

Agenda Item: 10.1

Source: Ericsson

Title: Modified Principles and text proposal for RANAP RAB Assignment

Document for: Decision

1 Introduction

This contribution proposes to agree on the principles to overcome the complexity of the RAB Assignment procedure in [1]. The potential for overly complex RAB Assignment procedure is illustrated by outlining signalling flows.

2 Discussion

2.1 Examples of RAB Assignment Signalling Flows

The figures 1 to 5 present examples of the possible signalling flows for the RAB Assignment request. The first response message is sent by UTRAN either after an initial time period or directly after the first handled request depending on the implementation choice. In the example UTRAN has handled request for two RABs during the initial time period before reporting the outcome of the request and two RABs are queued. The following cases indicating possible subsequent responses for this example:

Cases for which the outcome is reported separately per RAB or for a subset of RABs in queue:

- 1: all queued RABs established, modified or released successfully
- 2: part of queued RABs established, modified or released successfully and/or part of queued RABs established or modified unsuccessfully and/or part of queued RABs failed due to queuing timer expiry
- 3: all queued RABs established or modified unsuccessfully and/or all of queued RABs failed due to queuing timer expiry

Cases 4 to 5 are same as case 1, 2 and 3 but the outcome is reported at same time for all queued RABs. These cases are presented as signalling flows in the figures 1 to 5.

The timers needed in both CN and UTRAN side are presented with arrows in the figures. The abbreviations used in the figures are:

- E = establish
- M = modify
- R = release
- Q = queued
- B = radio access bearer

