TSG-RAN Meeting #9 *RP-000354*
Oahu, HI, USA, 20 – 22 September 2000

Title: **Agreed CRs to TS 25.303**

Source: **TSG-RAN WG2**

Agenda item: **5.2.3**

Doc-1st-	Status-	Spec	CR	Rev	Subject	Cat	Version	Versio
R2-001774	agreed	25.303	035	2	SRNS relocation	F	3.4.0	3.5.0
R2-001611	agreed	25.303	037		Variable Rate Transmission	F	3.4.0	3.5.0

3GPP RAN WG2#15
Sophia Antipolis, France, 21 – 25 August, 2000

Document R2-001774
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25.303	CR	035r2	Current Version:	3.4.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-RAN #9	for approval	X	strategic		(for SMG use only)
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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME	X	UTRAN / Radio	X	Core Network	

Source: TSG-RAN WG2 **Date:** 2000-08-21

Subject: SRNS relocation

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:

A description of the SRNS relocation procedure is given for:

- Combined Hard Handover and SRNS relocation
- Combined Cell/URA Update and SRNS relocation
- Serving SRNS relocation

with details of the interaction between layer 2 (PDCP, RLC) and higher layers, and the handling of the PDCP sequence numbers.

Clauses affected: 2, 6.4.7a (new), 6.4.7b (new)

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3G TS 25.321: "MAC Protocol Specification".

[2] 3G TS 25.322: "RLC Protocol Specification".

[3] 3G TS 25.331: "RRC Protocol Specification".

[4] 3G TS 25.304: "UE Procedures in Idle Mode and Procedures for Cell Reselection in Connected Mode".

[5] 3G TS 25.301: "Radio Interface Protocol Architecture".

[6] 3G TS 23.060: "General Packet Radio Service (GPRS) Service description; Stage 2"

[7] 3G TS 25.323: "PDCP Protocol Specification".

6.4.7a SRNS Relocation

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

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

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

and these are described in subclause 6.4.7a.1 and 6.4.7a.2, and in more detail in TS 23.060 [6].

6.4.7a.1 Serving and Combined Cell/URA Update SRNS relocation

The procedure is initiated by the source RNC deciding to perform a Serving SRNS relocation. Case I represents the situation when the UE is not involved and this is shown in Figure x. Case II represents the situation when the UE is involved and a Combined Cell/URA update and SRNS relocation is performed, also shown in Figure x.

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

For the affected radio bearers, t~~T~~he RLC entity is suspended and the PDCP sequence numbers are retrieved by RRC. The PDCP send and receive sequence numbers are then transferred in the RNSAP Relocation Commit message from source to target RNC for RABs that support lossless SRNS relocation. ~~Once the forwarding of data has been completed in the source RNC, t~~The target RNC becomes the serving RNC when the ~~(~~RANAP Relocation Detect~~) and the source RNC resources are released~~ message is sent.

The target RNC then sends a RNTI REALLOCATION (Case I) or a CELL/URA UPDATE CONFIRM (Case II); which configures the UE with the new U-RNTI and indicates the uplink receive PDCP sequence number for each radio bearer configured to support lossless SRNS relocation. The UE compares the uplink receive PDCP sequence number with the UE uplink send PDCP sequence number. If this confirms PDCP SDUs successfully transferred before the start of relocation ie already received by the source RNC then these are discarded by the UE.

If the UE has successfully configured itself, it shall send; a RNTI REALLOCATION COMPLETE (Case I and Case II) ~~or CELL/URA UPDATE CONFIRM (Case II)~~. These messages contain the downlink receive PDCP sequence number for each radio bearer configured to support lossless SRNS relocation. UTRAN compares the downlink receive PDCP sequence number with the downlink send PDCP sequence number~~. If this confirms PDCP SDUs successfully transferred before the start of relocation ie already received by the UE then these are discarded by the UTRAN.~~ For the affected radio bearers, ~~T~~~~the UE resets all PDCP sequence number variables to zero and t~~The RLC entity is re-established [2] with the current configuration.

