrying the radio access bearer (**Radio Link Reconfiguration Prepare**).
   Parameters: Transport Format Combination Set, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Transport Bearer Request Indicator.

6. Node B (drift) notifies DRNC that modification preparation is ready (**Radio Link Reconfiguration Ready**).
7. DRNC notifies SRNC that modification preparation is ready (**Radio Link Reconfiguration ready**).
8. Node B (serving) notifies SRNC that modification preparation is ready (**Radio Link Reconfiguration Ready**). Note: here a **Radio Link Reconfiguration Failure** could occur.
9. RNSAP message **Radio Link Reconfiguration Commit** is sent from SRNC to DRNC.
10. NBAP message **Radio Link Reconfiguration Commit** is sent from DRNC to Node B (drift).
11. NBAP message **Radio Link Reconfiguration Commit** is sent from SRNC to Node B (serving).
12. RRC message **Radio Bearer Reconfiguration** is sent by controlling RNC (here SRNC) to UE.
13. Both UE and Nodes B actualise modification of DCH (i.e. applying a new transport format).
14. UE sends RRC message **Radio Bearer Reconfiguration Complete** to SRNC.
15. SRNC initiates modify of Iub (Serving RNS) Data Transport bearer. The same does DRNC with its own Iub. SRNC initiates modify of Iur (Serving RNS) Data Transport bearer. In the case that ALCAP is implemented by Q.AAL2 (~~Q.2360.2~~ Q.2630.2 but without modification procedure) it implies the release of the existing bearer and the establishment of a new one.
16. SRNC starts an Iu Data Transport Bearer Modification between the CN and the SRNC using the ALCAP protocol with AAL2 bindings carried by radio access bearer assignment message (this step is not required towards PS domain). This has to be done after the initialisation of the user plane mode.
17. SRNC acknowledges the modification of radio access bearer (**Radio Access Bearer Assignment Response**) towards CN.

********** **Unaffected text** **********

7.11 Hard Handover

This subclause presents some examples of hard handover procedures. These procedures are for both dedicated and common channels and may be applied in the following cases:

- intra-frequency Hard Handover (TDD mode);
- inter-frequency Hard Handover (FDD and TDD mode).

7.11.1 Backward Hard Handover

This subclause shows some examples of hard handover in the case of network initiated backward handovers.

7.11.1.1 Hard Handover via Iur (DCH State)

This subclause shows an example of Hard Handover via Iur, when the mobile is in DCH state, for both successful and unsuccessful cases.

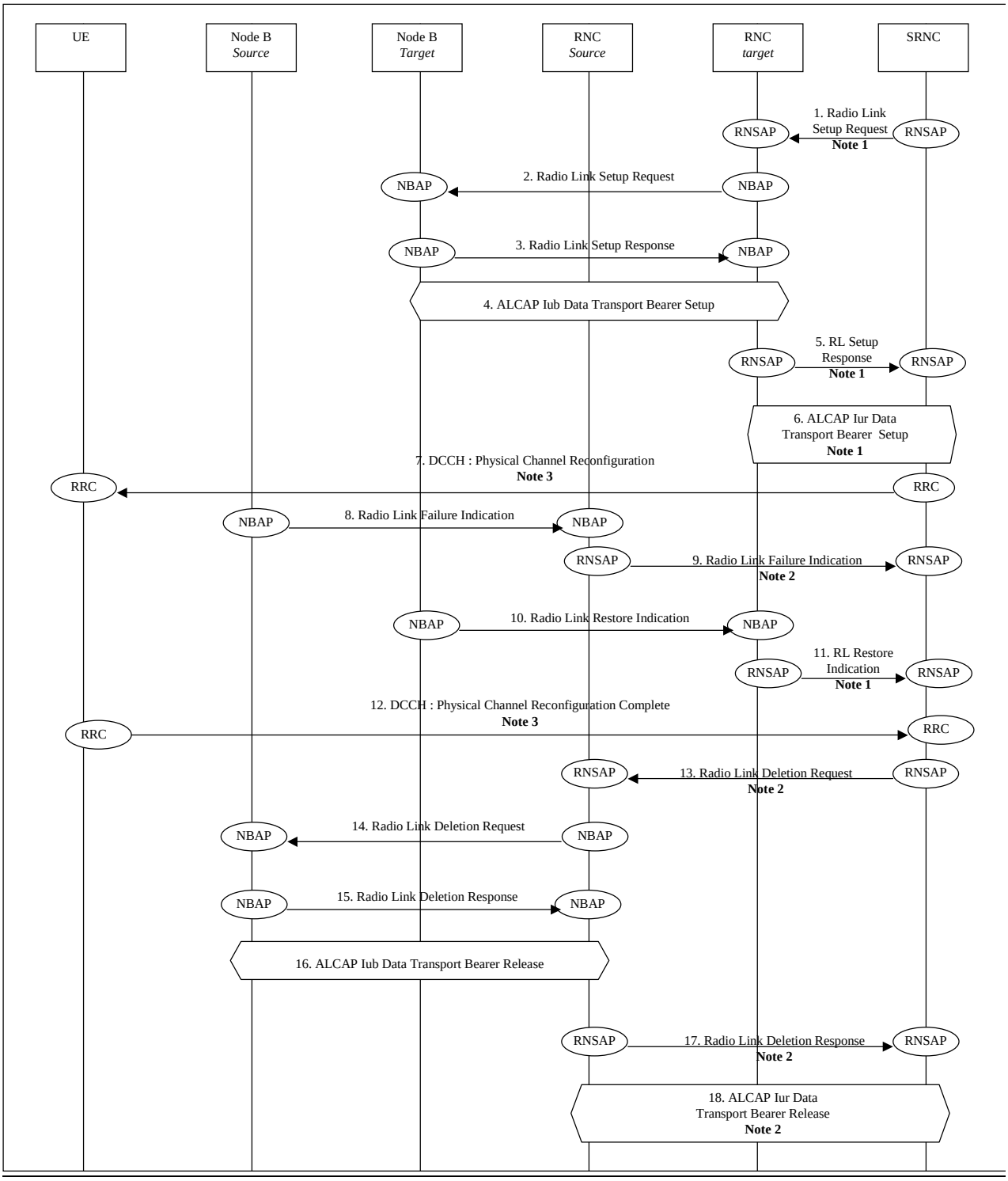


Figure 27: Hard Handover via Iur (DCH on Iur) – successful case

1. SRNC sends **Radio Link Setup Request** message to the target RNC.
   Parameters: target RNC identifier, s-RNTI, Cell id, Transport Format Set, Transport Format Combination Set. (Note 1).
2. The target RNC allocates RNTI and radio resources for the RRC connection and the Radio Link(s) (if possible), and sends the NBAP message **Radio Link Setup Request** to the target Node-B.
   Parameters: Cell id, Transport Format Set, Transport Format Combination Set, frequency, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information etc.
3. Node B allocates resources, starts PHY reception, and responds with NBAP message **Radio Link Setup Response**.
   Parameters: Signalling link termination, Transport layer addressing information for the Iub Data Transport Bearer.

4. Target RNC initiates set-up of Iub Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to the DCH. The request for set-up of Iub Data Transport bearer is acknowledged by Node B.
5. When the Target RNC has completed preparation phase, **Radio Link Setup Response** is sent to the SRNC (see note 1).
6. SRNC initiates set-up of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The request for set-up of Iur Data Transport bearer is acknowledged by Target RNC (see note 1).
7. SRNC sends a RRC message **Physical Channel Reconfiguration** to the UE.
8. When the UE switches from the old RL to the new RL, the source Node B detects a failure on its RL and sends a NBAP message **Radio Link Failure Indication** to the source RNC.
9. The source RNC sends a RNSAP message **Radio Link Failure Indication** to the SRNC (see note 2).
10. Target Node B achieves uplink sync on the Uu and notifies target RNC with NBAP message **Radio Link Restore Indication**.
11. Target RNC sends RNSAP message **Radio Link Restore Indication** to notify SRNC (see note 2) that uplink sync has been achieved on the Uu.
12. When the RRC connection is established with the target RNC and necessary radio resources have been allocated, the UE sends RRC message **Physical Channel Reconfiguration Complete** to the SRNC.
13. The SRNC sends a RNSAP message **Radio Link Deletion Request** to the source RNC (see note 2).
14. The source RNC sends NBAP message **Radio Link Deletion Request** to the source Node B.
    Parameters: Cell id, Transport layer addressing information.
15. The source Node B de-allocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.
16. The source RNC initiates release of Iub Data Transport bearer using ALCAP protocol.
17. When the source RNC has completed the release the RNSAP message Radio Link Deletion Response is sent to the SRNC (see note 2).
18. SRNC initiates release of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The request for release of Iur Data Transport bearer is acknowledged by the Source RNC (see note 2).

NOTE 1: This message is not necessary when the target RNC is the SRNC.
NOTE 2: This message is not necessary when the source RNC is the SRNC.
NOTE 3: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), clause 8.3.5.2.

