Agenda Item: 21

Source: Motorola

Title: Node B Configuration and Initial Cell Configuration Procedures

Document for: Decision

1   Introduction

The intention of this contribution is to further clarify the messaging necessary for the Node B Configuration and the Initial Cell Configuration procedures. The initial Node B Configuration was updated to clarify when the ALCAP and NBAP bearers are set up. The Initial Cell Configuration procedure was updated to use actual NBAP messaging for the cell setup procedure, to include the Node B resource notification message, and to include the common transport channel setup procedure that are performed before a cell is ready to accept traffic.

2   Discussion

2.1   Initial Node B Configuration

The detailed steps of the procedure is given in the below. It describes the scenario that a new Node B is added to the network and one or several cells of the Node B will be set up and activated.

In sections 8.5.1 and 8.1.1 of [1] NBAP procedures are specified for the Cell Setup and Common Channel(s) Setup. But the aspects not described in these sections are how the following is achieved (text taken directly from [1]):

- Node B equipment has previously been defined and configured to support the cell on the Implementation Specific O&M interface.

- A Node B control port is available for communication between the RNC and the Node B, for the procedure to be executed successfully.

The object of this example is to build a complete picture of the procedure by bringing the management systems into the scenario. The following is a description of the steps in the figure below.

1. The Node B hardware will be installed at the Node B site, as well as software to be installed locally and setting of parameters.
2. The ATM link between the Node B and C-RNC will be established. ~~This includes the establishment of the ALCAP and NBAP signalling bearer.~~
3. The transport channel for the Implementation Specific O&M will be established. If the Implementation Specific O&M is to be routed by the C-RNC, one or several AAL5/ATM PVC's or SVC's for the transport of O&M IP packets will be established. Otherwise a direct IP transport channel to the Node B Manager will be established.
4. An Node B initialisation procedure will be performed by means of Implementation Specific O&M functions (this could possibly be initiated from the NMC). It includes downloading of software from the Node B Manager which can be done automatically or manually. Having completed this procedure all necessary conditions to allow the subsequent configuration of logical resources in one or several cells will be met in the Node B.
5. Following the Node B implementation specific initialisation, some self tests may be performed. The result of these self tests should be communicated to the Node B manager via implementation specific O&M.

6.   ~~The ALCAP and NBAP signalling bearers are established between the Node B and the C-RNC. Note that the ALCAP and NBAP bearers are established independently using separate VCs. The exchanges necessary to synchronise the RNC and Node B can be performed once the NBAP bearer is established regardless of the state of the ALCAP bearer. The ALCAP bearer must be established prior to taking actions requiring backhaul.~~

7.   ~~The Node B informs the C-RNC about the completion of the Node B Initialisation.~~ Upon completion of the initialisation process, ~~t~~The Node B sends ~~also~~ the locally set parameters to the C-RNC which are needed for the cell configuration, i.e. Local Cell Id(s) and number of carriers.

~~7. C-RNC informs the C-RNC Manager about the completion of the Node B Initialisation, C-RNC Manager subsequently informs Network Management Centre (Step 9').~~