In case of failure; the UE shall send a RNTI REALLOCATION FAILURE (Case I) or CELL/URA UPDATE FAILURE (Case II) message. ~~The UE resets all PDCP sequence number variables to zero.~~

Upon reception of the RNTI REALLOCATION COMPLETE/FAILURE (Case I and Case II) or CELL/URA UPDATE COMPLETE/FAILURE (Case II) message, UTRAN shall ~~reset all PDCP sequence number variables to zero,~~ start the PDCP entity~~,~~ and the relocation procedure ends.

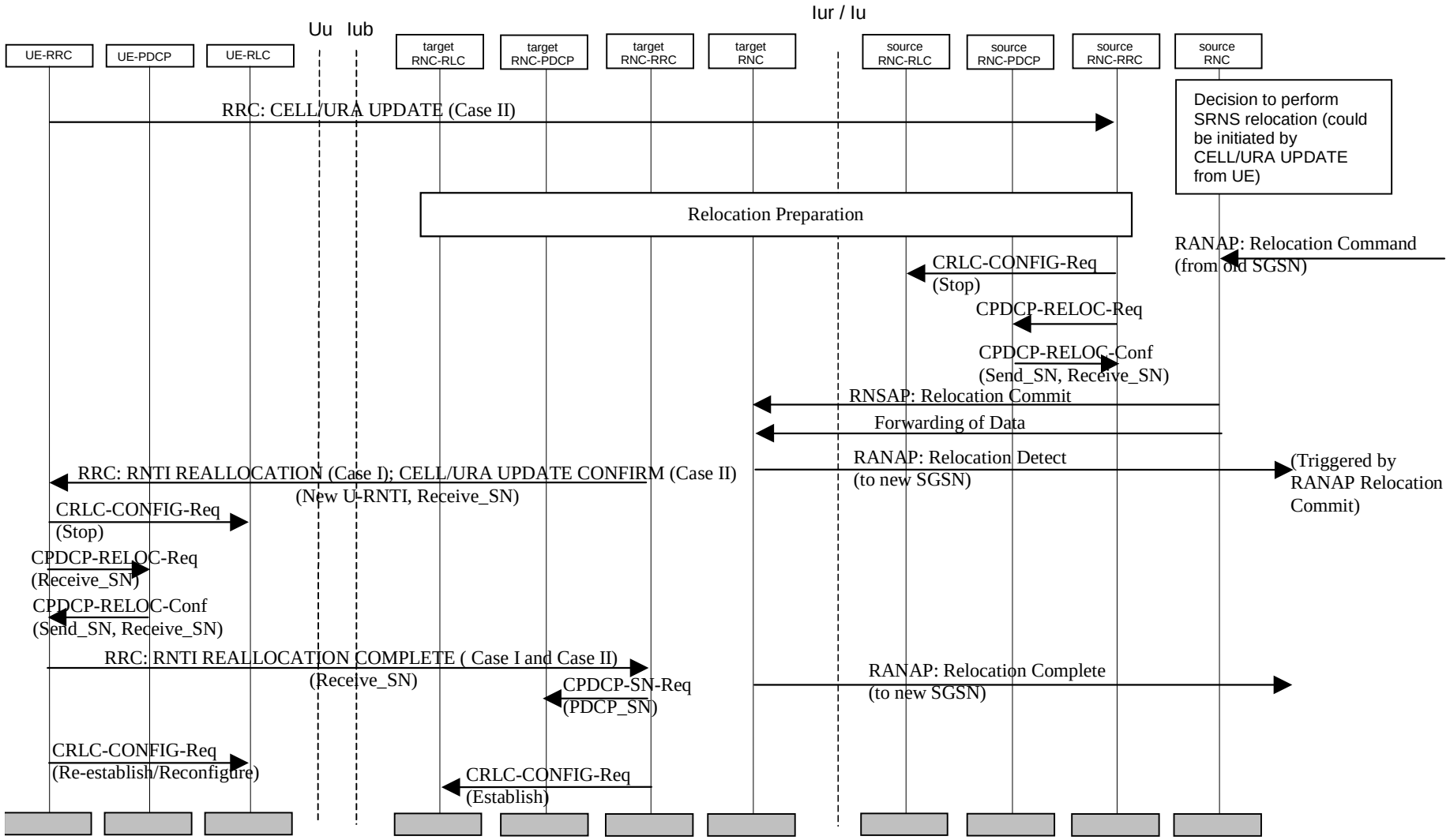

Figure x, Serving and Combined Cell/URA Update SRNS relocation

6.4.7a.2 Combined Hard Handover and SRNS relocation

Based on measurement results and knowledge of the UTRAN topology, the source SRNC decides to initiate a combined hard handover and SRNS relocation. The UE is still under control of the SRNC but is moving to a location controlled by the target RNC.

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

The Target SNC to Source RNC Transparent Container includes the RRC message (XXX) for hard handover. Upon reception of the RANAP Relocation Command, the source RNC triggers the execution of the relocation of SRNS by sending message XXX to the ~~MS~~UE. This message includes the new U-RNTI and the uplink receive PDCP sequence number for each radio bearer configured to support lossless SRNS relocation. The UE compares the uplink receive PDCP sequence number with the uplink send PDCP sequence number. If this confirms PDCP SDUs successfully transferred before the start of relocation ie already received by the source RNC then these are discarded by the UE.

