

**Agenda Item:** 6.8

**Source:** Ericsson

**Title:** **Completion of the procedures for RRC connection establishment and reestablishment**

**Document for:** Decision

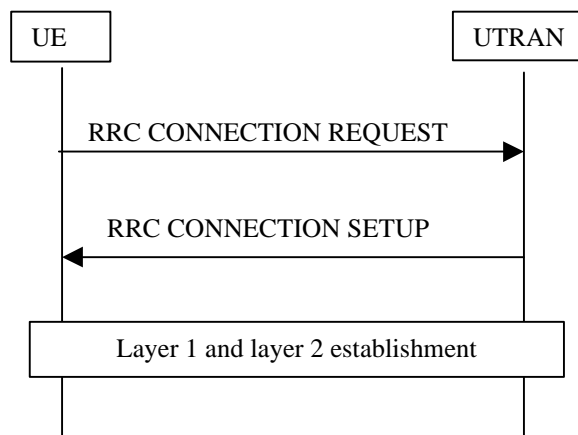
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## 1 Introduction

This contribution proposes the introduction of third message that completes the RRC connection establishment and re-establishment procedures.

## 2 Discussion

### 2.1 Current procedures for RRC connection (re-)establishment



**Figure 1. Procedure for RRC connection establishment**

In 25.331 [1], the current procedures for RRC connection (re-)establishment consist of two messages. It is also said that: “*Note: The necessity of an explicit RRC CONNECTION SETUP COMPLETE MESSAGE from the UE to the UTRAN on layer 3 is FFS. One assumption is, that there is an explicit layer 2 peer-to-peer signalling to establish the signalling link, making an explicit RRC CONNECTION SETUP COMPLETE message on layer 3 unnecessary*”.

### 2.2 Confirmation of the signalling link establishment

As indicated in the note in 25.331, there is a need to confirm the establishment of the signalling link. But when there is no BGN/BGACK exchange on RLC level, something is needed on layer 3. When the network receives the first layer 3 message from the UE on the signalling link, it knows that the signalling link is established in the UE. Since the establishment of the signalling link is a part of RRC connection establishment, this layer 3 message should be a part of the RRC connection establishment procedure.

### 2.3 Acknowledgement of assigned parameters

In the procedures for cell update, transport channel reconfiguration etc, there is always a COMPLETE message sent from the UE, when the UE is assigned certain parameters. For example:

- When the UE is assigned a C-RNTI on common transport channels, the UE must acknowledge this RNTI, by sending a message on DCCH mapped on RACH/FACH. When the network receives the COMPLETE message, it knows that the UE has received the C-RNTI, and the network can resume downlink transmission on DCCH and DTCH, if necessary.
- When the UE is assigned transport channel parameters, the UE acknowledges those by sending its associated transport channel ids.
- When the network changes the SSSD status for an UE, using the Physical Channel IE “SSD indicator”, the UE echoes its current SSSD status back.

In the current RRC connection (re-)establishment procedures, acknowledgement from the UE of the assigned parameters does not take place. It would be an advantage, if the network receives an acknowledgement also for these procedures and use the same principle.

### 2.4 Transfer of UE capability information

Immediately after the RRC Connection Establishment procedure, the UE transfers its UE capability as described in 25.303 [2]. The safest and probably also fastest procedure is that the UE always transfers its capability to the network.

It has also been proposed [3] to include a UE CAPABILITY INFORMATION CONFIRM as response when the UE sends its UE capability. This message solves some problems when there is an ongoing SRNC relocation. But if the network can wait to perform SRNC relocation until after RRC connection establishment and after it has received the first UE capability, the UE CAPABILITY INFORMATION CONFIRM is not needed in the RRC connection establishment case.