Note: The remaining logical cell configuration should be performed as described in chapter 10.1.3 below.
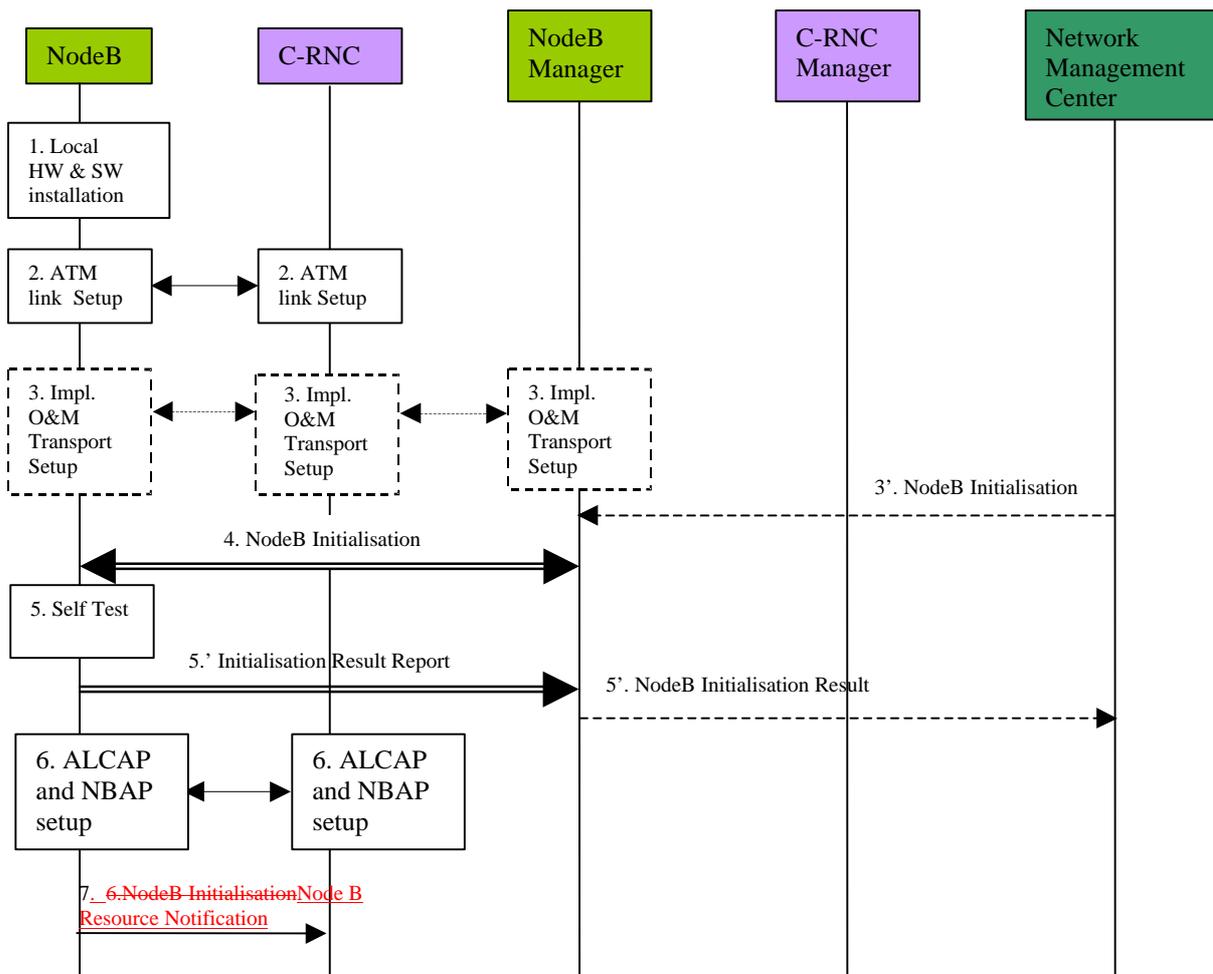
2.2   Initial Cell Configuration

The definition of a cell in the UMTS system will originate from the management system. In order to make this process as simple as possible for the network operator, automation should be used and standardised entities addressed wherever possible. As such, the focus for creation of a cell should be the standardised cell model defined within the UTRAN. The creation of this Logical traffic carrying entity should be the trigger for the overall cell creation process, since this enables the network operator to deal only in standardised entities and not manufacturer specific aspects.

The Logical cell entity itself is assumed to be resident in the RNC, since the cell is a logical traffic carrying entity and the RNC is the traffic controlling entity. The cell shall be as defined in [1]. The creation of the cell communication port in Node B shall be achieved via Implementation Specific O&M.

The following procedure represents one possible method by which a cell can be configured within the UTRAN. This procedure assumes that the associated Node B has already been installed using the procedure described in section 10.1.2, and that both Iub and Implementation Specific O&M communications are established.

