

Agenda Item: 14.1

Source: Ericsson

Title: **Specification of RRC procedure: RRC connection establishment**

Document for: Decision

1 Introduction

Two companion contributions propose a new set of RRC states [2] and principles for how RRC procedures shall be specified using text [1].

This contribution contains a proposal for specification of the RRC connection establishment procedure using those states and principles.

2 Text for RRC protocol specification

2.1 RRC connection establishment procedure

2.1.1 Purpose

The purpose with this procedure is to establish an RRC connection.

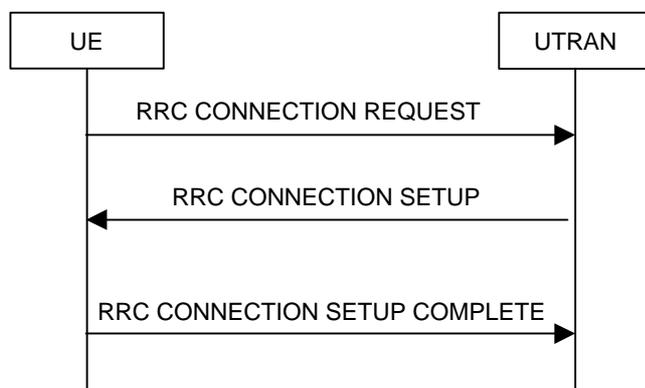


Figure 1. RRC Connection Establishment, network accepts RRC connection

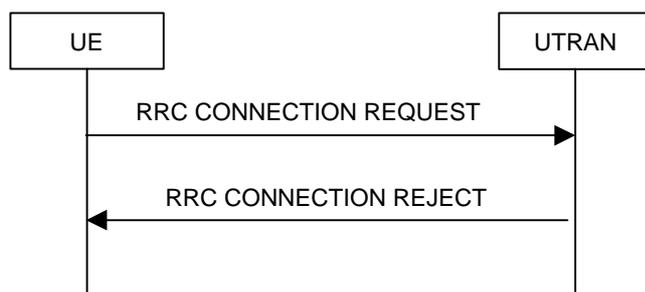


Figure 2. RRC Connection Establishment, network rejects RRC connection

2.1.2 Initiation

The non-access stratum in the UE may request establishment of an RRC connection.

The UE shall transmit an RRC CONNECTION REQUEST message on the uplink CCCH, reset counter V300, and start timer T300.

2.1.2.1 Message RRC CONNECTION REQUEST contents to set

The UE may set the IE “Establishment cause” according to indications from the non-access stratum.

The UE shall set the IE “Initial UE identity” according to subclause 2.4.

The UE shall indicate its capability in the IE “Initial UE capability”.

The UE shall include an intra-frequency measurement report, as instructed to do so in the system information.

2.1.3 Reception of RRC CONNECTION REQUEST by the UTRAN

UTRAN shall either

- start timer T350 and transmit an RRC CONNECTION SETUP on the downlink CCCH or
- transmit an RRC CONNECTION REJECT on the downlink CCCH. On the UTRAN side, the procedure ends and all context information for this UE may be deleted in UTRAN.

2.1.3.1 Message RRC CONNECTION SETUP contents to set

The IE “Initial UE identity” shall be set to the same value as in the received message RRC CONNECTION REQUEST.

[Editor’s note: Other IEs are included and set according to selection by the UTRAN.]

2.1.3.2 Message RRC CONNECTION REJECT contents to set

The IE “Initial UE identity” shall be set to the same value as in the received message RRC CONNECTION REQUEST.

2.1.4 Reception of RRC CONNECTION SETUP by the UE

The UE shall compare the value of the IE “Initial UE identity” in the received RRC CONNECTION SETUP message with the value of the IE “Initial UE identity” in the most recent RRC CONNECTION REQUEST message sent by the UE.

- If the values are identical, the UE shall stop timer T300, perform the actions according to 2.1.4.1 and transmit an RRC CONNECTION SETUP COMPLETE message on the uplink DCCH. When the RRC CONNECTION SETUP message has been successfully transmitted the procedure ends.
- If the values are different, the UE shall ignore the rest of the message

2.1.4.1 Message RRC CONNECTION SETUP contents to use

The UE shall

- store the values of the IEs “S-RNTI” and “SRNC identity” and
- initiate the signalling link parameters according to the IEs “Signalling link type” and “RAB multiplexing info”.

If the IE C-RNTI is included, the UE shall

- use that C-RNTI on common transport channels in the current cell.

If neither the IEs “PRACH info” nor “Uplink DPCH info” is included, the UE shall

- let the physical channel of type PRACH that is given in system information to be the default in uplink for RACH

If neither the IEs “Secondary CCPCH info” nor “Downlink DPCH info” is included, the UE shall

- start to receive the physical channel of type Secondary CCPCH that is given in system information to be used as default by FACH, and enter the CELL_FACH state.

Actions that shall be performed by the UE for other IEs are specified in subclause 2.5.

2.1.4.2 Message RRC CONNECTION SETUP COMPLETE contents to set

The UE shall include its capabilities in the RRC CONNECTION SETUP COMPLETE message, according to instructions in the system information.