## 3 Proposal

It is proposed to add a new RRC CONNECTION SETUP COMPLETE message, as a mandatory part of the RRC Connection Establishment procedure. The purpose of the new message is:

1. To confirm the establishment of the signalling link by sending a first layer 3 message using acknowledged mode on the link
2. To acknowledge the assignment of RNTI and other parameters using the same principle as other procedures
3. To transfer the UE capability, replacing the usage of UE capability information procedure at RRC connection establishment.
4. To complete the RRC connection establishment procedure. For instance, SRNC relocation is allowed after the NW reception of this message

It is also proposed to add a new RRC CONNECTION RE-ESTABLISHMENT COMPLETE message, with the same purposes as above, except the transfer of UE capability.

It is proposed that the output document 25.303 is updated according to proposed changes below. Changes to 25.331 are addressed by a companion contribution [4].

### 3.1 Proposed changes to 25.303

#### 7.1.1 RRC connection establishment - Case A

RRC connection establishment in common channel termination point case A (see /5/) is shown in Figure 2. The RRC layer in the UE leaves the idle mode and initiates an RRC connection establishment by sending an RRC Connection Request message using the MAC SAP for the CCCH logical channel. MAC transmits the L3 message on the RACH transport channel.

**[Editor's Note: The L23 EG has adopted a working assumption to use an identity from the Non-Access Stratum (such as TMSI+LAI) included in the RRC Connection Request message. A PRACH physical random access channel capable of transmitting 32 kbps is estimated to be suitable for the message, guidance on the preferability of this data rate is sought from the physical layer EG. Other alternatives exist, such as a random number.]**

On the network side, upon the reception of RRC Connection Request, the RRC layer performs admission control, assigns an s-RNTI for the RRC connection and selects radio resource parameters (such as transport channel type, transport format sets etc). If a DCH is to be established, a CPHY--RL-Setup request is sent to all Node B:s which would be involved in the channel establishment. The physical layer operation is started and a confirmation primitive is returned from each Node B. RRC configures parameters on layer 2 to establish the DCCH logical channel locally. The selected parameters including the RNTI, are transmitted to the UE in an RRC Connection Setup message using the MAC SAP for the CCCH logical channel.

Upon reception of the RRC Connection Setup message, the RRC layer in the UE configures the L1 and L2 using these parameters to locally establish the DCCH logical channel. In case of DCH, layer 1 indicates to RRC when it has reached

synchronisation. The need for the synchronisation indication on the network side is FFS ~~and depends on e.g. the method of L2 link establishment.~~

~~The RLC signalling link is locally established on both sides. The RLC signalling link can be either implicitly established and used for the transmission of a complete message from L3, or the establishment can be done with explicit signalling triggered by an establish request from L3.~~ The establishment can be mapped on either RACH / FACH, RACH+FAUSCH / FACH or DCH by MAC. ~~When the UE has established the RLC signalling link, it transmits an RRC Connection Setup Complete message to the network using acknowledged mode on the DCCH. The need for explicit establishment is FFS.~~