The following is a description of the steps in the figure below.~~The procedure above consists of the following steps.~~

1. Following the Node B implementation specific initialisation (which includes the implementation specific definition of the local cell and the cells associated resources as described in 2.1) ~~implementation specific)~~, Node B sends a resource notification to the RNC indicating that resources are available to configure a cell associated with the local cell id included in the notification. The notification also includes the resource capabilities of the cell, including the maximum DL power capability and number of channel elements (FFS).

2. The cell is defined and created in the network management system by the operator. This may be by manual means or as an output from network optimisation tool. The definition should include identifiers relating to the related Node B for creation of this cell and the associated C-RNC. These identifiers are FFS.

3. The operator initiates the creation of the cell, and the network management system sends the cell configuration data to the appropriate C-RNC manager. The C-RNC manager passes the cell data to the C-RNC for creation.

4. The C-RNC performs a resource check to ensure it has sufficient resources to support the new cell it has been instructed to define. This resource check applies only to the RNC's capabilities and not the Node B.

5. The C-RNC sends the associated cell configuration data to the target Node B.

~~6. The Node B then determines whether the configuration process to follow will impact on the logical resources it is currently supporting (if any). If logical resources are impacted, the Node B requests permission to block the associated resources from the RNC. This request should carry a priority indicator to indicate to the RNC whether it must block the resources immediately (RNC override) or whether it can delay or prevent the block. This priority should be derived from the initial operator request.~~

~~7. The RNC will attempt to block the resources as requested by the Node B.~~

~~8. The RNC will respond to the Node B advising of the success or rejection of the block request. In this way the RNC may delay the blocking of the resources based on the traffic conditions, unless it is instructed to block them immediately (see above). This process will be repeated until all necessary resources have been blocked.~~

~~9. Once all resources are finally blocked, the Node B performs it's Implementation Specific configuration.~~

~~10. The Node B advises the management system that the Implementation Specific configuration is complete.~~

~~11.~~6.   Node B then performs the configuration of the new cell and advises the management system of the new cell configuration~~.~~

~~12.~~7.   Once complete, the Node B advises the C-RNC that the configuration of the new cell has been successful. The ~~state of the~~ resources for the new cell are now available, but traffic is not allowed in the cell until the C-RNC configures the common transport channels.~~should be blocked at this stage.~~

~~13. The RNC then instructs the Node B to de-block any other Node B resources which might have been blocked to perform the configuration of the new cell. Note: this does not include the resources associated with the new cell.~~

~~14. Node B advises the RNC of the success of this de-block.~~

8.   The C-RNC will then configure the common transport channels for the cell. The Common Transport Channel Setup Request and Response messages are used to configure the BCH, PCH, FACH, and RACH.

~~15.~~9.   The Node B will not transmit anything on the BCH for the cell until the System Information Update procedure is invoked by the C-RNC.

10. Once the system information update procedure is complete, t~~T~~he C-RNC then advises the C-RNC manager that the configuration of the new cell has been successful. This success notification is passed to the network management system. At this point, the cell is now capable of accepting traffic.

~~16. The operator then initiates the activation of the new cell from the network management system, and a message is sent from the management system to the C-RNC manager and then to the C-RNC to trigger the activation of the cell.~~