For the affected radio bearers, t~~T~~he RLC entity is suspended and the PDCP sequence numbers are retrieved by RRC. The PDCP send and receive sequence numbers are then transferred during the forwarding of SRNS contexts via the CN phase from source to target RNC for RABs that support lossless SRNS relocation. ~~Once the forwarding of data has been completed in the source RNC, t~~The target RNC becomes the Serving RN~~S~~C ~~becomes the target RNC (~~when the RANAP Relocation Detect~~)~~ message is sent. ~~and the source RNC resources are released.~~

If the UE has successfully configured itself, it shall send a XXX COMPLETE message to the target RNC. This message contains the downlink receive PDCP sequence number for each radio bearer configured to support lossless SRNS relocation. UTRAN compares the downlink receive PDCP sequence number with the downlink send PDCP sequence number. ~~If this confirms PDCP SDUs successfully transferred before the start of relocation ie already received by the UE then these are discarded by the UTRAN.~~ For the affected radio bearers,~~T the UE resets all PDCP sequence number variables to zero and~~ the RLC entity is re-established [2] with the current configuration.

In case of failure, the UE shall send a XXX FAILURE message to the target RNC. ~~The UE resets all PDCP sequence number variables to zero.~~

Upon reception of the XXX COMPLETE/FAILURE, UTRAN shall ~~reset all PDCP sequence number variables to zero,~~ start the PDCP entity ~~,~~ and the ~~procedure ends~~relocation procedure ends.