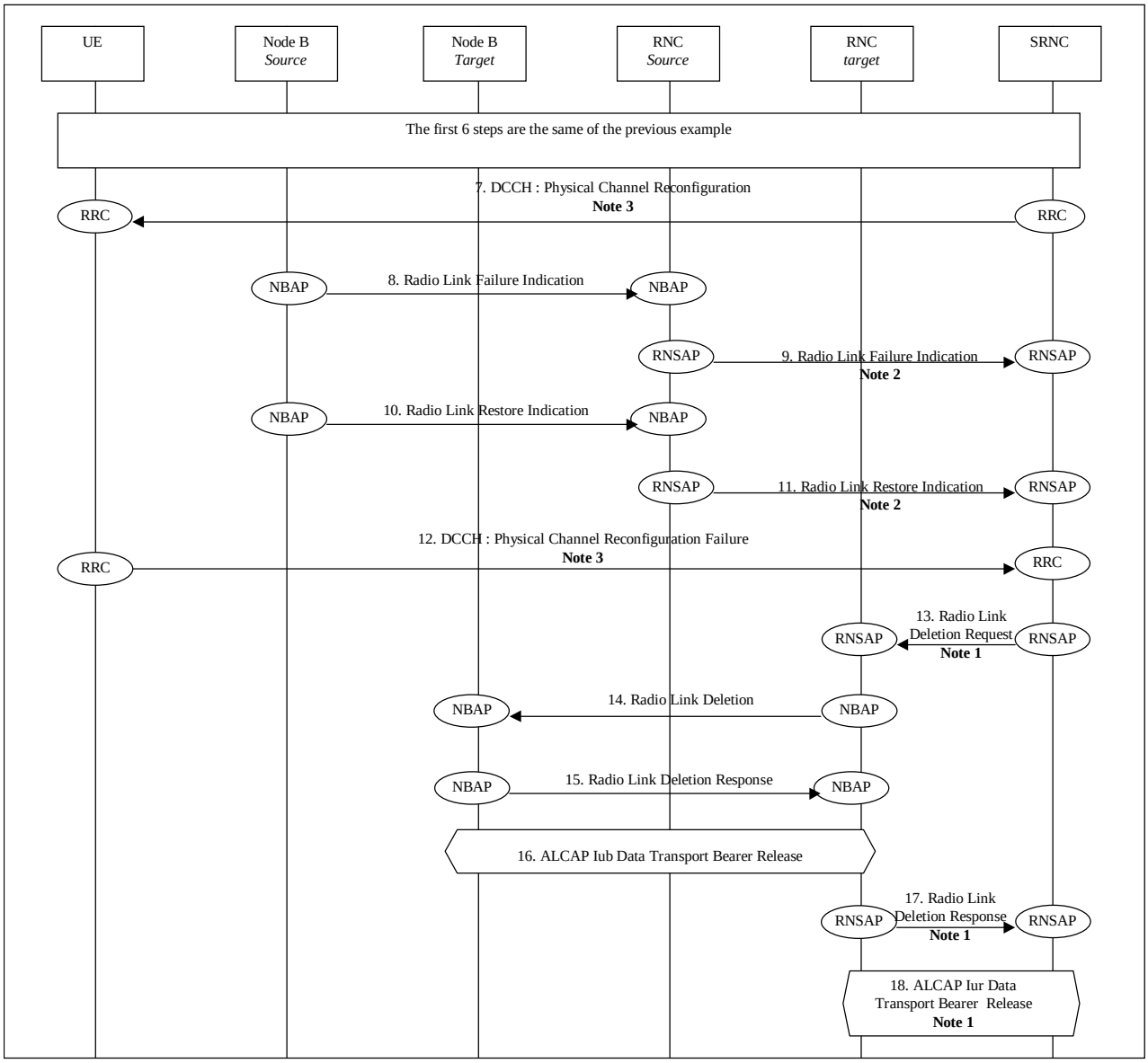


Figure 28: Hard Handover via Iur (DCH on Iur) – unsuccessful case.

The first 6 steps are the same of the previous example.

7. SRNC sends a RRC message **Physical Channel Reconfiguration** to the UE.
8. When the UE switch from the old RL to the new RL, the source Node B detect a failure on its RL and send a NBAP message **Radio Link Failure Indication** to the source RNC.
9. The SRNC sends a RNSAP message **Radio Link Failure Indication** to the source RNC (see note 2).
10. UE cannot access the target cell and switch back to ~~the new~~the old one. The source Node B detects a RL restoration and send a NBAP message **Radio Link Restoration Indication** to the source RNC.
11. The SRNC sends a RNSAP message **Radio Link Restoration Indication** to the source RNC (see note 2).
12. When the RRC connection is re-established with the source RNC the UE sends RRC message **Physical Channel Reconfiguration Failure** to the SRNC.
13. The SRNC sends a RNSAP message **Radio Link Deletion Request** to the target RNC (see note 1).
14. The target RNC sends NBAP message **Radio Link Deletion Request** to the target Node B.
    Parameters: Cell id, Transport layer addressing information.
15. The target Node B de-allocates radio resources. Successful outcome is reported in NBAP message **Radio Link Deletion Response**.
16. The target RNC initiates release of Iub Data Transport bearer using ALCAP protocol.
17. When the target RNC has completed the release the RNSAP message **Radio Link Deletion Response** is sent to the SRNC (see note 1).

18. SRNC initiates release of Iur Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iur Data Transport Bearer to the DCH. The Target RNC acknowledges the request for release of Iur Data Transport bearer (see note 1).

NOTE 1: This message is not necessary when the target RNC is the SRNC.

NOTE 2: This message is not necessary when the source RNC is the SRNC.

NOTE 3: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), clause 8.3.5.2.

7.11.1.2 Hard Handover with switching in the CN (UE connected to two CN nodes, DCH state)

This example shows Inter-RNS Hard Handover with switch in CN, in a situation in which the UE is connected to two CN nodes simultaneously and will be using one node B directly under the target RNC after the hard handover.

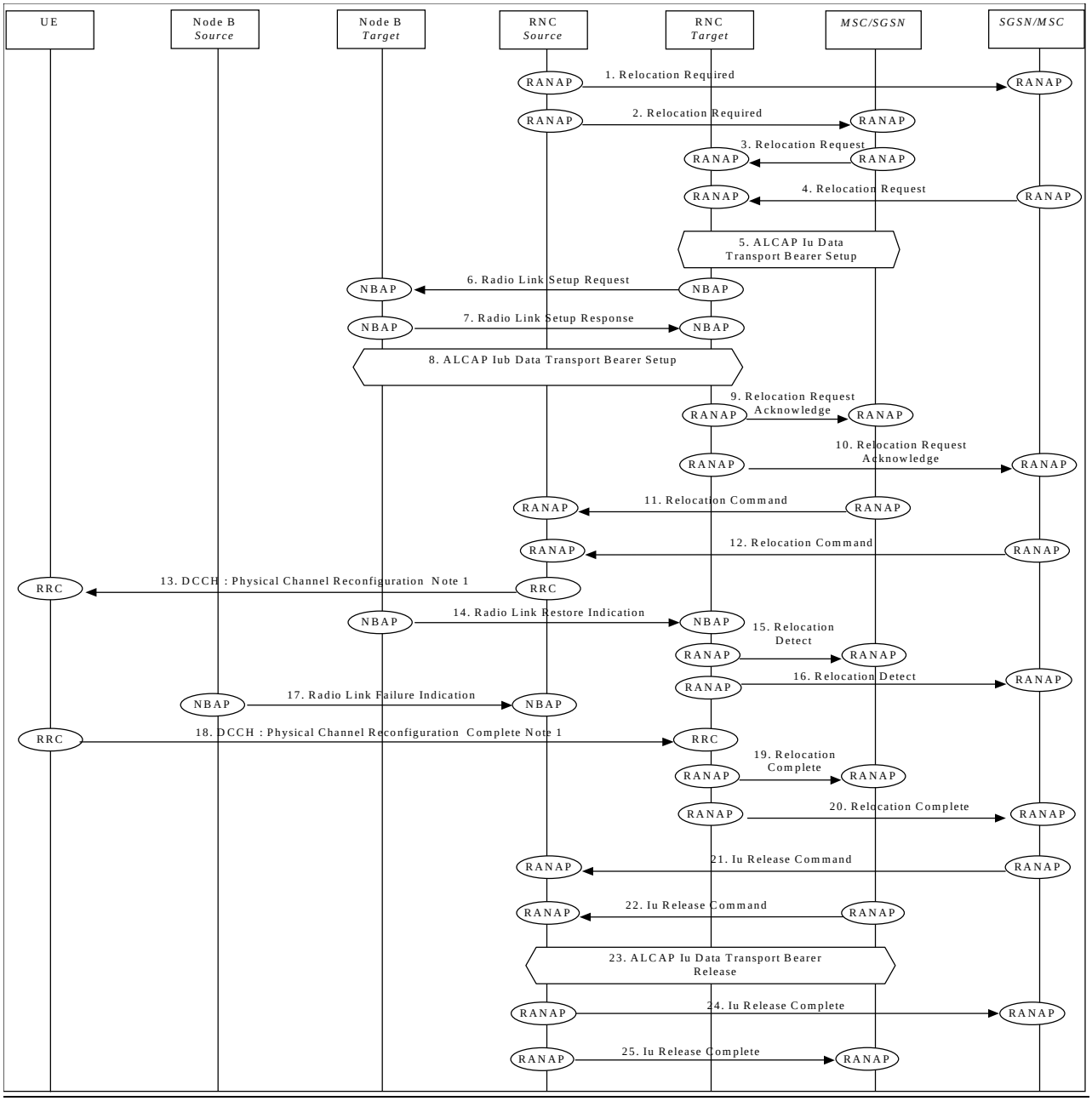


Figure 29: Hard Handover with switching in the CN (UE connected to two CN nodes, DCH state)

Serving RNC makes the decision to perform the Hard Handover via CN. Serving RNC also decides into which RNC (Target RNC) the Serving RNC functionality is to be relocated.

1./2. SRNC sends Relocation Required messages to both CN nodes.

Parameters: target RNC identifier, Information field transparent to the CN node and to be transmitted to the target RNC.
Upon reception of Relocation Required message CN element prepares itself for the switch and may also suspend data traffic between UE and itself for some bearers.

3./4. When CN is aware of preparation, CN node conveys a Relocation Request message to the target RNC to allocate resources.

Parameters: bearer ID's requested to be rerouted towards the CN node, from which the Relocation Request originated.
CN indicates in the message whether it prefers point to multipoint type of connections within CN or hard switch in CN. In this example the latter is assumed.

Target RNC allocates necessary resources within the UTRAN to support the radio links to be used after completion of the Hard Handover procedure.

5. Target RNC and CN node establish the new Iu transport bearers for each Radio Access Bearer related to the CN node.

6./7./8. The target RNC allocates RNTI and radio resources for the RRC connection and the Radio Link, then sends the NBAP message Radio Link Setup Request to the target Node-B.
Parameters: Cell id, Transport Format Set, Transport Format Combination Set, frequency, UL scrambling code (FDD only), Time Slots (TDD only), User Codes (TDD only), Power control information etc.

Node B allocates resources, starts PHY reception, and responds with NBAP message Radio Link Setup Response. Target RNC initiates set-up of Iub Data Transport bearer using ALCAP protocol. This request contains the AAL2 Binding Identity to bind the Iub Data Transport Bearer to the DCH.

9./10. When RNC has completed preparation phase, Relocation Request Acknowledge is sent to the CN elements.

Parameters: transparent field to the CN that is to be transmitted to the Source RNS.

11./12. When CN is ready for the change of SRNC, CN node sends a Relocation Command to the RNC. Message contains the transparent field provided by Target RNC.

Parameters: information provided in the Information field from the target RNC.

13. Source RNC sends a RRC message Physical Channel Reconfiguration to the UE.

14. Target Node B achieves uplink sync on the Uu and notifies target RNC with NBAP message **Radio Link Restore Indication**.

15./16 When target RNC has detected the UE, Relocation Detect message is sent to the CN nodesTarget RNC switches also the connection towards the new Iu, when UE is detected. After the switch UL traffic from node-B's is routed via the newly established MDC to the new MAC/RLC entities and finally to the correct Iu transport bearer. DL data arriving from the new Iu link is routed to newly established RLC entities, to the MAC and to the MD-splitter and Nodes B.

~~16~~17. When the UE switch from the old RL to the new RL, the source Node B detect a failure on its RL and send a NBAP message Radio Link Failure Indication to the source RNC.

18. When the RRC connection is established with the target RNC and necessary radio resources have been allocated the UE sends RRC message Physical Channel Reconfiguration Complete to the target RNC.

19./20. After a successful switch and resource allocation at target RNC, RNC sends Relocation Complete messages to the involved CN nodes.

At any phase, before the Relocation Complete message is sent, the old communication link between the CN and UE is all the time existing and working and the procedure execution can be stopped and original configuration easily restored. If any such unexceptional thing occurs a Relocation Failure message may be sent instead of any message numbered 3-10 and 13-15 described in this above.