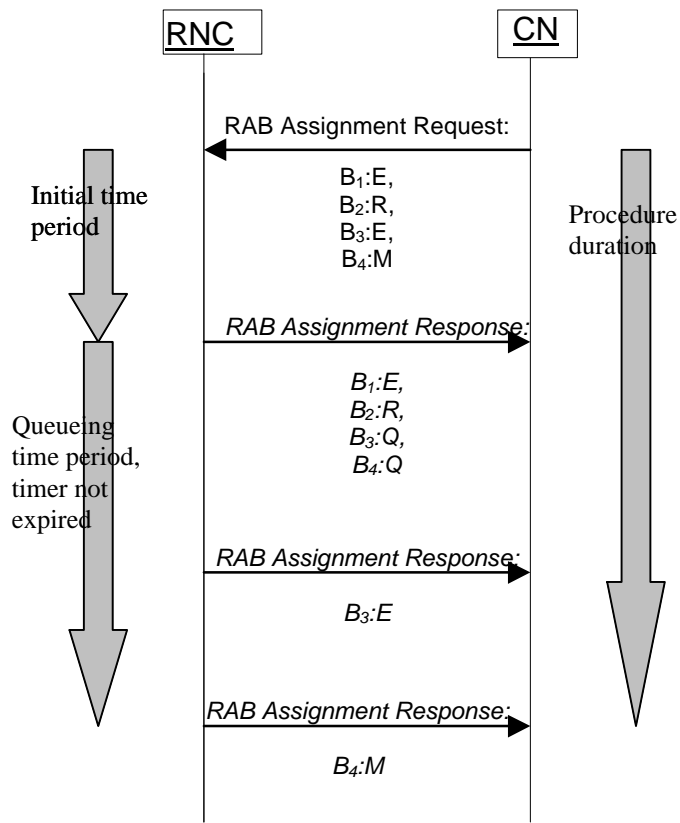


Figure 1. Case 1: only successful outcome, reported per queued RAB

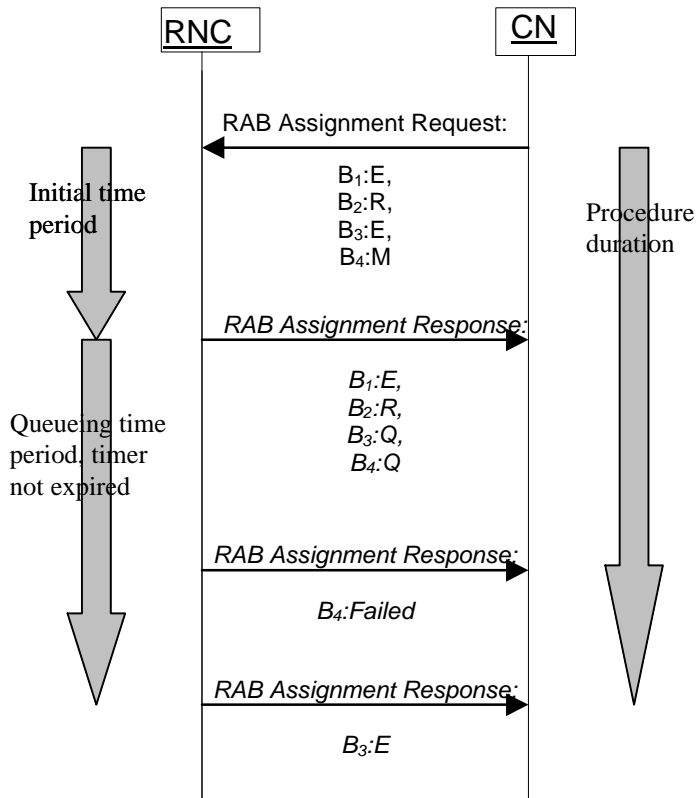


Figure 2. Case 2: both successful and failed outcome, reported per queued RAB

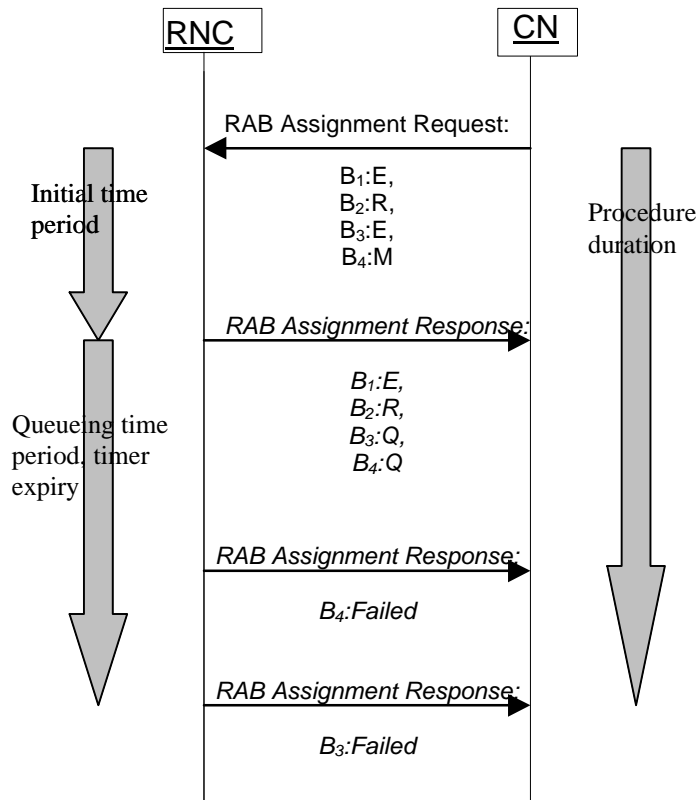


Figure 3. Case 3: only failed outcome, reported per queued RAB

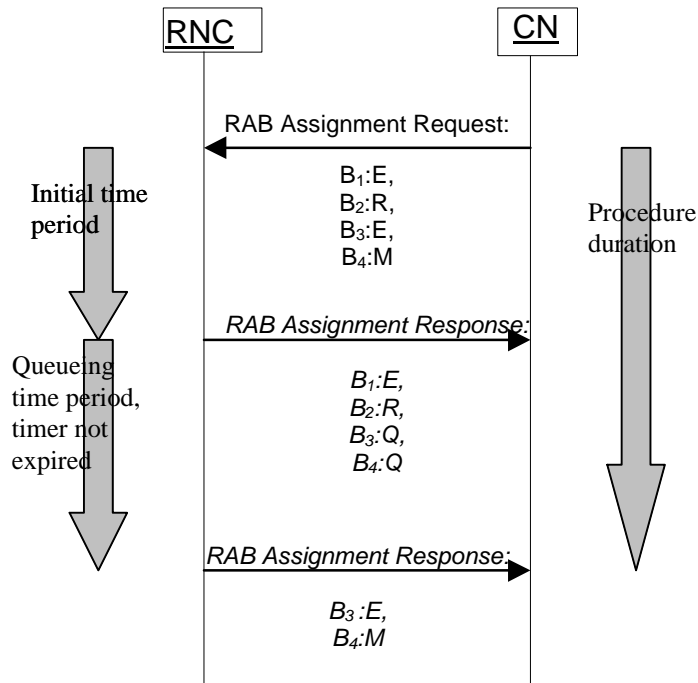