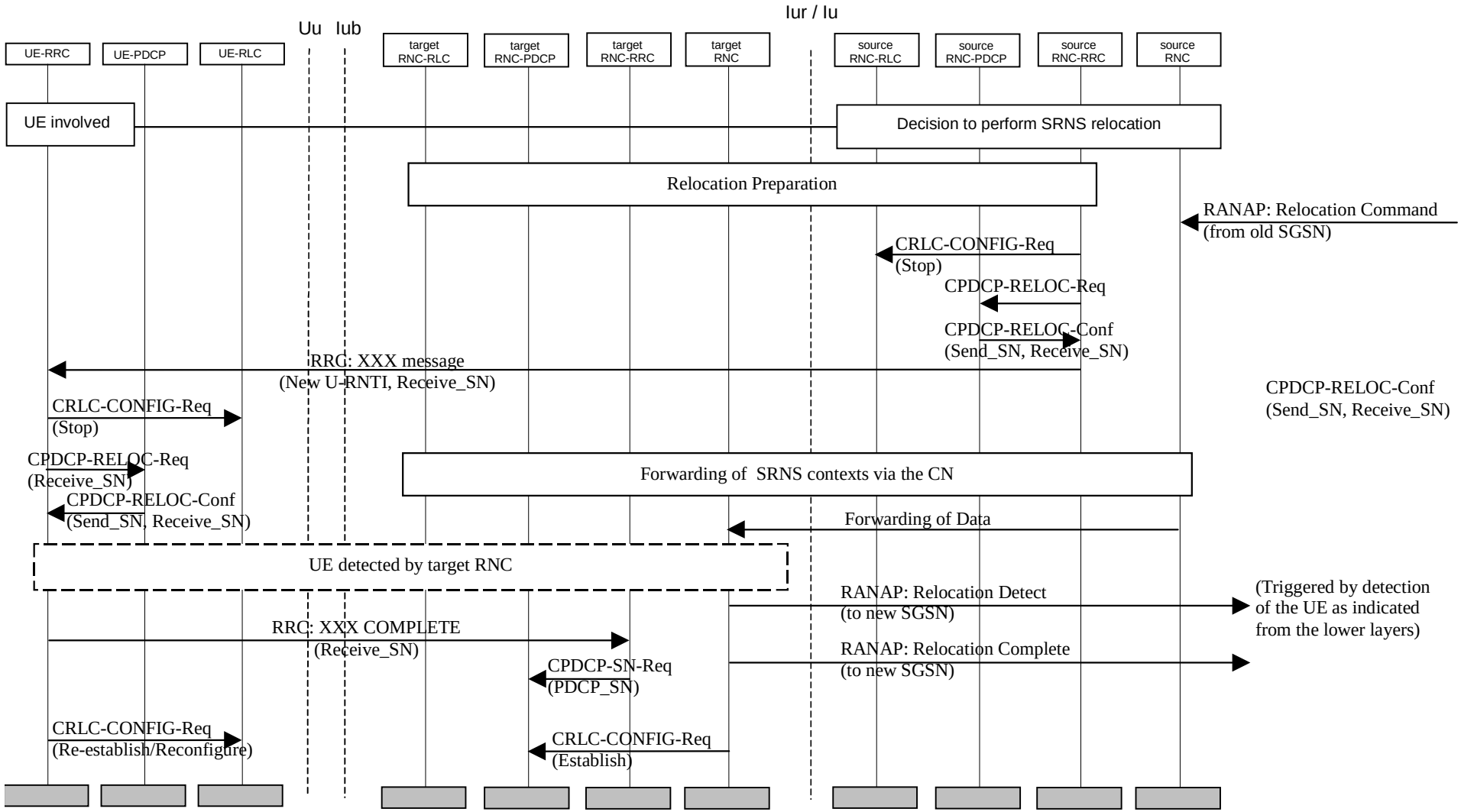

Figure y, Combined Hard Handover and SRNS relocation

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Sophia Antipolis, 21 - 25 August 2000

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25.303	CR	037	Current Version:	3.4.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]

Source: TSG-RAN WG2 **Date:** 09/08/00

Subject: Variable Rate Transmission

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	[X]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change:

- Correction to section 4, because data rate is not only reduced but can also be increased after a previous reduction.

- Description of variable rate packet transmission is changed to avoid references to certain services. Since RLC discard function (25.322) has been extended and is now usable for all RLC modes the procedure is not limited anymore to non-real time services.

- RLC/MAC interaction has been clarified in 25.322

Clauses affected: 4, 6.2.6

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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4 General Description of Connected Mode

The connected mode is entered when the RRC connection is established. The UE is assigned a radio network temporary identity (RNTI) to be used as UE identity on common transport channels. Two types of RNTI exist. The Serving RNC allocates an s-RNTI for all UEs having an RRC connection. The combination of s-RNTI and an RNC-ID is unique within a PLMN. c-RNTI is allocated by each Controlling RNC through which UE is able to communicate on DCCH. c-RNTI is always allocated by UTRAN when a new UE context is created to an RNC, but the UE needs its c-RNTI only for communicating on common transport channels.

