TSG-RAN Working Group 3 Meeting #6   *TSGR3#6(99)932*

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

Agenda Item: **15.3 and 23**

Source: **Ericsson**

Title: **The need for a "C-RNTI Release" procedure**

Document for: **Decision**

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1   Introduction

At the RAN WG3 meeting #5 in Helsinki it was agreed that the identification (D-RNTI) of a UE context used over Iur for a UE using a common transport channel in a DRNC is allocated only once per DRNC. The D-RNTI is thus allocated only if no UE context exist for the S-RNTI and SRNC-ID indicated in the access. It was also agreed that a new C-RNTI *may* be allocated at a secondary Cell Update in a DRNC, even if there is one allocated previously, i.e. the C-RNTI may be re-allocated at any secondary Cell Update received by a DRNC. In this contribution some of the consequences of these decisions are further more elaborated on.

2   Discussion

When deciding that a D-RNTI for a UE using a common transport channel in a DRNC is allocated at the primary RACH access only the full consequences were not considered. The following sequence for an initial Cell Update in a DRNC was agreed in Helsinki:
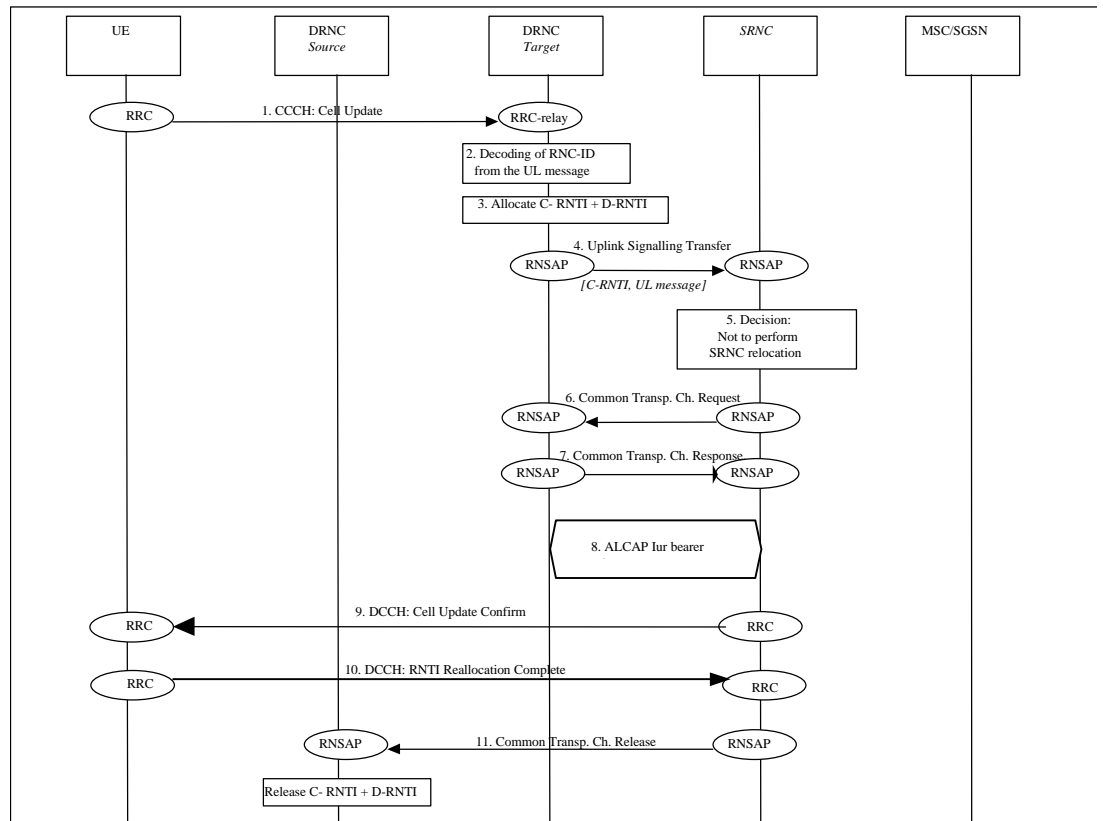
Figure 1 – Initial Cell Update in a new DRNC

