Agenda Item:

Source: **Ericsson**

Title: **Bearer Release RANAP procedure**

Document for:

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1.   Introduction

Considering protocol specification and some implementation complexity aspects, this contribution proposes to simplify the RAB Assignment procedure and introduce a separate Bearer Release procedure into [1].

2.   Discussion

As currently described in [1], the RAB Assignment procedure fulfills several requirements. The procedure is used for establishing bearers and releasing bearers: These two tasks can be performed in a single shot procedure or de-correlated from one another. This means that RAB Assignment procedure can trigger:

- Resource allocation and resource release procedures in UTRAN concurrently

- Resource allocation procedure in UTRAN

- Resource release procedure in UTRAN

- Resource reconfiguration

The main benefit in having the same procedure for allocation and release of resources is signaling transfer rationalization over Iu at the cost of extra complexity in the SRNC. Functionally, the same could be achieved through a sequence of procedures for assignment and release.

If for a service reason, a new RAB needs to be assigned (through the RAB assignment procedure) which is beyond the UE maximum capabilities of the UE e.g. in terms of number of RABs, pre-emption could be applied on a pre-emptable established RAB. From a logical division between CN and UTRAN, this is deemed more suitable than a combined assignment and release procedure with less complexity. If a conflict occurs (e.g. none of the established RABs are pre-emptable), the RAB assignment procedure would be failed.

One more aspect of added complexity through combined procedure is message coding where information elements presence become context dependent. For instance when RAB ASSIGNMENT REQUEST is used to establish a bearer, then user plane addresses (e.g. AAL2 address or IP address) shall be present. The same applies to QoS attributes parameters. When the same procedure is used for release only, then these elements shall be excluded.

Therefore, we believe that the RAB assignment procedure should be simplified by removing the release functionality and a separate procedure for bearer release shall be specified as proposed in the following section. This proposal does not affect the possibility to assign several RABs in one time.

3.   Bearer Release

The Bearer Release procedure can be initiated for the following reasons:

- Completion of service(s) or modification of service(s) associated to a RAB or a list of RABs
- UTRAN generated reasons
- RAB pre-emption

The Bearer Release procedure shall not be used to release Iu connections between Iu access points nodes. The Iu Release procedure shall be used instead.

The Bearer Release procedure messages i.e. BEARER RELEASE REQUEST, BEARER RELEASE COMMAND, BEARER RELEASE COMPLETE and BEARER CLEARED INDICATION are sent as connection oriented messages over the appropriate SCCP connection.

3.1 Bearer Release due to completion or modification of services associated to a RAB or list of RABs

If the release of a radio bearer or list of bearers is required because of completion or modification of the associated services, then the CN shall generate a BEARER RELEASE COMMAND message towards the RNS for that particular bearer or list of bearers.

The CN can still send other connection oriented RANAP messages on this particular Iu connection after BEARER RELEASE COMMAND message has been sent.

This message shall include a Cause Information Element, indicating the reason for the release.

When the RNS receives the BEARER RELEASE COMMAND message:

1) The clearing on the radio access bearers or list of bearers is initiated

2) The RNS returns a BEARER RELEASE COMPLETE message to the CN originating the BEARER RELEASE COMMAND message and takes action to return the corresponding user plane resources to idle. (The RNC need not wait for the radio access bearer(s) release to be completed before returning the BEARER RELEASE COMPLETE message.)

The signalling flow for Bearer Release procedure due to completion or modification of services between UE and CN is shown in figure X:
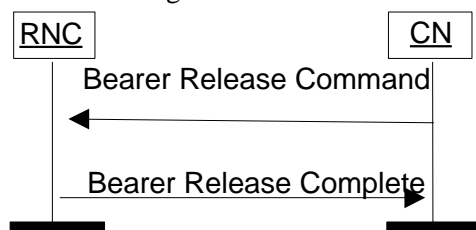

Figure X: Bearer Release: Completion or modification of services

3.2 Bearer Release due to UTRAN generated reasons

If the release of a radio bearer or list of bearers is required because of a UTRAN generated reason (e.g. "O and M intervention", "equipment failure"), then the RNC shall generate a BEARER RELEASE REQUEST message towards the CN responsible for that particular bearer or list of bearers. If this list of bearers is under responsibility of several CNs, then the RNC shall ensure that the appropriate BEARER RELEASE REQUEST messages are sent to the CN nodes with the bearer list relevant to each CN node. This list contains the list of the identities of the bearers to release.

This message shall include a Cause Information Element, indicating the reason for the release.

On receipt of a BEARER RELEASE REQUEST the CN shall initiate the bearer release procedure by sending a BEARER RELEASE COMMAND message echoing the list of the identities of the bearers to release.

On receipt of this message the UTRAN shall, if the resources are not already internally released, release the resources in the normal way. The procedure is always terminated with a BEARER RELEASE COMPLETE to the CN. This procedure handles both pre-configured and by-demand connections.

