TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3) ***TSGR2#4(99) 391***
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Agenda Item: **6.8**

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Title: Inter RNC Cell Update procedure

Document for: Decision

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1. INTRODUCTION

This paper discusses the inter-RNC Cell Update procedure (same principles concern also other RACH procedures using "SRNC ID + S-RNTI" as UE identifier: URA Update, RRC Connection Re-establishment and (UTRAN originated) Paging Response messages). Two solutions have been introduced in RAN WG2 [1] [2], but no conclusion has been achieved yet.

2. DISCUSSION

1.1 Uplink messages

According to [3] :

- *CRNC shall also be able to reallocate the C-RNTI always when the UE accesses a new cell for which a C-RNTI has not yet been allocated by the controlling RNC.*
- *UE shall therefore use S-RNTI and SRNC-ID as UE identifier always when accessing such a new cell.*
- *These identifiers shall be decodable for the CRNC.*
- *RAN WG3 assumption is that all messages identified by S-RNTI and SRNC-ID (in case SRNC-ID ¹ CRNC-ID) are transported over Iur by the RNSAP protocol message Uplink Transfer.*
- *It is also considered that in order to be able to better estimate capacity requirements for Iur, the size of these messages shall not be significantly larger than what is required for their functionality. Increased protocol complexity is also foreseen if a lot of interactions with user plane data transfer and control plane signalling is introduced e.g. interactions between RNSAP entity and RLC/MAC-d entity within SRNC*

From these assumptions, the CCCH solution for Cell Update (etc.) procedures seems more logical. The main issue is that since the message is carried over Iur on (L3) RNSAP, it should not contain a MAC-PDU. Otherwise we end up with quite complex protocol model, jumping back and forth between L2 and L3 when RACH messages are carried over Iur.

The proposed outline for interlayer signalling flow is presented in figure 1. (Note that this figure does not contain all details.)

The consequences of this solution are:

- these uplink (CCCH) RRC messages cannot be ciphered on RLC or MAC. However, it is assumed that ciphering of these messages is not needed, but the integrity control is enough

- since the integrity control requires a time-varying input [4], it has to be implemented on RRC layer (since RLC is used in transparent mode and MAC uses RACH). For this, a counter on RRC layer is needed (like for ciphering CFN on MAC and RLC PDU number on RLC). However, this counter is needed only to ensure that the peer RRC entities do not get out of synch even if some integrity protected RRC messages are lost. Thus, 1-2 bits may be enough.

- since also some UE-CN signalling requires integrity protection, also the **Direct Transfer** RRC message needs to be integrity protected (at least optionally). Since this message is sent on DCCH (non-transparent RLC), the integrity protection could be implemented in RLC layer on this particular case, but it is probably better to keep the integrity mechanism on RRC layer also for this case. The overhead is only the RRC layer counter (for which 2 bits may be enough).

1.2 Downlink (response) messages

For the response messages (e.g. Cell Update Confirm), different requirements apply. Since these messages may contain new temporary identifier(s) for the UE, it is foreseen that a requirement to cipher these messages will be quite probable. Thus, they should not be sent on CCCH. However, there should be no problem to send the response message on DCCH (this should work well for both Iur scenarios (immediate SRNC relocation and User plane setup on Iur)).

3. PROPOSAL

The proposal is that the following uplink RRC messages are sent on CCCH logical channel:
- Cell Update
- URA Update
- RRC Connection Re-establishment
- Paging Response

The response messages on downlink, listed below, should be sent on DCCH (using RLC-UM), to allow ciphering. The ciphering may be necessary, since these messages (may) contain new temporary identities allocated for the UE.
- Cell Update Confirm
- URA Update Confirm
- RRC Connection Re-establishment Complete

TS25331 and TS25303 should be updated accordingly.