Based on the above sequence and the above referred decision made in Helsinki the sequence for a second Cell Update from the UE in a DRNC is derived according to the following:
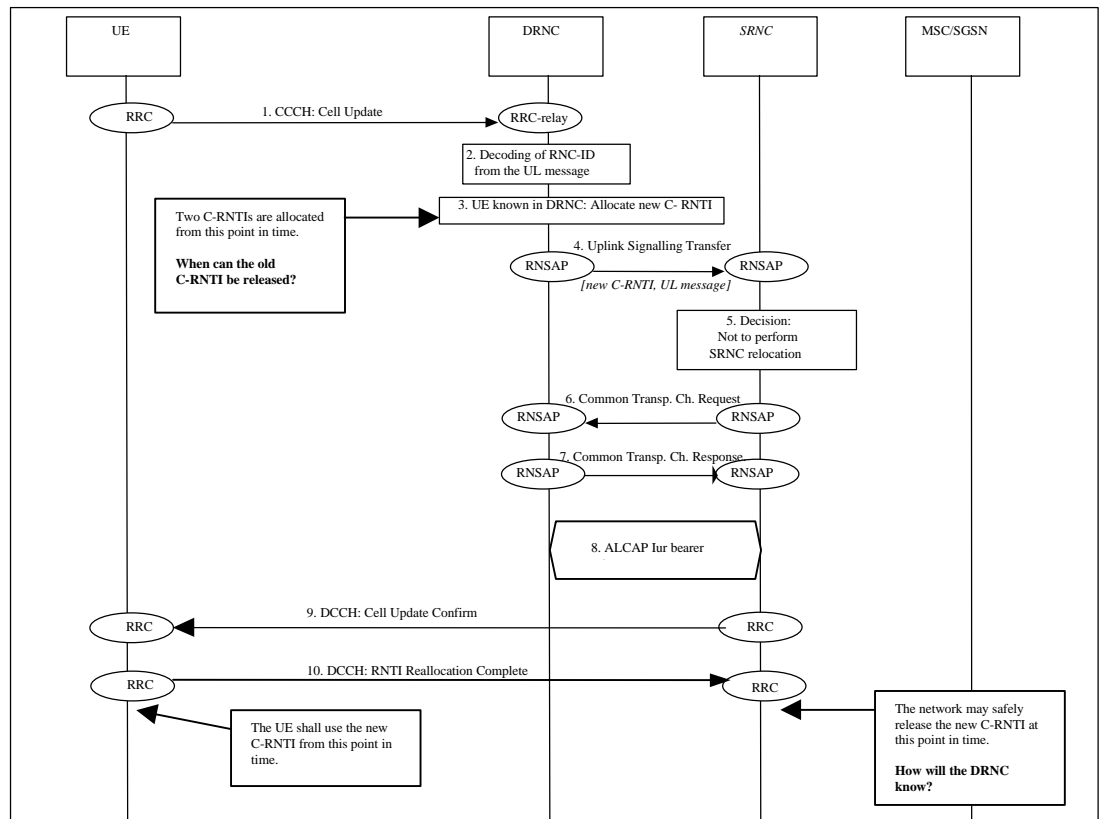
Figure 2 – Secondary Cell Update in a DRNC (with C-RNTI Re-allocation)

From the above sequence it is clear that there is no *explicit* way of releasing the old C-RNTI once it is safe to release it, i.e. when the UE has confirmed the reallocation of the C-RNTI. Presently it is thus unclear when a DRNC can start to reuse a C-RNTI. This problem can be solved in (at least) three ways:

1. Revert the decision from Helsinki, i.e. the DRNC will not search for a UE context when receiving an initial RACH access, e.g. Cell Update. The consequence of this alternative is that the old D-RNTI and the old UE context has to be released explicitly by the SRNC using the COMMON TRANSPORT CHANNEL RELEASE message at every Cell Update.

2. Modify the existing Common Transport Channel Release procedure so that it can be used to release the old C-RNTI from the UE context or the complete UE Context.

3. Require that a UE shall release the C-RNTI independently when selecting a new cell and initiating an access in that cell. In this way the DRNC can immediately release the old C-RNTI when receiving an initial RACH access (and allocating a new C-RNTI).