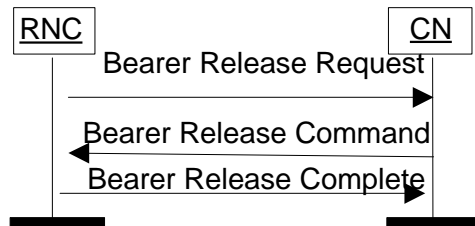The signalling flow for this procedure has been illustrated in Figure X+1.

Figure X+1: Bearer Release: UTRAN generated reasons

3.3   Bearer Release due to pre-emption

A BEARER CLEARED INDICATION message shall be sent by the RNC to the CN element responsible for that RAB or list of RABs to indicate a bearer, or bearers, previously established between this element and the UE and which have been released that due to pre-emption.

If the list of bearers is under responsibility of several CNs, then the RNC shall ensure that the appropriate BEARER CLEARED INDICATION messages are sent to the CN nodes with the bearer list relevant to each CN node.

The BEARER CLEARED INDICATION message shall include a Cause Information Element, indicating the reason for the release: "pre-emption".

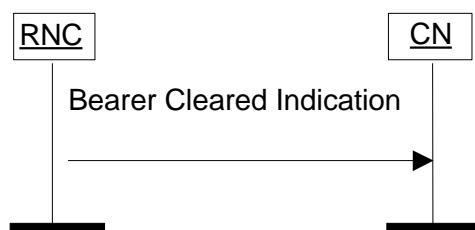The signalling flow for this procedure has been illustrated in Figure X+2.

Figure X+2: Bearer Release: pre-emption

4.   Conclusion and Proposal

It is therefore proposed to separate the release functionality from the RAB Assignment ptocedure and to port into a separate Bearer Release procedure.

This proposal requires modification of section 9.2.2.3 of the Iu Interface Description document [1] as follows:

9.2.2.3 Radio Access Bearer Assignment

This procedure is triggered from the CN side and is used to <u>assigning or</u> modifying the list of bearers established between the requesting CN element and a given MS for which a RRC connection exists with the requesting CN element prior the running of the procedure.

The procedure is started by the CN sending a RANAP RADIO ACCESS BEARER ASSIGNMENT REQUEST message. Such a message contains the information needed for the UTRAN to decide the new bearer configuration to build. This comprises :

·   *The list of the bearers to establish if possible, with their description and a identity;*

·   *Bearer linking, building group of bearers which must be either all established, or all rejected ;*

·   *The list of the identities of the bearers to keep if possible, with possibly a description when it is changed ;*

·   ~~The list of the identities of the bearers to release ;~~

Each list may be empty. The bearers are only those related to RRC connection, i.e., used between the concerned MS and the requesting CN element. This excludes bearers set with other MS or with other CN elements.

For each bearer to establish, the following information is provided :

·   *An identity (bearer identity), used for eventual reference ;*

·   *The characteristics of the MS-CN bearer, including such aspects as data rates, transmission quality of service, ... Some of them may include negotiable values.*

·   *Priority level and pre-emption indication ;*

·   *Possibly a bit string to be passed to the upper layer on the UE side together with the bearer establishment indication.*

·   *Binding Id used for associating the bearer identity and the corresponding User plane. The details of using the Binding Id are FFS.*

For each bearer to keep if possible, none, part or all of the following information may be provided in addition to the bearer identity :

·   *The characteristics of the MS-CN bearer, including such aspects as data rates, transmission quality of service, ...*

·   *Priority level and pre-emption indication.*

~~*For each bearer to be released, only the bearer identity is provided. If a radio channel release is required because of a UTRAN generated reason (e.g. "O and M intervention", "equipment failure", or if transmission from the UE is lost) then, the RNC shall generate a BEARER RELEASE REQUEST message towards the CN. This message shall include a Cause Information Element, indicating the reason for the failure. On receipt of a BEARER RELEASE REQUEST the CN shall initiate the release, as defined above, by sending a RANAP RADIO ACCESS BEARER ASSIGNMENT REQUEST message. On receipt of this message the UTRAN shall, if the resources are not already internally released, release the resources in the normal way. The procedure is always terminated with a RANAP RADIO ACCESS BEARER ASSIGNMENT COMPLETE to the CN. This procedure handles both pre-configured and by-demand connections. The signalling flow for this procedure has been illustrated in Figure 4*~~

~~*…*~~

~~*A RANAP BEARER CLEARED INDICATION message shall be sent to a CN element to indicate a bearer, or bearers, previously established between this element and the MS and which have been released that due to pre-emption.*~~

And introduction of a new section 9.2.13 including text of section 3.

5.   References

[1] UMTS ZZ.11 V.0.1.0, Description of Iu Interface, Source: Editor

[2] GSM08.08 V.7.0.0., MSC-BSC Interface, Layer 3 Specification