17. The RNC instructs the Node B to de-block the new cell resources.
18. The Node B de-blocks the resources and advises the RNC of the success of this operation.
19. The RNC instructs the Node B to begin transmission of the BCH in the new cell (this shall be achieved using a deblock procedure from the RNC to the Node B for the BCCH).
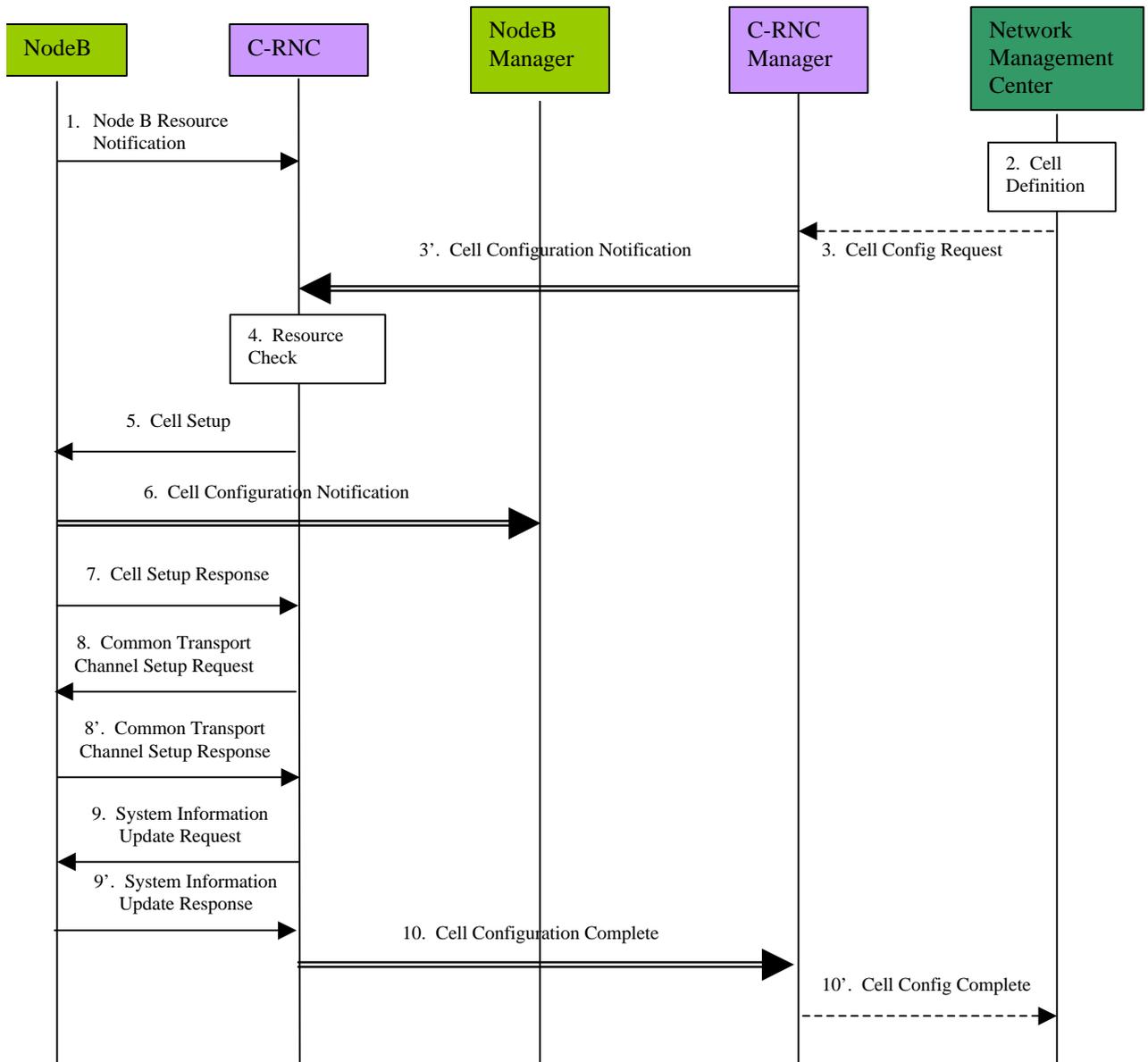
3 Proposal

The following changes to TR I3.05 [2] are proposed –

1. Replace the procedure (the steps and figure) in section 10.1.2 – Initial Node B Configuration with the updated steps and figure of Section 2.1 (Initial Node B Configuration).

2. Replace the procedure (the steps and figure) in section 10.1.3.1 – Initial Cell Configuration with the updated steps and figure of Section 2.2 (Initial Cell Configuration).

Note: Refer to section 10.1.3.1 of [2] for the original message sequence diagram for the Initial Cell Configuration procedure.

4 References

[1] 3GPP TS 25.433 - NBAP Specification v1.2.0

[2]   TR I3.05 - Node B O&M Functional Description v 0.2.1