Alternative 1 above would in principle have to be supported since it is supported for the case when the UE moves from one DRNC to another, see figure 1 above. The difference between alternative 1 and the case figure 1 is that the source and target DRNCs are the same RNC in alternative 1 (but not in figure 1). However, even though the sequence in figure 1 has to be supported it does not mean that the sequence has to be executed for *all* cell updates.

Alternative 2 implies modifying the procedure Common Transport Channel Release and the RNSAP message COMMON TRANSPORT CHANNEL RELEASE. The modification will take care of the two possibilities, i.e. either releasing the whole UE context (as in figure 1) or just an individual C-RNTI (as needed in figure 2).

Alternative 3 would limit the possibilities for flexibly allocating one C-RNTI in an area consisting of one cell or more cells in a DRNC. This alternative is out of the scope for RAN WG3. This alternative is further more not in line with the assumptions within RAN WG2 where it is assumed that the RRC message RNTI Reallocation Complete informs the network that the UE has completed the reallocation of an RNTI. When the reallocation of the RNTI is completed it is safe for the network to re-use the old RNTI.

3 Conclusions

It seems natural to keep the agreement that if there is a context for a UE in a DRNC then that UE context shall be reused at secondary Cell Updates (secondary RACH Accesses). It is further more not considered as a good option to limit the flexibility of the usage of a C-RNTI. It is thus concluded that the best option is to modify the existing Common Transport Channel Release procedure to cover also the cases where only an individual C-RNTI is released.

4 Proposal

As a consequence of the conclusion above it is proposed to modify the Common Transport Channel Release procedure and the message COMMON TRANSPORT CHANNEL RELEASE. The following changes are required:

1. RNSAP Procedure description

The Common Transport Channel Release procedure description should be modified in ref. 1:

8.3.1 Common Transport Channel Resources Release

This procedure is used by the SRNC to request release of ~~the~~ Common Transport Channel ~~Traffic Context Identity~~Resources for a given UE in the DRNS.

The SRNC initiates the Common Transport Channel Release procedure either ~~in order~~ to ~~indicate that the D-RNTI can be~~ released the UE context from the DRNC (and thus both the D-RNTI and any allocated C-RNTI) or to release an individual C-RNTI. The SRNC sends the message COMMON TRANSPORT CHANNEL RESOURCES RELEASE REQUEST to the DRNC. The C-RNTI shall be included in the message if an individual C-RNTI shall be. If the whole ~~The message contains the D-RNTI of the~~ UE ~~whose~~ context shall be released no C-RNTI shall be included.

At the reception of the message, the DRNC releases either the whole UE context identified by the D-RNTI or the C-RNTI indicated~~used by the UE~~.

If the DRNC receives the COMMON TRANSPORT CHANNEL RESOURCES RELEASE REQUEST messages for an unknown D-RNTI the message is ignored. If the D-RNTI is known but the C-RNTI does not exist for that D-RNTI (UE context) the message is ignored. If the indicated C-RNTI is the only C-RNTI allocated for the UE context the DRNC releases the whole UE context.

Whether or not the procedure needs to be acknowledged (response, failure) is FFS.

SRNC   DRNC

          COMMON TRANSPORT CHANNEL RESOURCES
          RELEASE REQUEST

Figure 9-17: Common Transport Channel Resources Release

2.   RNSAP Message description

The following message description should be added to chapter 9.1 in ref. 1:

9.1.32 COMMON TRANSPORT CHANNEL RESOURCES RELEASE REQUEST

Information element	Reference	Type
Message type		M
Transaction ID		M
D-RNTI		M
C-RNTI		O

3.   Signalling Procedure Example

The following example should be added in chapter 9 in ref. 2:

This example shows a cell update in DRNS without SRNS relocation when an Iur RACH/FACH transport bearer exists and the UE is already known in the DRNS. In this example the DRNC decides to allocate a new C-RNTI for the UE.
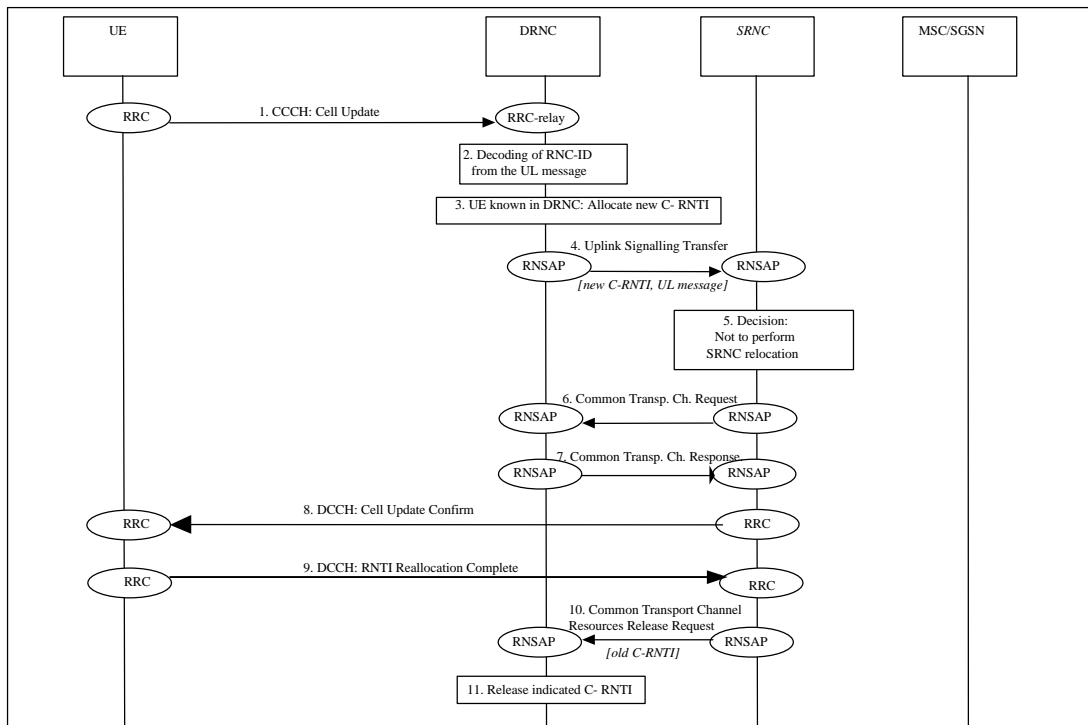
Cell Update via Iur without SRNS Relocation (with C-RNTI reallocation)

1. UE sends an RRC message Cell Update to the UTRAN, after having made cell re-selection.

2. Upon reception of a CCCH message from a UE, the target DRNC decodes the SRNC ID and the S-RNTI.

3. The UE is already registered in the target DRNC (RNC ID and SRNTI unknown), thus the target DRNC only allocates a new C-RNTI for the UE.

4. The target DRNC forwards the received uplink CCCH message towards the SRNC in the RNSAP Uplink Signalling Transfer message. The Uplink Signalling Transfer message includes also the Cell-ID of the cell from which the CCCH message was received and the new C-RNTI.

5. Upon reception of the Uplink Signalling Transfer message the SRNC decides not to perform a SRNS Relocation towards the target RNC.

6. The SRNC initialises the UE context in the target RNC with the RNSAP Common Transport Channel Request message. The message includes the D-RNTI and the cell identity previously received in the Uplink Signalling Transfer message, as well as a request for transport layer address and binding identity if there exists no appropriate Iur transport bearer to be used for the UE.

7. The target DRNC sends the transport layer address, binding identity and optionally PHY parameters (FACH code, ..) to the SRNC with the RNSAP Common Transport Channel Response message.

8. The SRNC sends RRC Cell Update Confirm on DCCH to the UE. The message is sent in the Iur user plane. It will be sent by the target DRNC to the UE on the FACH coupled to the RACH. Subsequent FACH data may be sent on a different FACH if so decided by the target DRNC.

9. The UE sends RRC RNTI Re-allocation Complete on DCCH successful reception of Cell Update Confirm.

10. The SRNC releases the old C-RNTI in the DRNC by sending a Common Transport Channel Resources Release Request message.

11. The DRNC releases the indicated C-RNTI.

5 References

1. UMTS 25.423 UTRAN Iur Interface RNSAP Signalling

2. UMTS 25.931 UTRAN Functions, Examples on Signalling Procedures