Figure 4. Case 4: only successful outcome, reported for all queued RABs at the same time

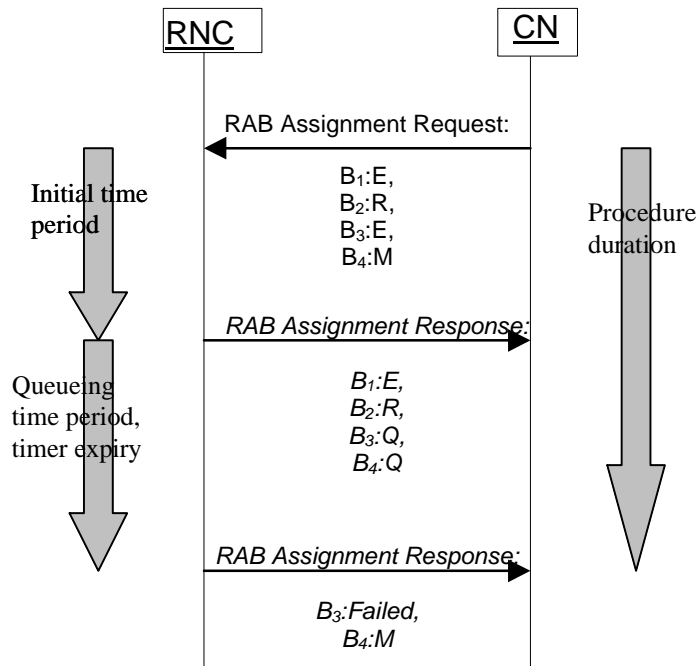


Figure 5. Case 5: both successful and failed outcome, reported for all queued RABs at the same time

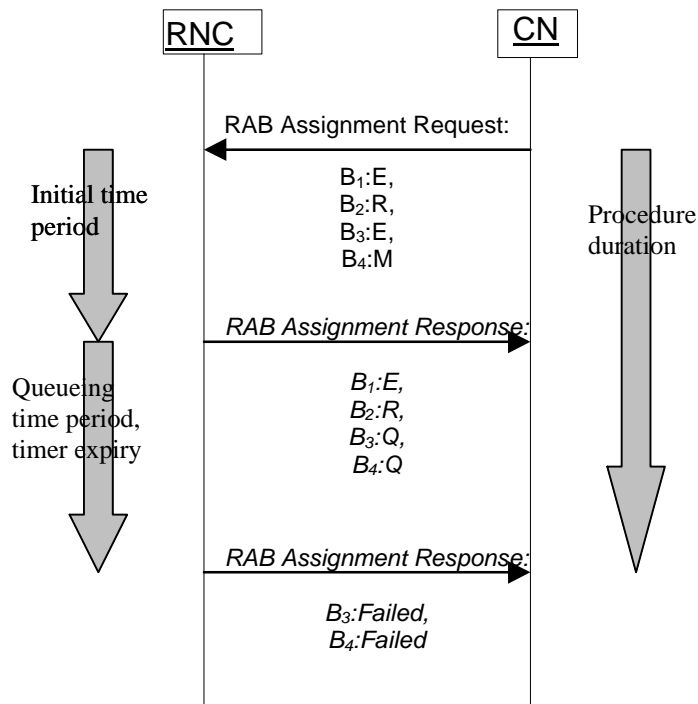


Figure 6. Case 6: only failed outcome, reported for all queued RABs at the same time