21./22. The CN node initiates the release of the Iu connections to the source RNC by sending RANAP message Iu Release Command.

23. Upon reception of the release requests from the CN nodes the old SRNC executes all necessary procedures to release all visible UTRAN resources that were related to the RRC connection in question.

24./25. SRNC confirm the IU release to the CN nodes sending the message Iu Release Complete.

NOTE 1: The messages used are only one example of the various messages which can be used to trigger a handover, to confirm it or to indicate the handover failure. The different possibilities are specified in the RRC specification (25.331), clause 8.3.5.2.

7.11.2 Forward Hard Handover

This subclauses shows some examples of hard handover in the case of mobile initiated forward handovers.

Some examples of Cell Update procedures are shown, i.e. those procedures that update the position of the UE when a RRC connection exists and the position of the UE is known on cell level in the UTRAN. The UE is in CELL_PCH or CELL_FACH.

7.11.2.1 Cell Update with SRNS relocation

This example shows Inter-RNS Cell Update with switching in the CN (therefore with SRNS relocation) and RNTI reallocation.

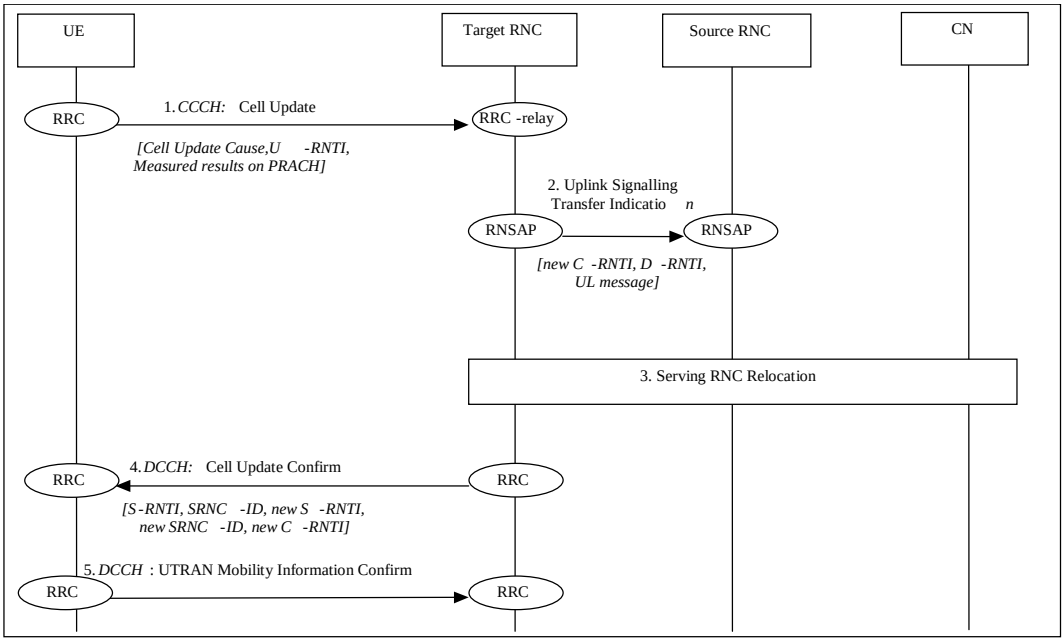


Figure 30: Cell Update with SRNS Relocation

1. UE sends a RRC message **Cell Update** to the UTRAN, after having made cell re-selection. Upon reception of a CCCH message from a UE, target RNC allocates a C-RNTI for the UE.
2. Controlling target RNC forward the received message (on CCCH) via **Uplink Signalling Transfer Indication** RNSAP message towards the SRNC. Message includes, besides target RNC-ID, also the allocated C-RNTI, which is to be used as UE identification within the C-RNC, and the D-RNTI. Upon reception of the RNSAP message SRNC decides to perform SRNS Relocation towards the target RNC.
3. Serving RNC relocation procedure is executed as defined in subclause 'SRNS Relocation Relocation (UE connected to a single CN node)'. After completing SRNS Relocation, target RNC allocates new S-RNTI for the UE, ~~UE~~ becoming the new serving RNC.
4. Target RNC responds to UE by RRC **Cell Update Confirm**, including old S-RNTI and SRNC ID as UE identifiers. Message contains also the new S-RNTI, SRNC-ID and C-RNTI.
5. UE acknowledges the RNTI reallocation by sending the RRC message **UTRAN Mobility Information Confirm**.

********** Unaffected text **********

7.12 URA Update

This subclause presents some examples of URA Update procedures, i.e. those procedures that update the UTRAN registration area of a UE when a RRC connection exists and the position of the UE is known on URA level in the UTRAN.

7.12.1 Inter-RNS URA Update with SRNS Relocation

This example shows Inter-RNS URA Update with switching in the CN (SRNS relocation).

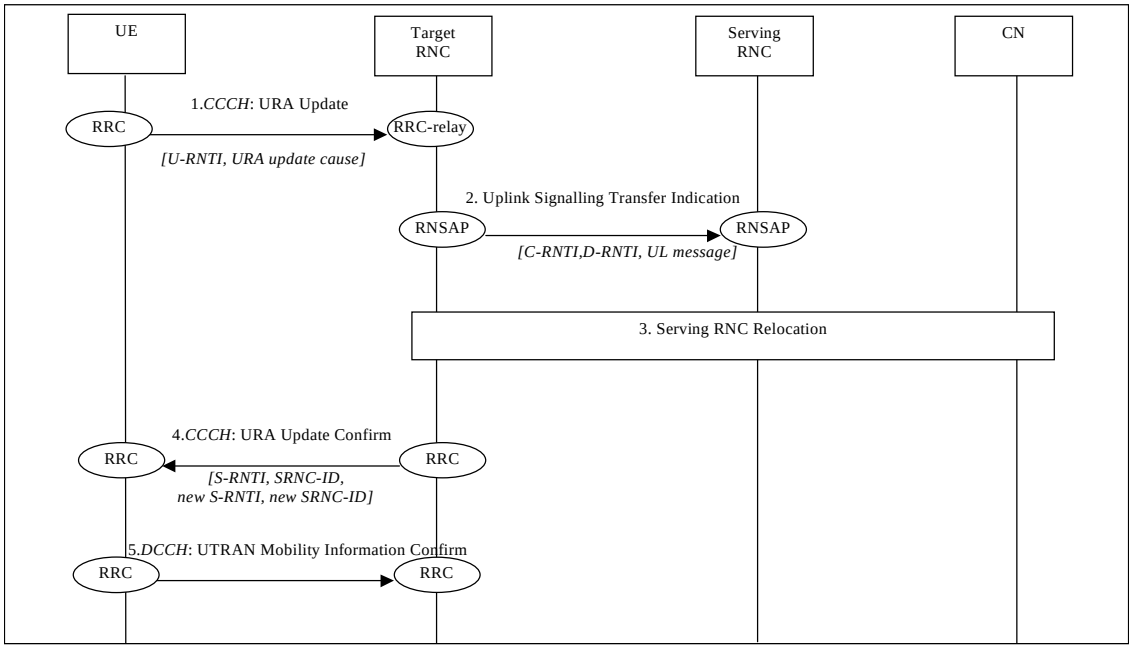


Figure 33: Inter RNS URA Update with switching in CN.

1. UE sends a RRC message **URA Update** to the UTRAN, after having made cell re-selection. Upon reception of a CCCH message from an unknown UE, the target RNC becomes a controlling RNC and it allocates a new C-RNTI and a new D-RNTI for the UE.
2. The target RNC forwards the received uplink CCCH message towards the SRNC by RNSAP **Uplink Signalling Transfer Indication** message to the old Source/Controller RNC. Message includes, besides target RNC-ID, also the allocated C-RNTI, which is to be used as UE identification within the C-RNC, and the D-RNTI. Upon reception of the RNSAP message SRNC decides to perform SRNS Relocation towards the target RNC.
3. Serving RNC relocation procedure is executed as defined in subclause 'SRNS Relocation (UE connected to a single CN node)'. After having completed SRNS Relocation, target RNC allocates new S-RNTI for the UE becoming the new serving RNC. New SRNC also deletes the allocated C-RNTI, since it is not needed for an UE in URA_PCH state.
4. Serving RNC acknowledges the message by RRC **URA Update Confirm**, including old S-RNTI and SRNC ID as UE identifiers. Message contains also the new S-RNTI and RNC-ID.
5. UE acknowledges the RNTI reallocation by sending the RRC message **UTRAN Mobility Information Confirm** on DCCH.

7.12.2 Inter-RNS URA Update via Iur without SRNS relocation

This example shows an Inter RNS URA update in DRNS without SRNS relocation. In this example target RNS, source RNS and serving RNS are all located separately from each other. Other scenarios can be easily derived from this most comprehensive signalling procedure.

Please note that this example shows the case when no ciphering is ~~requires~~required; for this case no channels on Iur are required and therefore the message flow 5 (Cell Update Confirm) is sent on CCCH. In the case that ciphering is

required, that message must be sent on the DCCH (ciphering is performed at MAC-d level) and the flow becomes similar to the one shown for the Cell Update in section "Cell Update via Iur without RNS relocation".