The UE leaves the connected mode and returns to idle mode when the RRC connection is released or at RRC connection failure.

Within connected mode the level of UE connection to UTRAN is determined by the quality of service requirements of the active radio bearers and the characteristics of the traffic on those bearers.

The UE-UTRAN interface is designed to support a large number of UEs using packet data services by providing flexible means to utilize statistical multiplexing. Due to limitations, such as air interface capacity, UE power consumption and network h/w availability, the dedicated resources cannot be allocated to all of the packet service users at all times.

Variable rate ~~packet~~ transmission provides the means that for ~~packet service user~~services of variable rate the data rate is ~~reduced when the~~adapted according to the maximum allowable output power ~~is reached~~.

The UE state in the connected mode defines the level of activity associated to the UE. The key parameters of each state are the required activity and resources within the state and the required signalling prior to the data transmission. The state of the UE shall at least be dependent on the application requirement and the period of inactivity.

Common Packet Channel (CPCH) uplink resources are available to UE's with an access protocol similar to the RACH. The CPCH resources support uplink packet communication for numerous UEs with a set of shared, contention-based CPCH channels allocated to the cell.

Packet Services can be supported also using the FAUSCH, by means of which a dedicated transport channel can be allocated for data transmission.

The different levels of UE connection to UTRAN are listed below:

- No signalling connection exists
  The UE is in idle mode and has no relation to UTRAN, only to CN. For data transfer, a signalling connection has to be established.

- Signalling connection exists
  When at least one signalling connection exists, the UE is in connected mode and there is normally an RRC connection between UE and UTRAN. The UE position can be known on different levels:

  - UTRAN Registration Area (URA) level
    The UE position is known on URA level. The URA is a set of cells

  - Cell level
    The UE position is known on cell level. Different transport channel types can be used for data transfer:

  - Common transport channels (RACH / FACH, DSCH, CPCH)

  - Dedicated transport channels (DCH) (FAUSCH can be used to allocate a dedicated transport channel for data transmission.)

Assuming that there exists an RRC connection, there are two basic families of RRC connection mobility procedures, URA updating and handover. Different families of RRC connection mobility procedures are used in different levels of UE connection (cell level and URA level):

- URA updating is a family of procedures that updates the UTRAN registration area of a UE when an RRC connection exists and the position of the UE is known on URA level in the UTRAN;

- handover is a family of procedures that adds or removes one or several radio links between one UE and UTRAN when an RRC connection exists and the position of the UE is known on cell level in the UTRAN.