2.2 Principles on RAB Assignment

As illustrated in the signalling flows above, the RAB assignment procedure can be highly complex. Ericsson considers that some basic principles would may be not overcome the complexity of this

polymorphic procedure but limit it. The following principles intend to simplify the RAB assignment procedure:

- 1) Introduce a Class 3 type of RANAP Elementary Procedure with one REQUEST message and one or several RESPONSE messages (i.e. no need for RAB Assignment Failure message), reporting both successful, unsuccessful outcome of the requests and temporary status information about the requests. This type of EP only initiates and terminates (through response(s) or EP timer expiry. They do not have unsuccessful or successful termination.
- 2) Request message can include request to:
 - request to establish,
 - modify
 - release RABs
- 3) Response message can include for each RAB one of the following:
 - successfully established
 - successfully modified
 - ~~(successfully)~~ released
 - unsuccessfully released
 - failed to establish or modify
 - queued (temporary status information)
- 4) Timer for queuing is on function level and not on RAB level within the RAB Assignment procedure.
- 5) One or several response messages can be sent from UTRAN to CN (e.g. the outcome for all queued RABs can be reported at one message or the outcome can be reported with several response messages per queued RAB).
- 6) Queueing function is part of the RAB Assignment procedure instead of being a stand alone RANAP Elementary Procedure (i.e. no need for the Queuing Indication procedure for RAB Assignment).

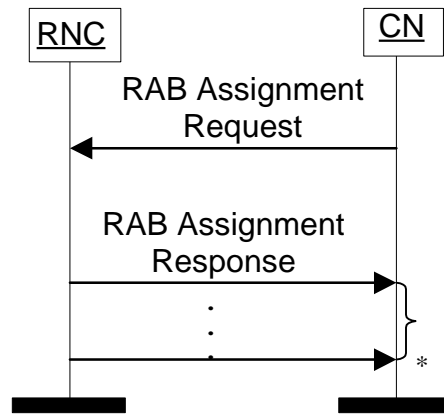
3 Procedure description and Response Message Contents

The text for the RAB Assignment procedure endorsing the principles of the chapter 2.2 is proposed in the following chapter. The proposal on the message contents of the RAB ASSIGNMENT RESPONSE is presented in the chapter 3.2.

3.1 RAB Assignment

3.1.1 Normal operation

This procedure is used to modify or release an already established RAB or to establish a new RAB for a given UE. The procedure is connection oriented. The signalling flow for the RAB Assignment procedure is shown in Figure X.



* it can be several responses

Figure 1. RAB Assignment Procedure.

The CN initiates the procedure by sending a RAB ASSIGNMENT REQUEST message. When sending the RAB ASSIGNMENT REQUEST, the CN starts the $T_{RABAssgt}$ timer .

The message contains the information required by the UTRAN to build the new RAB configuration. CN can request UTRAN to:

- establish
- modify
- release

one or several RABs with one RAB ASSIGNMENT REQUEST message.

The RAB ASSIGNMENT REQUEST message contains the following information:

- list of RABs to establish with their bearer characteristics
- list of RABs to modify with their bearer characteristics
- list of RABs to release

Upon reception of the RAB ASSIGNMENT REQUEST message UTRAN shall execute the requested RAB configuration. UTRAN shall report to CN the outcome of the request by sending RAB ASSIGNMENT RESPONSE message(s).

UTRAN can report to CN for one or several RABs, which are:

- successfully established with their respective bearer characteristics (note FFS)
- successfully modified RABs with their respective bearer characteristics (note FFS)
- released
- failed to establish or modify or release
- queued

in one RAB ASSIGNMENT RESPONSE message.

If none of the RABs have been queued, the CN shall stop timer $T_{RABAssgt}$ and the RAB Assignment procedure terminates, successfully, unless all RABs have failed to establish or modify. In that case, the procedure is also terminated in UTRAN.