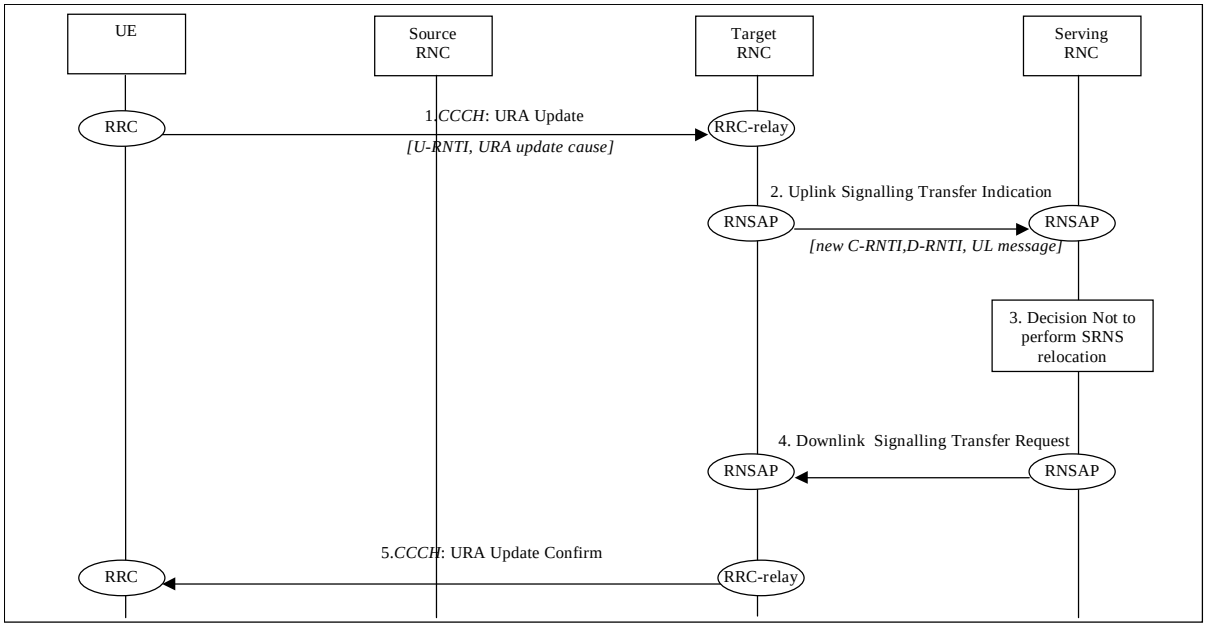


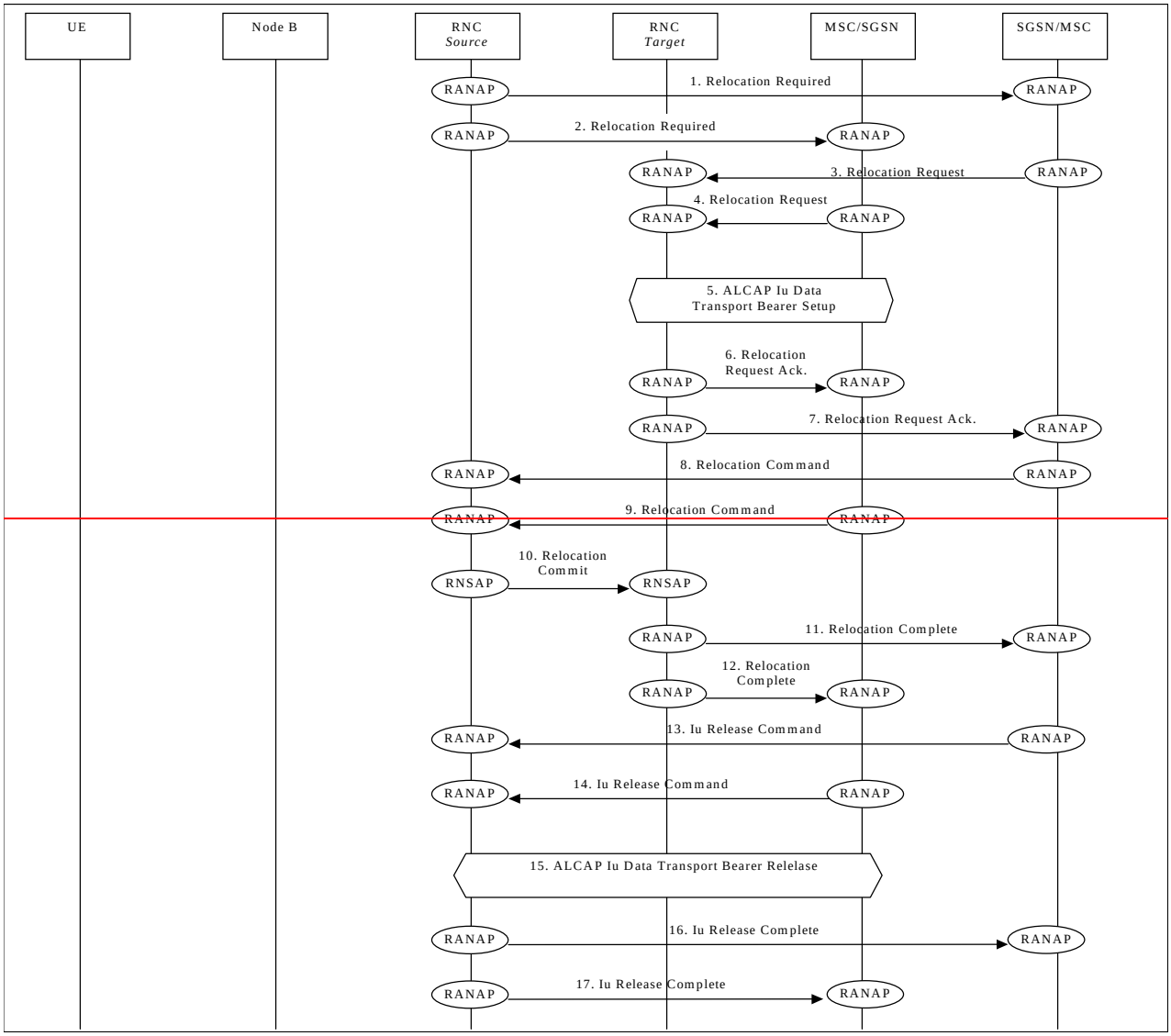
Figure 34: Inter-RNS URA Update via Iur without SRNS relocation

1. UE sends a RRC message **URA Update** to the UTRAN, after having made cell re-selection and URA has changed.
2. Upon reception of the message from a UE, Target RNC decodes the RNC ID and the S-RNTI. The UE is not registered in the target RNC (RNC ID and SRNTI unknown), thus RNC allocates C-RNTI and D-RNTI for the UE. The Target RNC forward the received Uu signalling message towards the SRNC by RNSAP **Uplink Signalling Transfer Indication** message. The message includes also the cell-ID from which the message was received and the allocated C-RNTI and D-RNTI.
3. Upon reception of the RNSAP message SRNC decides not to perform an SRNS relocation towards the target RNC. The target RNC become C-RNC while SRNC remains unchanged.
4. SRNC delivers to Target RNC information upon, eventually new, RNTIs via a **Downlink Signalling Transfer Request**, transporting a URA Update Confirm.
5. The **URA Update Confirm** is forwarded to the UE (via CCCH with new RNTIs) from the target RNC.

7.12.3 SRNS Relocation (UE connected to two CN nodes)

This example show SRNS Relocation, in situation in which the UE is connected to two CN nodes simultaneously (this means that RNC is connected to a SGSN and a MSC). It is assumed that:

- all cells in the active set are in one DRNC;
- the CN performs hard switching of the user traffic.


UE
Node B
RNC Source
RNC Target
MSC/SGSN
SGSN/MSC
RANAP
1. Relocation Required
2. Relocation Required
3. Relocation Request
4. Relocation Request
5. ALCAP Iu Data Transport Bearer Setup
6. Relocation Request Ack.
7. Relocation Request Ack.
8. Relocation Command
9. Relocation Command
RNSAP
10. Relocation Commit
11. Relocation Complete
12. Relocation Complete
13. Iu Release Command
14. Iu Release Command
15. ALCAP Iu Data Transport Bearer Relelase
16. Iu Release Complete
17. Iu Release Complete

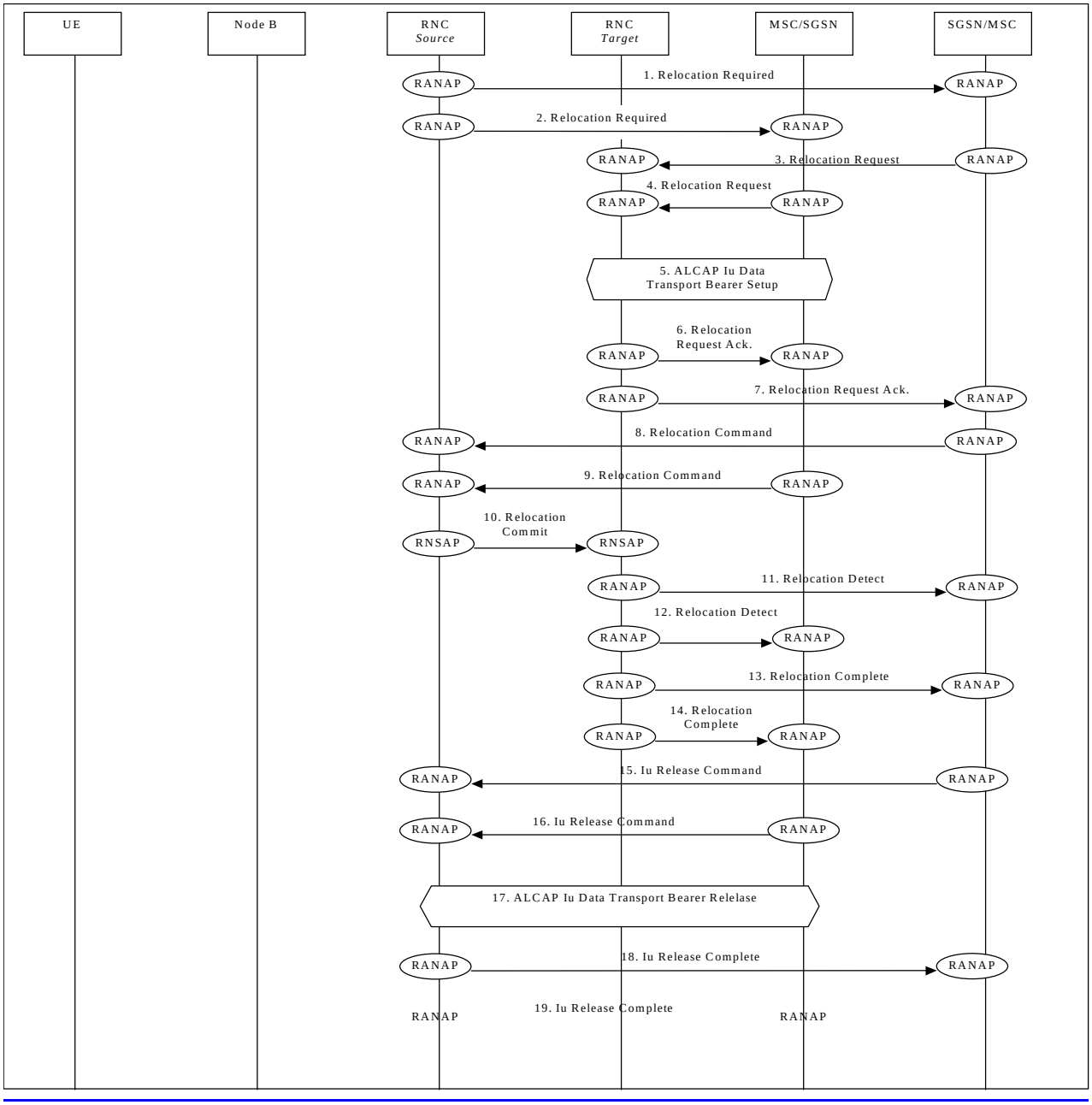


Figure 35: SRNS Relocation (UE connected to two CN nodes)

Note that the SRNC makes the decision to perform the Serving RNC relocation procedure. The Serving RNC also decides into which RNC (Target RNC) the Serving RNC functionality is to be relocated.

1./2. The source SRNC sends **Relocation Required** messages to both CN nodes.
Parameters: target RNC identifier, Information field that the CN node(s) shall pass transparently to the target RNC. This transparent field contains the UE identifier, number of CN nodes and other data.
Upon reception of **Relocation Required** message the CN element prepares itself for the switch and may also suspend user data traffic and/or signalling between UE and itself for some bearers.

3./4. When preparation is completed the CN node conveys a **Relocation Request** message to the target RNC.
Parameters: indication of which bearers should be routed towards this CN node, transparent information field sent by the source RNC, UE identifier.
The target RNC uses the UE identifier to link the requests from multiple CN nodes to each other and to the resources (e.g. Iub links) that the UE is currently using.