4. REFERENCES

[1] TSGR2#3(99) 277 Usage of DCCH vs CCCH on common channels (Nortel)
[2] TSGR2#3(99) 308 Identifier and logical channel for Cell Update (etc.) procedures (Nokia)
[3] TSGR2#4(99) 377 Answer for Liaison statement regarding the feasibility study for addressing mechanisms for the MAC protocol (RAN WG3)
[4] TSGR2#3(99) 271 Security functionality in the RAN (SA WG3)

5. ANNEX A: INTER-RNC CELL UPDATE

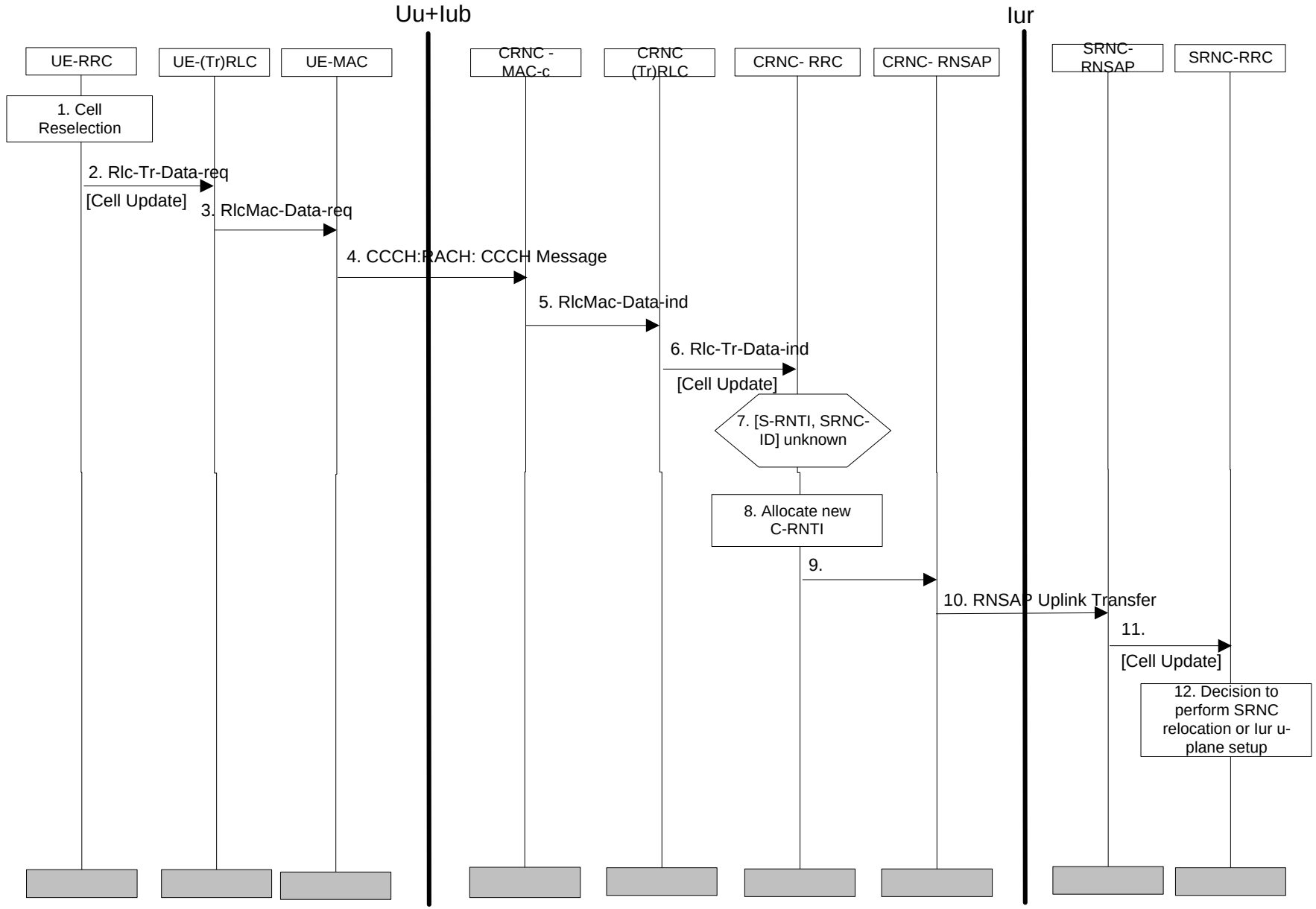

Figure 1. Inter RNC Cell Update