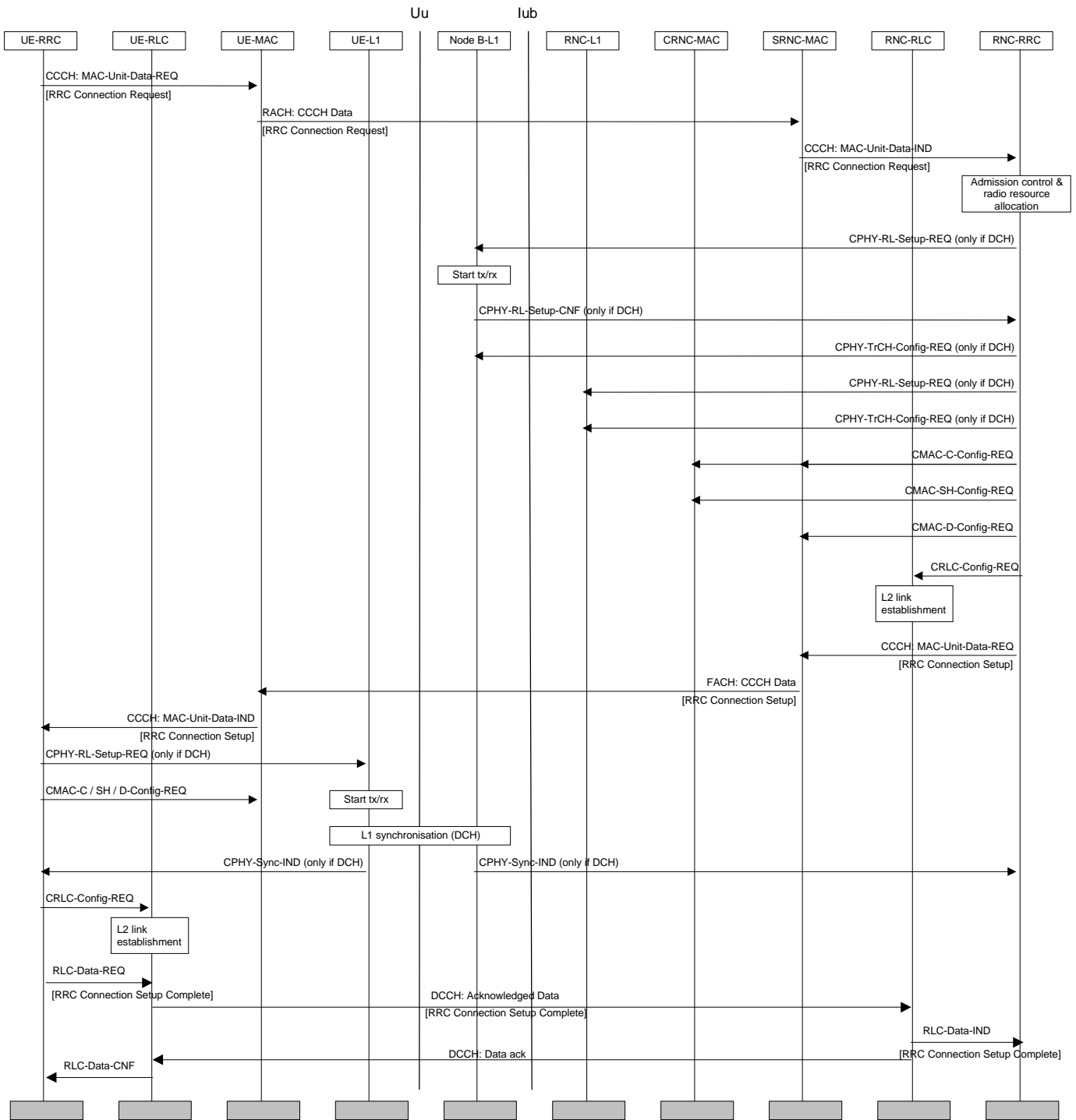


Figure 2. RRC connection establishment with common channel termination case A

## 7.1.2 UE Initiated Signalling Connection Establishment

The sequence in Figure 3 shows the establishment of the first Signalling Connection for the UE, initiated by the UE. ~~[Note1: The establishment of a second, simultaneous Signalling Connection for the UE is FFS, e.g. in the case of GPRS and non-GPRS Core Network domains].~~

RRC Signalling Connection Establishment is requested by the non access stratum in the UE with a primitive over the Dedicated Control (DC) SAP. The primitive contains an initial message to be transferred transparently by RRC to the non-access stratum entity on the network side. [Note2: The initial NAS message could for a GSM based Core Network be e.g. CM Service Request, Location Update Request etc.]