5. The targets RNC and CN node establish the new Iu transport bearers for each Radio Access Bearer related to that CN node.

6./7. When the source RNC and the target RNC have completed its preparation phase, **Relocation Request Acknowledge** message is sent to CN.

8./9. When the CN node is ready for the SRNC move, the CN node indicates the completion of preparation phase at the CN side for the SRNS Relocation by sending the **Relocation Command** message~~. To~~ to the source RNC~~ and the target RNC.~~.

10. When the source RNC has received **Relocation Command** messages from all the CN nodes, the source RNC sends a **Relocation Commit** message to the target RNC to request the target RNC to proceed with the Relocation.

11./12~~.~~ The target RNC sends the **Relocation Detect** message to the involved CN nodes and also executes both the DL and UL switch for all bearers at the earliest suitable time instance.

After the switch UL traffic from node-B's is routed via the newly established Macro Diversity Combiner to the new MAC/RLC entities and finally to the correct Iu transport bearer. UL data transmission to the old Iur transport bearer is ceased. Upon reception of Relocation Detect message, the CN may switch the user plane from the source RNC to the target RNC.

DL data arriving from the new Iu link is routed to newly established RLC entities, to the MAC and to the Macro Diversity Splitter and Nodes B. The DL data received from the old Iur is discarded.

~~11~~13./~~12~~14. Immediately after a successful switch at RNC, target RNC (=SRNC) sends **Relocation Complete** messages to the involved CN nodes.

If the User plane has not been switched at Relocation Detect, ~~Upon reception of messages 9 and 10,~~ the CN switches from the old Iu transport bearers to the new ones.

~~13~~15./~~14~~16. After a successful switch at the CN node, the CN node initiates the release of the Iu connection to the source RNC by sending the RANAP message **Iu Release Command**.

~~15~~17 Upon reception of the release requests from the CN nodes the old SRNC executes all necessary procedures to release all visible UTRAN resources that were related to the RRC connection in question.

~~16~~18./~~17~~19. SRNC confirm the IU release to the CN nodes sending the message **Iu Release Complete.**

At any phase, before the **Relocation Complete** message is sent, the old communication link between the CN and UE is all the time existing and working and the procedure execution can be stopped and original configuration easily restored. If any such abnormal thing occurs a **Relocation Failure** may be sent instead of any message numbered 3~~-11~~-13 described.

7.13 HO & Cell Reselection between UTRAN and GSM/BSS

This subclause presents some examples of handover procedure from UTRAN to GSM/BSS and vice versa.

The case of a UTRAN connected to UMTS CN connected to a 2G-MSC (i.e. via MAP/E interface) is shown. The case of an UTRAN connected a GSM CN trough an IWF (where RANAP is interworked with BSSMAP) is not shown, because is equivalent from the point of view of the UTRAN.

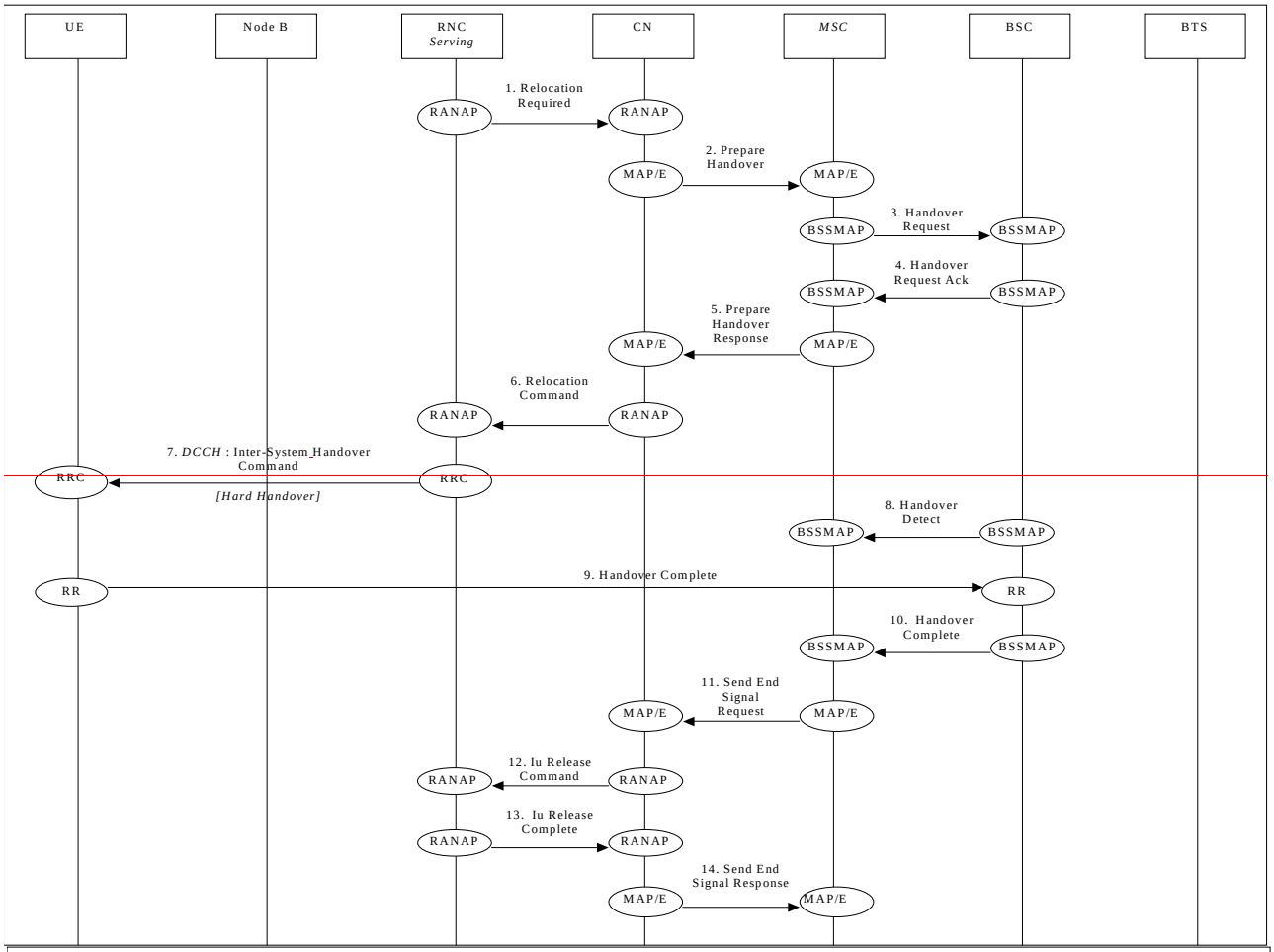
The case of HO between UTRAN and GPRS and vice versa is also considered.

7.13.1 UTRAN ⇒ GSM/BSS

7.13.1.1 UTRAN ⇒ GSM/BSS

This example shows how handover (Hard Handover) is performed from UTRAN to GSM/BSS between a UMTS CN and a 2G-MSC.

NOTE: Procedures between CN and MSC, and between MSC and BSC are out of the scope of WG3, and are only included for clarity.


UE
Node B
RNC
Serving
CN
MSC
BSC
BTS
RANAP
1. Relocation Required
2. Prepare Handover
MAP/E
BSSMAP
3. Handover Request
4. Handover Request Ack
5. Prepare Handover Response
6. Relocation Command
7. DCCH : Inter-System Handover Command
RRC
[Hard Handover]
8. Handover Detect
9. Handover Complete
RR
10. Handover Complete
11. Send End Signal Request
12. Iu Release Command
13. Iu Release Complete
14. Send End Signal Response

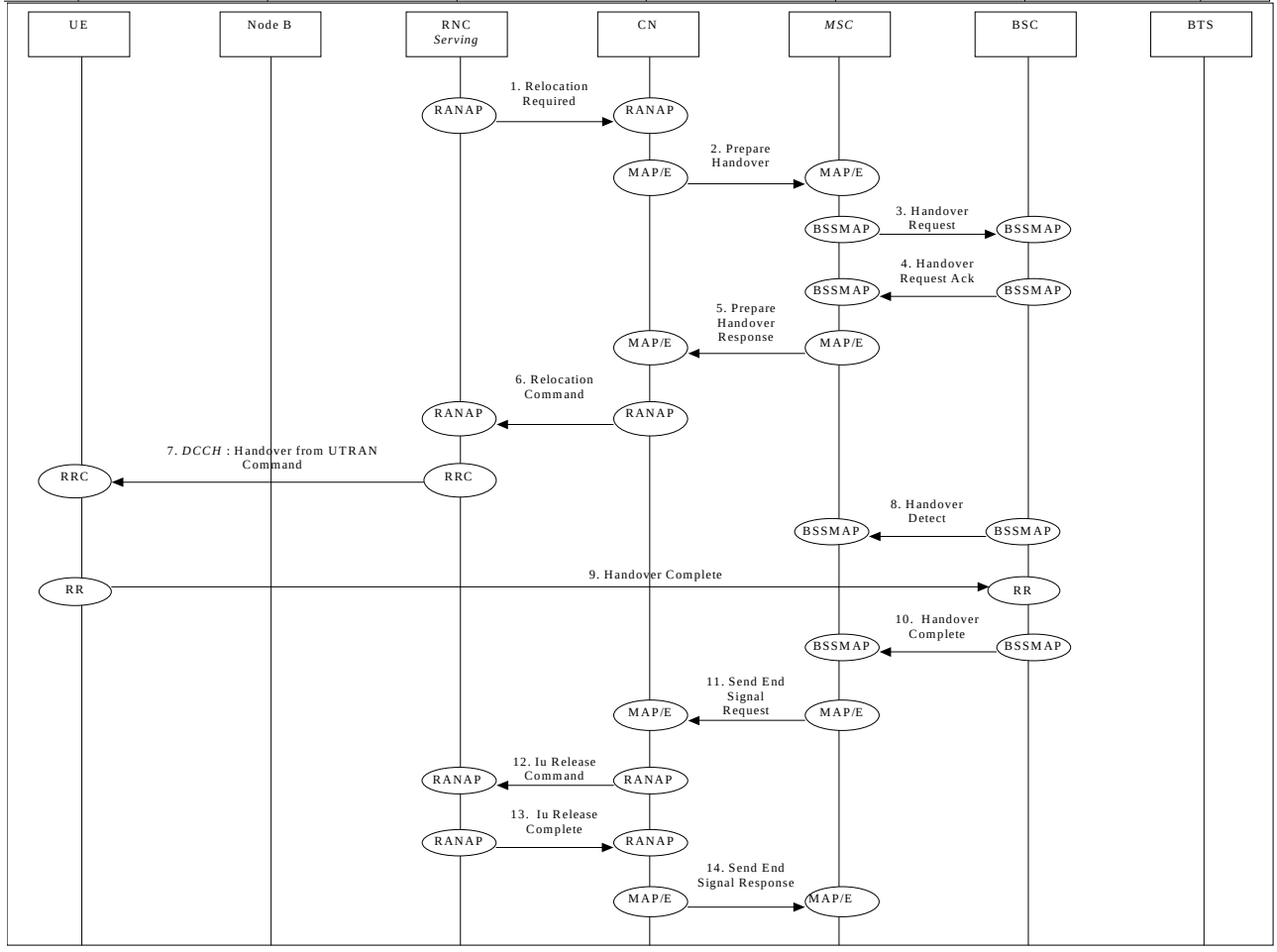

UE
Node B
RNC
Serving
CN
MSC
BSC
BTS
RANAP
1. Relocation Required
2. Prepare Handover
MAP/E
BSSMAP
3. Handover Request
4. Handover Request Ack
5. Prepare Handover Response
6. Relocation Command
7. DCCH : Handover from UTRAN Command
RRC
8. Handover Detect
9. Handover Complete
RR
10. Handover Complete
11. Send End Signal Request
12. Iu Release Command
13. Iu Release Complete
14. Send End Signal Response

Figure 36: UTRAN ⇒ GSM/BSS handover

1. Upon detection of a trigger SRNC sends RANAP message **Relocation Required** to the CN.
2. The UMTS CN will forward this request to the GSM MSC (indicated in the received message) over the MAP/E interface (MAP message **Prepare Handover**).