6.2.6 Variable Rate ~~Packet~~ Transmission of Uplink DCHs

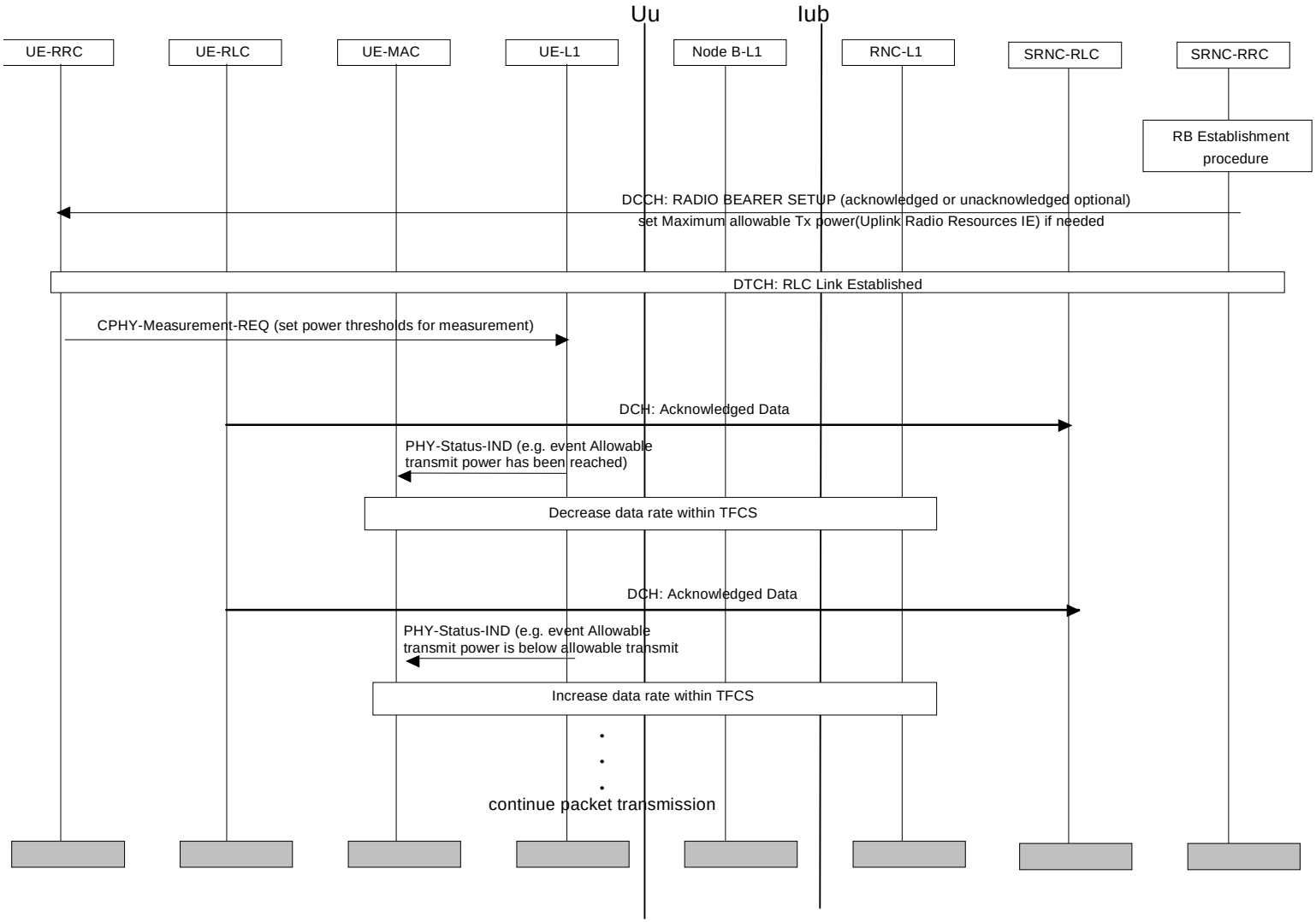

Figure 19: Variable Rate ~~Packet~~ Transmission of Uplink DCHs

Figure 19 illustrates an example of the Variable Rate ~~Packet~~ Transmission procedure of uplink DCHs. With this procedure the QoS of ~~high rate NRT~~ service~~s~~ ~~user~~with variable rate can be maintained and unnecessary interference can be avoided by a temporary reduction of the data rate within the TFCS.

When a connection for a ~~packet~~ variable rate service is established the RRC assigns the TFCS to MAC. At the radio bearer set-up procedure the maximum allowable Tx power can also be set for each ~~packet~~ user if it shall be different from the UE capability class.

With the CPHY-Measurement-REQ the power thresholds will be set to the UE. If during a ~~packet~~ transmission the allowable transmit power is above the set threshold the event will be signalled to the MAC that will decrease the data rate within the set TFCS at the next transmission time interval. In the UE, the PDUs that can not be transmitted in a TTI (i.e. MAC has indicated that some of the available PDUs can not be transmitted) shall be buffered according to the discard configuration set by RRC.

When channel conditions improve and the averaged transmission power falls below the allowable transmission power the physical layer indicates this event to the MAC. If there is enough data to be sent~~d~~ ~~T~~the MAC in response increases the data rate by increasing the number of transport blocks delivered to L1 and the physical layer increases the total transmission power to the UE by the predefined amount. This allows the data that was buffered during bad channel conditions to be delivered to the UTRAN.