2.1.5 Abnormal cases: DPCH failure or T300 timeout

- Upon expiry of timer T300, or
- if the UE failed to establish the DPCH(s) indicated in the message RRC CONNECTION SETUP

the UE shall check the value of V300, and

- if V300 is smaller or equal than N300, the UE shall transmit a new RRC CONNECTION REQUEST message on the uplink CCCH, restart timer T300 and increase counter V300. The UE shall set the IEs in the RRC CONNECTION REQUEST message according to subclause 2.1.2.1.
- If V300 is greater than N300, the UE shall enter idle mode. The procedure ends and a connection failure may be indicated to the non-access stratum. Other actions the UE shall perform when entering idle mode from connected mode are specified in subclause 2.2.

2.1.6 Reception of RRC CONNECTION REJECT by the UE

When the UE receives an RRC CONNECTION REJECT message on the downlink CCCH, it shall compare the value of the IE “Initial UE identity” in the received RRC CONNECTION SETUP message with the value of the IE “Initial UE identity” in the last RRC CONNECTION REQUEST message sent by the UE.

- If the values are identical, the UE shall stop timer T300 and perform the actions in subclause 2.1.6.1.
- If the values are different, the UE shall ignore the rest of the message

2.1.6.1 Message RRC CONNECTION REJECT contents to use

If the IE “wait time” is present, and

- if V300 is smaller or equal than N300, the UE shall wait at least the time stated in the IE “wait time”, transmit a new RRC CONNECTION REQUEST message on the uplink CCCH, restart timer T300 and increase counter V300. UE shall set the IEs in the RRC CONNECTION REQUEST message according to subclause 2.1.2.1.
- If V300 is greater than N300 the UE shall enter idle mode. The procedure ends and a connection failure may be indicated to the non-access stratum. Other actions the UE shall perform when entering idle mode from connected mode are specified in subclause 2.2.

If the IE “wait time” is not present the UE shall

- enter idle mode. The procedure ends and a connection failure may be indicated to the non-access stratum. Other actions the UE shall perform when entering idle mode from connected mode are specified in subclause 2.2.

2.1.7 Reception of RRC CONNECTION SETUP COMPLETE by the UTRAN

When UTRAN has received the RRC CONNECTION SETUP COMPLETE message, the procedure ends on the UTRAN side, and timer T350 shall be stopped.

2.1.8 Abnormal case: T350 timeout

Upon expiry of timer T350, the procedure ends on the UTRAN side, and all context information for this UE may be deleted in UTRAN.

2.2 Actions when entering idle mode from connected mode

FFS

2.3 Actions when entering CELL_DCH state

FFS

2.4 Selection of initial UE identity

FFS

2.5 Default actions for IEs

When any of the following IEs are received by the UE in any RRC message, the UE shall perform the actions specified below, unless specified otherwise.

[Editor's note: maybe the actions can be included under each IE in chapter 10 of 25.331.]

2.5.1 Transport Format Set

If the IEs “transport channel identity” and “Transport format set” is included, the UE shall

- store the transport format set for that transport channel.

2.5.2 Transport format combination set

If the IE “Transport format combination set” is included, the UE shall

- start to respect those transport format combinations.

2.5.3 Transport format combination subset

If the IE “Transport format combination subset” is included, the UE shall

- restrict the transport format combination set to that transport format combination subset. If the transport format combination subset indicates the “full transport format combination set” any restriction on transport format combination set is released and the UE may use the full transport format combination set.

2.5.4 Frequency info

If the IE “Frequency info” is included the UE shall

- Store that frequency as the active frequency and
- Tune to that frequency.

If the IE “Frequency info” is not included and the UE has a stored active frequency, the UE shall

- Continue to use the stored active frequency

If the IE “Frequency info” is not included and the UE has no stored active frequency, it shall

- map any used physical channels on the frequency given in system information as default

2.5.5 Activation time

If the IE “Activation time” is present, the UE shall

- activate the new configuration present in the same message as this IE at the indicated time.

[Editor's note: The new configuration is typically a dedicated physical channel present in the same message as the “Activation time” IE.]

2.5.6 PRACH info

If the IE “PRACH info” is included, the UE shall

- Release any active dedicated physical channels in the uplink and
- let the PRACH be the default in the uplink for RACH

2.5.7 Secondary CCPCH info

If the IE “Secondary CCPCH info” is included and the IE “PICH info” is not included, the UE shall

- Start to receive that Secondary CCPCH in the downlink and
- enter the CELL_FACH state if not already in that state.

2.5.8 Uplink DPCH info

If the IE “Uplink DPCH info” is included, the UE shall

- Release any active uplink physical channels, activate the given physical channels and
- enter the CELL_DCH state if not already in that state. Additional actions the UE shall perform when entering the CELL_DCH state from another state are specified in subclause 2.3.

2.5.9 Downlink DPCH info

If the IE “Downlink DPCH info” is included, the UE shall

- Activate the dedicated physical channels indicated by that IE

3 Proposal

It is proposed that the current description of the RRC procedure “RRC Connection Establishment” TS 25.331 is replaced by chapter 2.1 of this contribution. It is also proposed that the contents of chapter 2.2 of this contribution is inserted into chapter 10 (Messages and IEs) of TS 25.331.

4 References

- [1] TSGR2#6(99)809, Principles for specification of RRC procedures, source: Ericsson
- [2] TSGR2#6(99)807, RRC protocol states, source: Ericsson