Steps 3 & 4 follow the normal GSM procedures and are shown only for clarity.

5. Once initial procedures are complete in GSM MSC/BSS the MSC returns MAP/E message **Prepare Handover Response**.
6. CN responds to the initial request from SRNC by sending RANAP message **Relocation Command** to the SRNC.
7. Via existing RRC connection, SRNC sends RRC message ~~Inter System Handover Command (Hard Handover)~~Handover from UTRAN command to the UE. One or several message from the other system can be included in this message.
   ~~Parameters: Handover type.~~

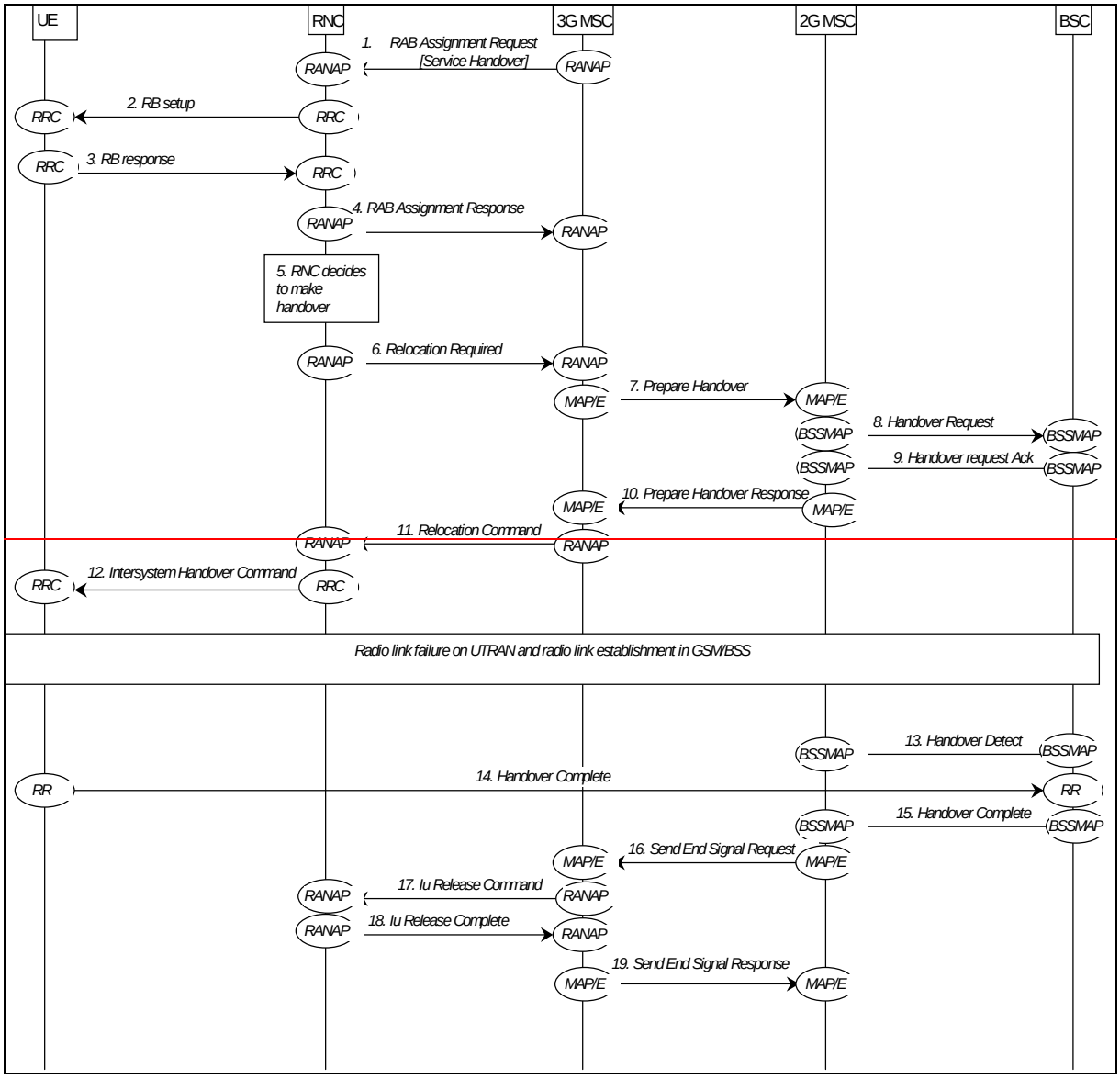
Procedures related to synchronisation etc. to GSM BSS are not shown.

Steps 8 & 10 follow normal GSM procedures and are shown only for clarity.

11. Detection of the UE within the GSM coverage results in the MSC sending MAP/E message **Send End Signal Request** to the CN.
12. CN initiates release of resources allocated by the former SRNC (**Iu Release Command**).
13. Previously allocated bearer resources are released within UMTS (e.g. using RANAP and ALCAP protocols [ALCAP not shown]) (Iu Release Complete).
14. Procedure is concluded from UMTS point of view by CN sending MAP/E message Send End Signal Response (this message is not sent until the end of the call).

7.13.1.2 Service Based Intersystem Handover

If the *Service Handover* IE is included in the RAB ASSIGNMENT REQUEST message, the service based intersystem handover from UMTS to GSM can be performed. The following example shows the signalling flow.


UE
RNC
3G MSC
2G MSC
BSC
1. RAB Assignment Request [Service Handover]
RANAP
2. RB setup
RRC
3. RB response
4. RAB Assignment Response
5. RNC decides to make handover
6. Relocation Required
7. Prepare Handover
MAP/E
BSSMAP
8. Handover Request
9. Handover request Ack
10. Prepare Handover Response
11. Relocation Command
12. Intersystem Handover Command
Radio link failure on UTRAN and radio link establishment in GSM/BSS
13. Handover Detect
RR
14. Handover Complete
15. Handover Complete
16. Send End Signal Request
17. Iu Release Command
18. Iu Release Complete
19. Send End Signal Response

