TSG-RAN Working Group 3 Meeting #6 ***TSGR3#6(99)933***

Sophia Antipolis, France, 23rd – 27th August 1999

Agenda Item: **15.3**

Source: **Ericsson**

Title: **UE Identification over Iur (RNSAP)**

Document for: **Decision**

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1 Introduction

At the RAN WG3 meeting #5 in Helsinki it was agreed that the identification of a UE context in a DRNC for a UE using a common transport channel is the D-RNTI. The D-RNTI is allocated only once per DRNC and UE connection. It was also agreed that that the UE context in the DRNC is kept as long as the UE is on a common transport channel (the discussion was regarding RACH/FACH) within a cell controlled by the DRNC. Thus the D-RNTI must not be re-allocated at secondary RACH accesses, e.g. Cell Update. In this contribution the consequences of this are further elaborated.

2 Discussion

Since the UE context is kept as long as the UE is on a RACH/FACH within a cell controlled by the DRNC it is quite natural to keep the UE context also when switching to a DCH (and when switching back to a RACH/FACH).

2.1 Identification of the UE Context

The identification of a UE context over Iur is done by:

1. RACH/FACH (or RACH/PCH):
   The S-RNTI and the D-RNTI are used to identify the UE context in the SRNC and DRNC respectively. The D-RNTI is used as an identifier over Iur (both user and control plane) in the downlink direction. The S-RNTI is used as an identifier over Iur (both user and control plane) in the uplink direction. (Connectionless SCCP is used.)

2. DCH or DCH/DSCH:
   The SCCP Connection in use uniquely identifies the UE context in the SRNC and the DRNC in the control (Connection oriented SCCP is used.). In the user plane the AAL2 connection identifies the UE context on the DCH. The user plane for the DSCH is not defined yet.

2.2 Requirements when Switching Between Channel Types

2.2.1 General

When switching between channel types there must be a way of identifying the existing UE context in a DRNC in order not to create a new UE context when not needed.

The following cases of channel type switching are identified

i. RACH/FACH -> DCH
ii. RACH/FACH -> DCH/DSCH
iii. DCH/DSCH -> DCH
iv. DCH/DSCH -> RACH/FACH
v. DCH -> DCH/DSCH
vi. DCH -> RACH/FACH

The cases i and ii implies switching between the case where the D-RNTI identifies the UE context in the DRNC (case 1 in chapter 2.1 above) and the case where the SCCP connection identifies the UE context (case 2 in chapter 2.1 above).

The cases iv and vi implies switching between the case where the SCCP connection identifies the UE context (case 2 in chapter 2.1 above) and the case where the D-RNTI identifies the UE context in the DRNC (case 1 in chapter 2.1 above).

The cases iii and v implies channel type switching where the UE context both before and after the channel type switching is identified by the SCCP connection. This case does not cause any problem with identification of the UE context during the channel type switching.

The cases that need to be considered are when the type of UE context identification is different before and after the channel type switching.

2.2.2 Case A, From D-RNTI to the SCCP connection as an identifier of the UE Context in the DRNC

In this case the SRNC knows the S-RNTI and the D-RNTI before the channel type switching. The S-RNTI is used in the SRNC to identify the UE context when receiving user and control plane messages. The D-RNTI is used when the SRNC sends user and control plane messages to the DRNC.

The DRNC also knows the D-RNTI and the S-RNTI. The D-RNTI is used in the DRNC to identify the UE context when receiving user and control plane messages. The S-RNTI is used when the DRNC receives an RACH access (CCCH) to find the relevant UE context for the access. The S-RNTI is also used when the DRNC sends user and control plane messages to the SRNC.

In this case the best way to find the relevant UE context in the DRNC when the dedicated resources are requested would be using the D-RNTI. However, the D-RNTI is not present in the RL SETUP REQUEST message (the first message related to the dedicated resources). In the absence of the D-RNTI the S-RNTI can be used to find the UE context, even though less efficiently.

2.2.3 Case B, From the SCCP connection to the D-RNTI as an identifier of the UE Context in the DRNC

It is assumed that this case is performed using a Cell Update procedure initiated by the UE as a result of a Physical Channel Reconfiguration (or possibly a RAB Reconfiguration), see chapters 9.18.4 and/or 9.9.4 in ref. 1. This means the UE context in the DRNC will be found by the DRNC using the received S-RNTI (and SRNC-ID) when receiving the initial RACH access (Cell Update). This case is thus already covered by the present specifications with regards to identification of the UE context.

However, when keeping the UE context at channel type switching it implies a modification to the RL Deletion procedure. The implication is that there are two cases of release for the RADIO LINK RELEASE REQUEST message. These two cases are:

a) When releasing the radio link resources and any allocated D-RNTI and C-RNTI. Thus in this case the UE context is released.

b) When releasing the radio link resources but keeping the UE context. This is done when the UE is still using common resources in the DRNC, e.g. RACH/FACH.

3 Conclusions

The present RNSAP specification can support identification of the UE context in the DRNC. However, to make the identification more efficient a few minor changes to the messages related to the Radio Link Set-up procedure are required.

4 Proposal

It is proposed to:

1. Add D-RNTI as an *optional* parameter in RL SETUP REQUEST, chapter 9.1.2 in ref. 2.

2. Change D-RNTI to *optional* in RL SETUP RESPONSE (not needed to be sent if already received in RL SETUP REQUEST), chapter 9.1.3 in ref. 2.

3. Add D-RNTI as a *conditional* parameter in RL SETUP FAILURE, chapter 9.1.4 in ref. 2. The D-RNTI may be present if there is at least one RL being successfully set-up. The D-RNTI would thus serve the same purpose at partial failure as it does in successful case (RL SETUP RESPONSE message). The condition should be described as *"The D-RNTI may be present if at least one radio link is being successfully set-up"*.

4. Modify the first paragraph of the RL Deletion procedure, chapter 8.2.3 in ref. 2

   When the serving RNC makes an algorithmic decision to delete a cell from another RNS (drift RNS) from the active set of a specific RRC connection, the message RL DELETION to request deletion of radio link is sent to the corresponding drift RNC. The message contains essentially the RL identifier to be deleted. Upon reception of the message, the Drift RNS should immediately delete the radio link and all related allocations within the drift RNS and acknowledge the deletion to the Serving RNC by the message RL DELETION RESPONSE. If the radio link to be deleted is the last radio link for the UE in the DRNS then the DRNC shall also release the UE context unless the UE is using common resources in the DRNS.

5 References

1. UMTS 25.931 UTRAN Functions, Examples on Signalling Procedures

2. UMTS 25.423 UTRAN Iur Interface RNSAP Signalling