Note FFS: The RAB parameters in the bearer characteristics are included in the RAB ASSIGNMENT RESPONSE message only if they are different than requested in the RAB ASSIGNMENT REQUEST message.

UTRAN shall report the outcome of a specific RAB configuration change only after the transport network control plane signalling, which is needed for this configuration establishment or modification, has been executed.

[Note: Following paragraph is removed under the RAB Release Request procedure.]

If some existing RABs (related to the same or to another UE) have to be released due to the received RAB ASSIGNMENT REQUEST (in case of pre-emption for example) RAB Release Request procedure shall be used.

When the request to establish or modify one or several RABs is queued, UTRAN shall start the timer T_{QUEUING} . This timer specifies the maximum time for queuing of the request of establishment or modification. The same timer T_{QUEUING} is supervising all RABs being queued.

For each RABs that are queued the following outcomes are possible:

- successfully established or modified
- failed to establish or modify
- failed due to expiry of the timer T_{QUEUING}

Except in the case of T_{QUEUING} expiry, UTRAN shall report the outcome of the queuing for every RAB individually or for several RABs in the RAB ASSIGNMENT RESPONSE message(s). This is left to implementation. UTRAN shall stop T_{QUEUING} when all RABs have been either successfully established or modified or failed to establish or modify. The RAB Assignment procedure is then terminated both in CN and UTRAN.

~~The RAB Assignment procedure is terminated successfully unless all RABs have failed to establish or modify.~~

~~[Authors Note: Following two bullet points can be removed and the information can be moved to message contents chapter as proper parameters.]~~

To ensure the necessary load sharing on the Iu-PS interface,

- When the CN sends RAB ASSIGNMENT REQUEST for all Radio Access Bearers (associated with PDP contexts) of an UE, the CN specifies the IP address of the packet processing function allocated to this / each of these PDP context(s) in the CN.
- In the response to the CN request, i.e. in RAB ASSIGNMENT RESPONSE, the RNC specifies the IP address of the packet processing function allocated to this / each of these Radio Access Bearer(s) in the RNC.

~~3.1.2 Unsuccessful outcome~~

~~When CN receives the response or responses that all RABs failed to establish or modify, then CN shall stop T_{RABAssgt} timer and consider the the RAB Assignment procedure terminated unsuccessfully~~

When CN receives the response that one or several RABs are queued, CN expects UTRAN to provide the outcome of the queuing function for each RAB before expiry of the T_{RABAssgt} timer. Otherwise, CN considers the RAB Assignment procedure terminated. ~~unsuccessfully.~~

In the case the timer T_{QUEUING} expires, the RAB ASSIGNMENT procedure terminates in UTRAN un-~~successfully~~ for all queued RABs, and UTRAN shall respond for all of them in one RAB ASSIGNMENT RESPONSE message. The RAB Assignment procedure is also terminated in CN.

3.2 Message Contents of RAB Assignment Response

RAB ASSIGNMENT RESPONSE

Information element	Reference	Type
Message type		M
Location Identifier		O
Bearer x n established or modified		C1
RAB ID		M
Bearer RAB parameters		O (1)
Transport address		M (2)
Iu transport association		M (2)
Bearer x n released		C1
RAB ID		M
Cause		M
Bearer x n queued		C1
<u>RAB ID</u>		<u>M</u>
Bearer x n failed to establish or modify or release		C1
<u>RAB ID</u>		<u>M</u>
<u>Cause</u>		<u>M</u>

C1 At least one group shall be present.

- (1) ~~Bearer~~RAB parameters are needed only if something has changed.
- (2) Always present for SGSN.

2 Conclusion and Proposal

It is proposed to endorse the principles illustrated in the chapter 2.2 of this document. It is also proposed to incorporate the chapter 3.1 and 3.2 of this document to the reference [1].

3 References

- [1] 3GPP 25.413, UTRAN Iu Interface RANAP Signalling V1.1.1