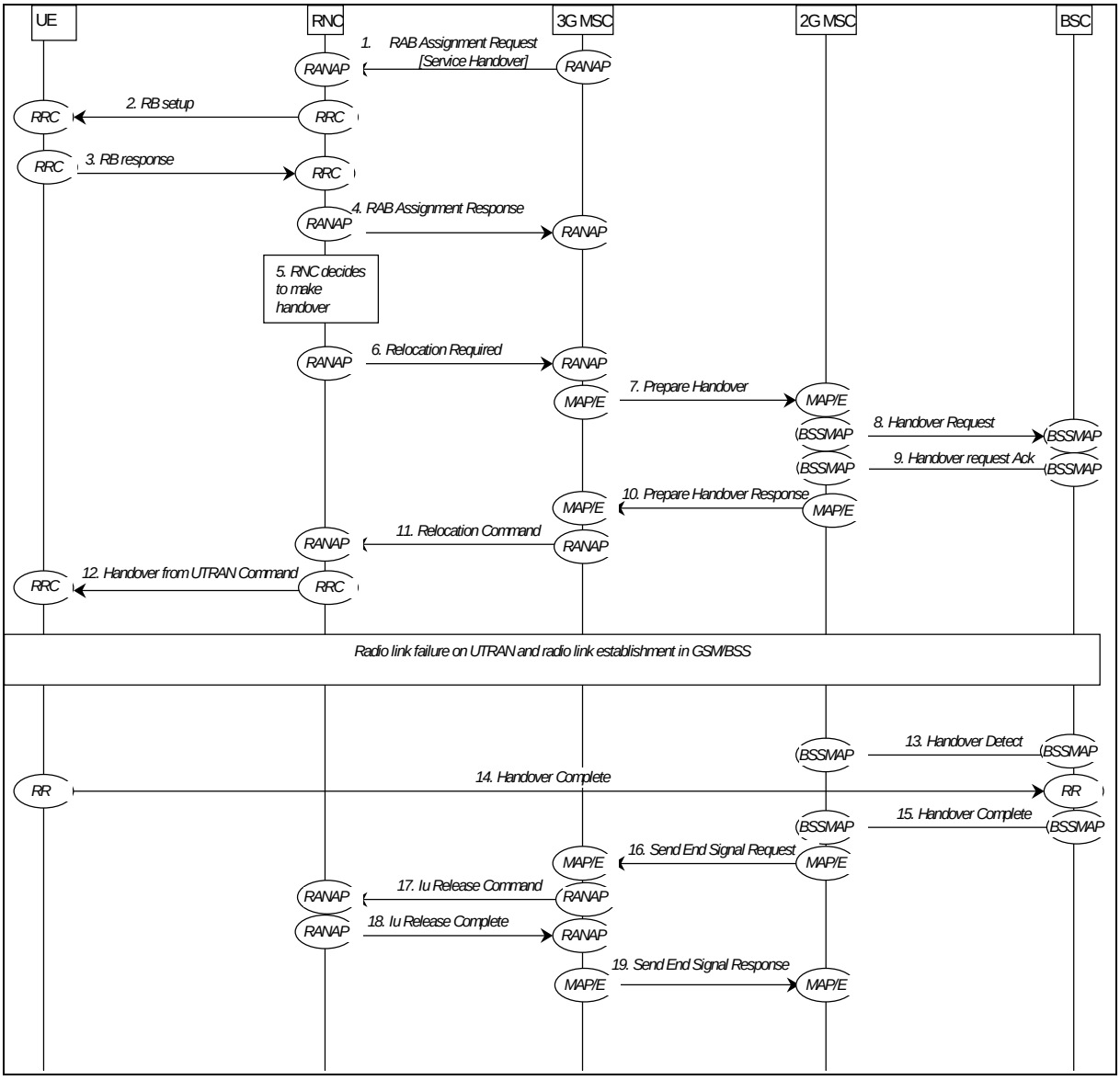


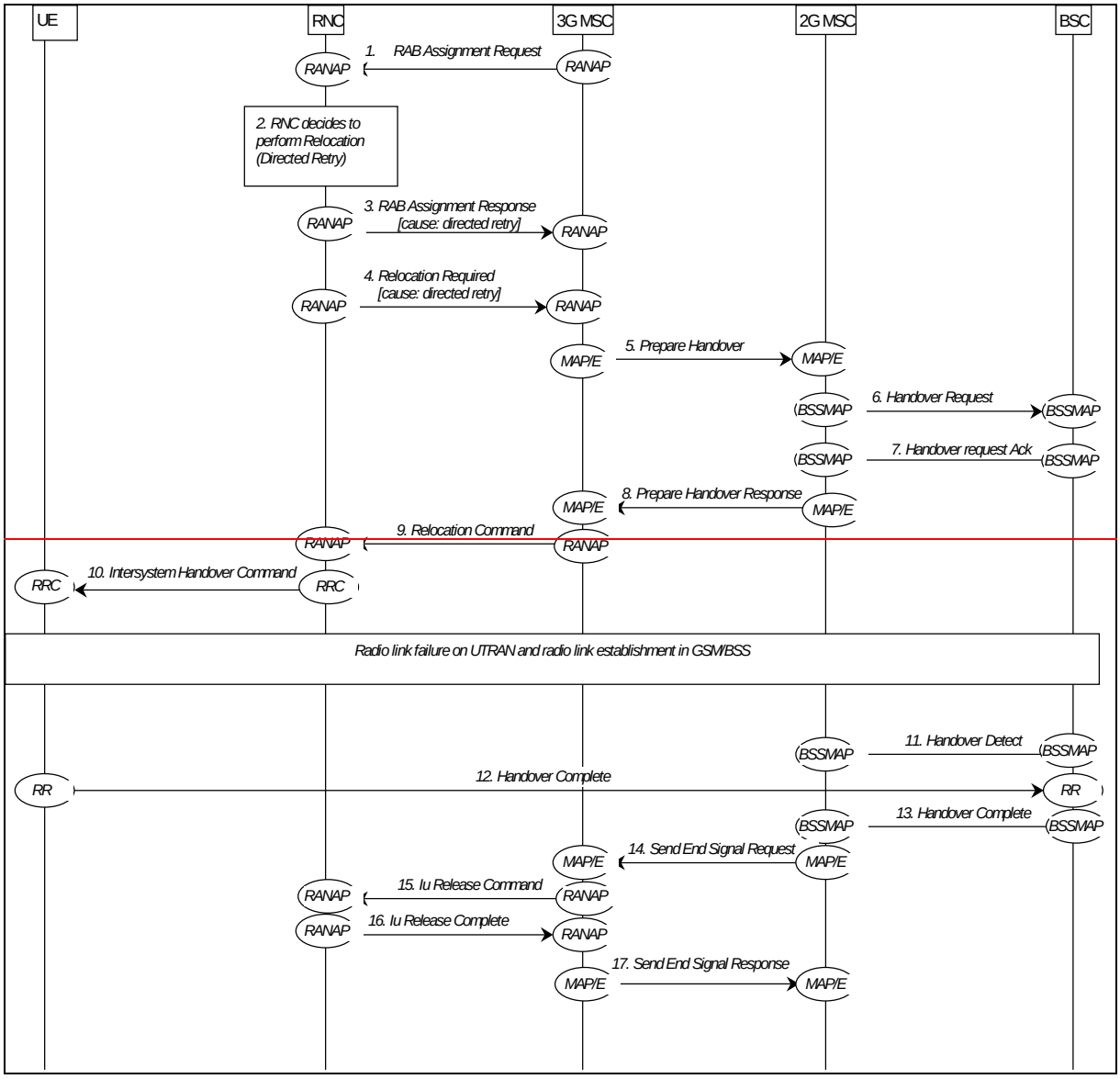
Figure 36a: Service based UTRAN to GSM/BSS Intersystem Handover

1. CN initiates establishment of the radio access bearer with RANAP message **Radio Access Bearer Assignment Request**.
   Parameters: Service Handover.
2 RRC message **Radio Bearer Setup** is sent by RNC to UE.
3 UE sends RRC message **Radio Bearer Setup Complete** to RNC.
4 RNC sends RANAP message **Radio Access Bearer Assignment Response** to CN.
5 Being based on the value assumed from *Service Handover* IE, the RNC decides to perform handover towards GSM.
6 RNC sends RANAP message **Relocation Required** to the CN.

Steps 7 to 19 are the same as 2 to 14 in subsection 7.13.1.1.

7.13.1.3 Directed Retry

Directed retry could be used to avoid the assignment phase, allowing direct assignment of resources on GSM system by CN. The following figure shows the signalling flow.


UE
RNC
3G MSC
2G MSC
BSC
RANAP
1. RAB Assignment Request
2. RNC decides to perform Relocation (Directed Retry)
3. RAB Assignment Response [cause: directed retry]
4. Relocation Required [cause: directed retry]
MAP/E
5. Prepare Handover
BSSMAP
6. Handover Request
7. Handover request Ack
8. Prepare Handover Response
9. Relocation Command
RRC
10. Intersystem Handover Command
Radio link failure on UTRAN and radio link establishment in GSM/BSS
11. Handover Detect
RR
12. Handover Complete
13. Handover Complete
14. Send End Signal Request
15. Iu Release Command
16. Iu Release Complete
17. Send End Signal Response

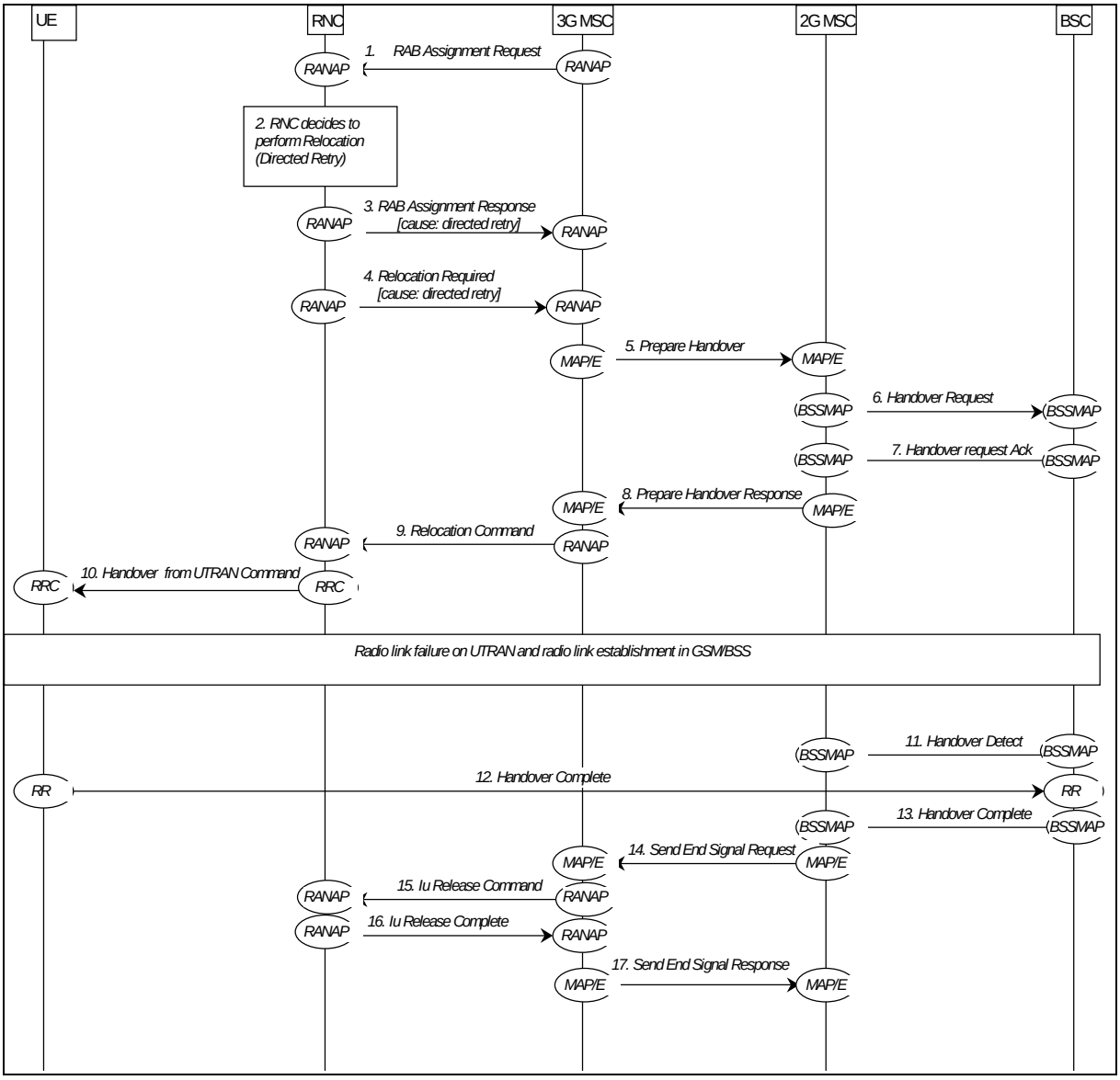


Figure 36b: Directed Retry

1. CN initiates establishment of the radio access bearer with RANAP message **Radio Access Bearer Assignment Request**.
2. RNC decides to perform relocated avoiding the Radio Bearer Setup phase.
3. RNC sends RANAP message **Radio Access Bearer Assignment Response** to CN with the RAB ID included in the list of RABs failed to setup and a cause value of "Directed Retry".
4. RNC sends RANAP message **Relocation Required** with cause value "Directed Retry".

Steps 5 to 17 are the same as 2 to 14 in subsection 7.13.1.1.

7.13.2 GSM/BSS ⇒ UTRAN

This example shows how handover (Hard Handover) is performed from GSM/BSS to UMTS between a UMTS CN and a 2G-MSC.

NOTE: Procedures between CN and MSC, and between MSC and BSC are out of the scope of WG3, and are only included for clarity.