If no RRC connection exists, the RRC layer makes an RRC connection establishment, which includes the transmission of UE capability information. When the RRC connection establishment is completed, the signalling connection establishment can be resumed. ~~The transmission of UE capability information can be triggered by the UTRAN (see Error! Reference source not found.), if this information doesn't exist within UTRAN yet.~~

The initial message from NAS is transferred in the RRC message “Transparent Message Direct Transfer” using acknowledged mode on the DCCH, to the network, where it is passed on with an RRC Signalling Connection Establish IND primitive over the DC-SAP. [Note3: The necessity for a separate RRC message for encapsulating NAS messages is FFS]. When the initial NAS message has been transferred successfully, as indicated by the RLC-Data-CNF primitive in the UE, the Signalling Connection Establishment is confirmed by the UE-RRC.

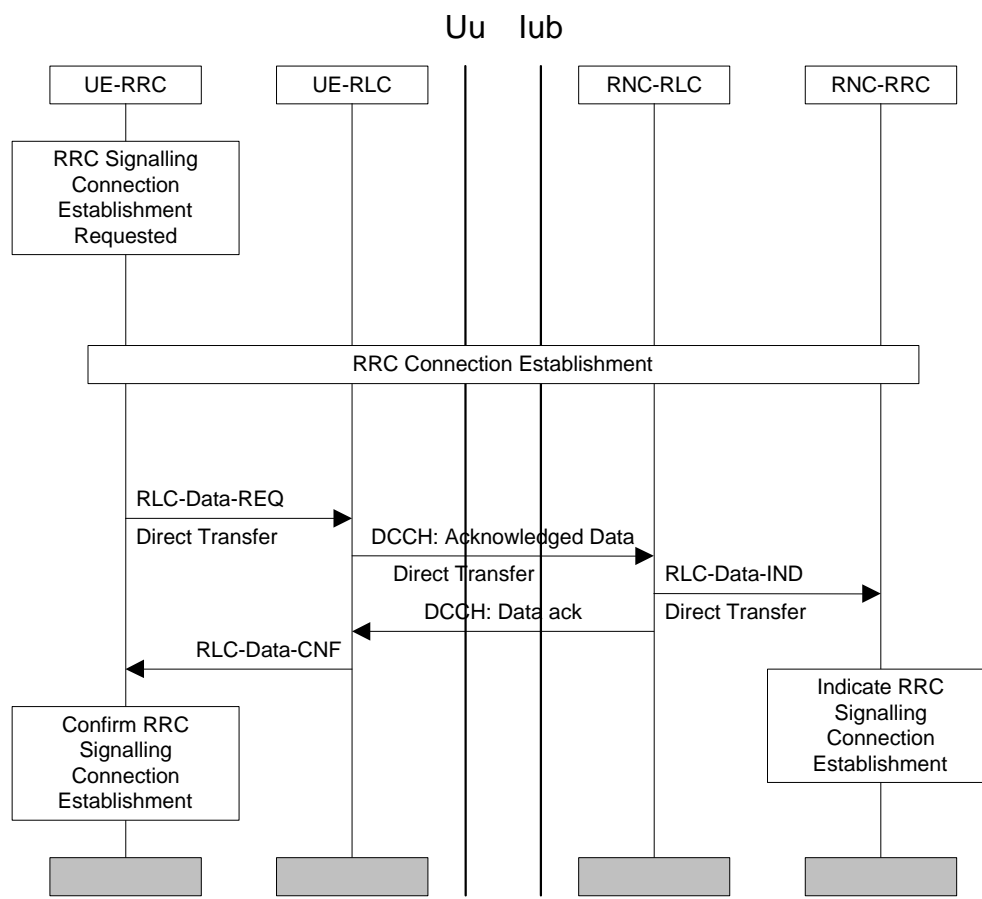


Figure 3. UE initiated Signalling Connection Establishment

## 4 References

- [1] 25.331, v1.0.0, RRC protocol specification
- [2] 25.303, v2.0.0, UE functions and interlayer procedures in connected mode

- [3] TSGR2#4(99)376, source Rapporteur (Ericsson), Results from the RRC procedures ad-hoc group
- [4] TSGR2#4(99)417, source Ericsson, Proposed changes to the RRC protocol specification regarding RRC connection establishment and re-establishment procedures