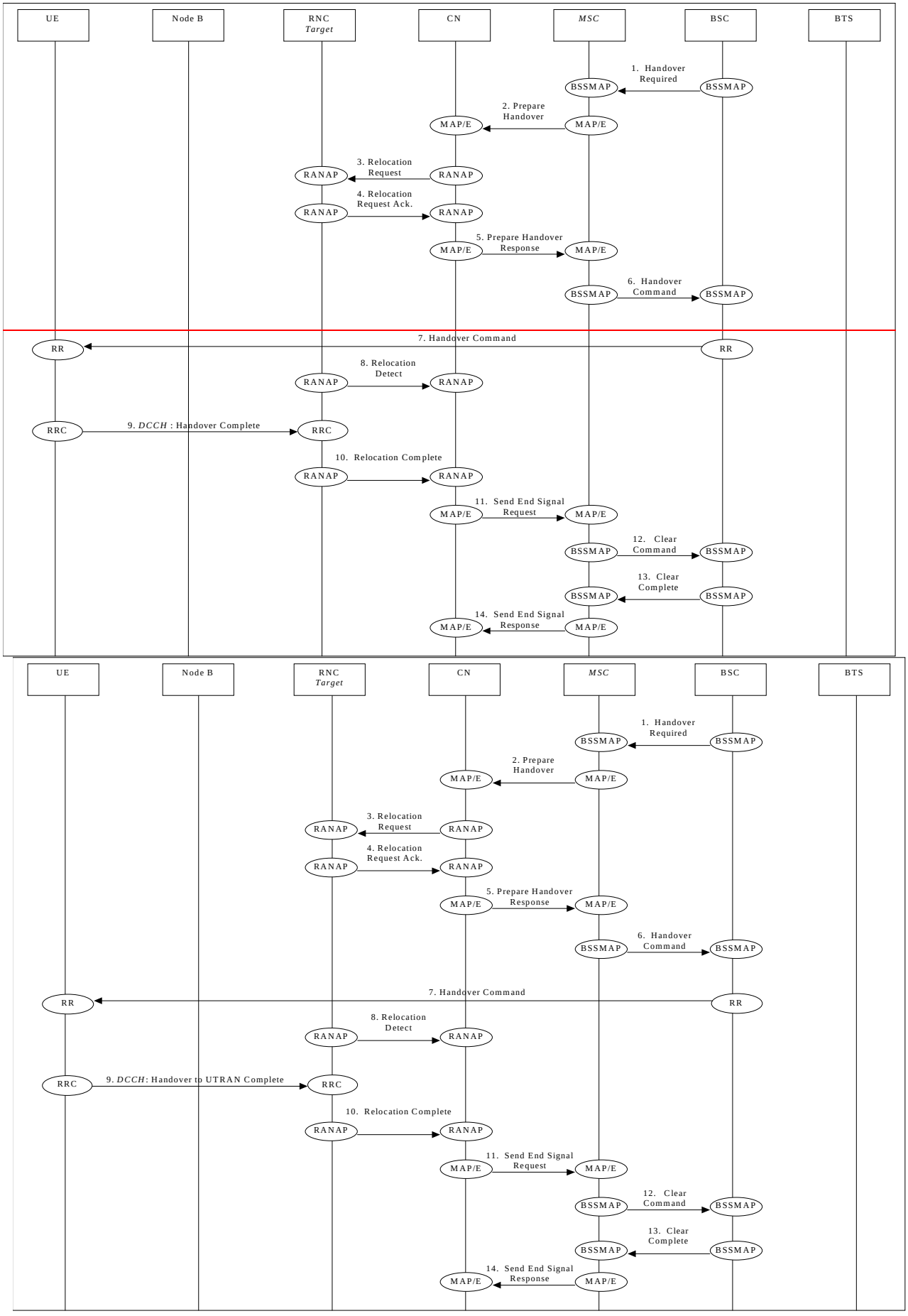


Figure 37: GSM/BSS ⇒ UTRAN handover

1. The BSC sends **Handover Required** message to the GSM MSC.

2. The MSC sends MAP/E message **Prepare Handover** to the UMTS CN.
3. The CN sends RANAP message **Relocation Request** to the Target RNC.
4. Response **Relocation Request Acknowledge** is returned to the CN by the target RNC via RANAP.
5. MAP/E message **Prepare Handover Response** is sent by the UMTS CN to the MSC.

Steps 6 & 7 follow normal GSM procedures and are shown only for clarity.

8. When target RNC has detected the UE, **Relocation Detect** message is sent to the CN node.
9. When the RRC connection is established with the target RNC and necessary radio resources have been allocated the UE sends RRC message ~~**Handover complete**~~ **Handover to UTRAN Complete** to the target RNC.
10. Once complete the target RNC sends RANAP message **Relocation Complete** to the CN.
11. CN sends MAP/E message **Send End Signal Request** to the MSC.
12. The MSC sends **Clear Command** message to the BSC.
13. The BSC responds with **Clear Complete** message to the GSM
15. The MSC sends MAP/E message **Send End Signal Response** to the UMTS CN to conclude the procedure (this message is not sent until the end of the call).

7.13.3 GPRS ⇒ UMTS Cell Reselection

This subclause shows UTRAN signalling procedures for GPRS to UTRAN Cell Reselection.

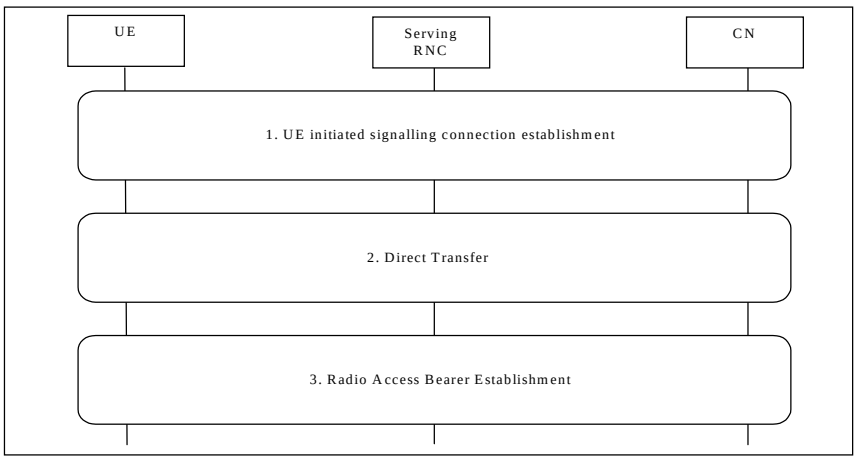


Figure 38

1. The UE selects a UTRAN cell, reads system information, and initiates establishment of a NAS signalling connection.
   See section UE Initiated Signalling Connection Establishment.
2. The NAS signalling connection between UE and CN can now be used for NAS message transfer (e.g. execution of security functions).
   See section Direct Transfer.
3. After necessary CN-GPRS preparations (e.g. UE context information retrieval), CN initiates establishment of radio access bearer(s).
   See section Radio Access Bearer Establishment.

7.13.4 UMTS ⇒ GPRS Cell Reselection, UE Initiated

This subclause shows UTRAN signalling procedures for UTRAN to GPRS cell reselection initiated by UE..

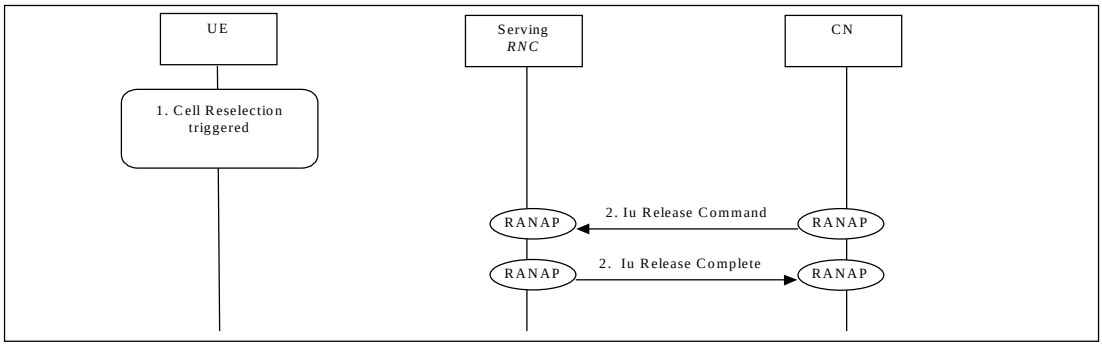


Figure: 39

1. The UE selects a GPRS cell, reads system information, and initiates establishment of UE-GPRS connection.
2. After necessary CN-GPRS preparations (e.g. UE context information retrieval), CN initiates release of Iu connection. SRNC releases the RRC connection.

7.13.5 UMTS ⇒ GPRS Cell Reselection, Network Initiated

This subclause shows UTRAN signalling procedures for UTRAN to GPRS Cell Reselection triggered by Serving RNC.

NOTE: This case can only supported if the RNC could generate GSM messages.

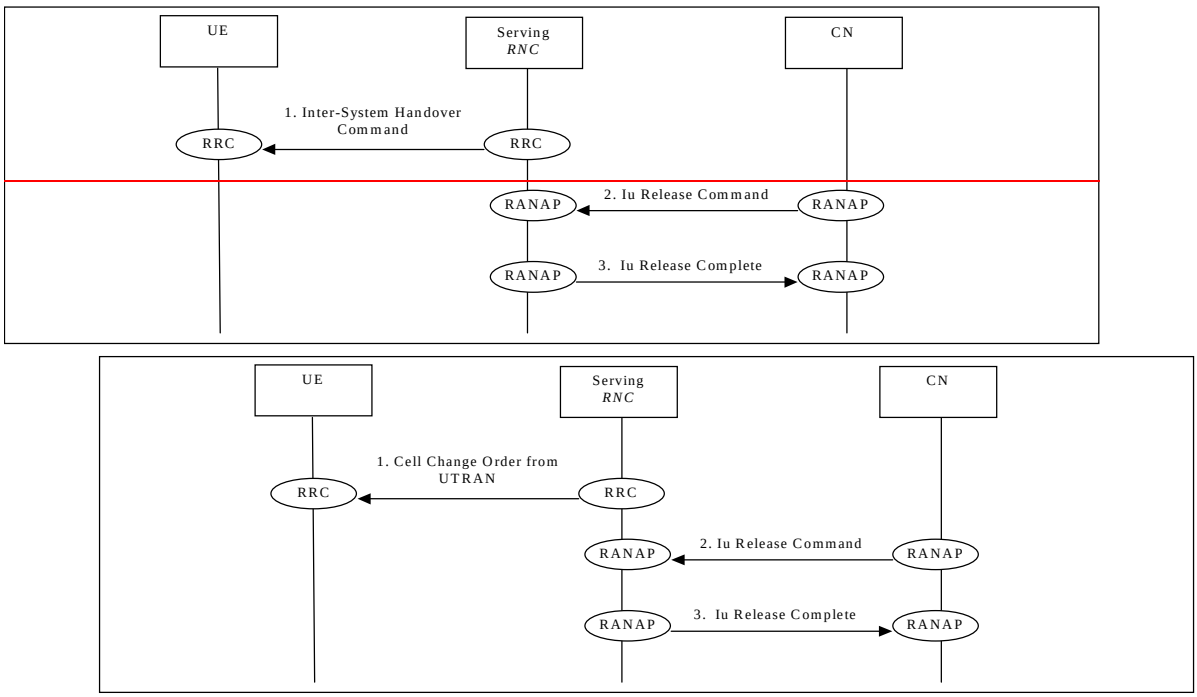


Figure 40: UTRAN to GPRS Cell Reselection

1. Based on UE measurements, SRNC triggers the handover to a GPRS cell by sending a ~~Inter System Handover Command~~Cell Change order from UTRAN to the UE. The UE initiates establishment of UE-GPRS connection.
2. After necessary CN-GPRS preparations (e.g. UE context information retrieval), CN initiates release of the RRC connection.
3. SRNC releases all resources reserved for the UE.