TSG-RAN Working Group 3 meeting #7
Sophia Antipolis, France, 20-24 September 1999

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Agenda Item: 15.3

Source: **Nortel Networks**

Title: Node B Capacity management on Iub interface

Document for: Approval

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1 Introduction

This contribution presents the Node B capacity management on Iub Interface:
It proposes to manage new logical objects for Node B capacity modelling and refine the related NBAP associated procedures.

2 Discussion

The RNC has to be provided by the Node B a fairly accurate idea of its capacity both Base Band and RF. This allows the RNC to manage more efficiently the Node B resources for Call Control procedures :

- by taking, for example, appropriate margins (for incoming Handover, to secure specific services …),
- by not requesting unavailable resources,
- by understanding the failure cases.

This capacity is communicated to the RNC by using the Node B logical model that gives :

- to RNC traffic management the capability to predict the Node B capacity changes due to its actions,
- to Node B, the tools to report Capacity changes that can be understood by the RNC.

The RF capacity is linked to the Cell Object in the Node B logical model and is characterised by :

- Maximum Power,
- Minimum Spreading Factor.

The Base Band capacity is reported to the RNC thanks to the supervision of the Traffic Termination Point over Iub and specified by the following informations attached to this object :

- a global credit,
- a credit consumption law.

The RNC is kept updated with the Node B Capacity by :

- Node B Resource Notification for the nominal capacity (credit, law, limitations),
- Node B Resource Status Indication for the current availability and capacity (new credit).

3 Description

3.1 Change proposal in TS 25.430 ([R2]) on Traffic Termination point definition

3.1.1 Traffic Termination Point

Traffic Termination Point represents DCH and DSCH data streams belonging to one or more Node B Communication Contexts (UE contexts), which are controlled via one Communication Control Port. ~~The Traffic Termination Point is thus a descriptive entity which neither is controlled over Iub nor by O&M.~~
The Traffic Termination Point represents a Node B Base Band entity for Node B capacity management, and is consequently supervised over Iub and by O&M. It is characterised by a global credit and a consumption law.

3.2 Change proposal in TS 25.433

3.2.1 Elementary NBAP Procedures

3.2.1.1 Resource Status Indication

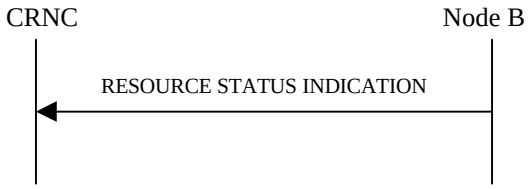
With the Resoure Status Indication message the Node B informs the RNC about the abnormal condition of a logical resource that is the result of a temporary or permanent HW failure.

The following reasons to start this procedure are foreseen (list is not exhaustive):
The Node B starts this procedure when a faulty equipment is taken out of service in Node B, and the logical resource that it serves is taken out of service or its service is degraded. The loss of equipment could result in the loss of a cell, carrier, number of codes supported ~~or~~ power availability or Base Band capacity.

The Node B starts this procedure when it has detected that HW resources allocated for the cell control are no longer available and HW resources must be reallocated for that purpose. Node B sends the common NBAP message „Resource Status Indication“ to the RNC to indicate that cell parameters have been cleared and common transport channels of the cell have been locally released. The RNC may also initiate other procedures to clear resources affected by the failure. It is up to the RNC to e.g. retransmit the configuration data and reallocate the common transport channels. In this case the message contains at least the Local Cell Identifier.

The Node B starts this procedure when it has detected that HW resources allocated for the traffic termination point are no longer available and HW resources must be reallocated for that purpose. Node B sends the common NBAP message „Node B Failure“ to the RNC to indicate that all radio links and Node B communication contexts of the traffic termination point have been locally released. In this case the message contains at least the communication control port identifier, which uniquely also identifies the traffic termination point. At reception of the Traffic Termination Point Failure message the C-RNC is expected to locally release all the radio links and the C-RNC communication contexts of the identified traffic termination point.

The Node B shall use the following procedure to advise the CRNC of a failure at Node B:



- The RESOURCE STATUS INDICATION message may include the following parameters ~~Failure type (e.g. service degradation, cell control or traffic termination point restart)~~
- ~~Local Cell Id~~
- ~~Cell Id (if configured) FFS~~
- Resource information (e.g. cell capacity, logical resources configured, communications control port identifier):
  - For a cell
    - Local cell id or global cell id (FFS).
    - Operational state. (1)

    - Availability status. (1)
    - New Maximum Power.
    - New Minimum Spreading Factor.
- For a Traffic Termination Point
    - TTP Id .
    - Operational state. (1)
    - Availability status. (1)
    - New Global Credit.
- For a Communication Control Port : (1)
    - TTP id
    - Operational state. (1)
    - Availability status. (1)
- For a Node B , a Node B Control Port: (1)
    - Node B Id, Node B Control Port Id
    - Operational state. (1)
    - Availability status. (1)
- For a Common Channel (PCH, RACH, FACH, DSCH, USCH, BCH):
    - Common Channel Id
    - Local cell id or global cell id (FFS).
    - Operational state. (1)
    - Availability status. (1)

- ~~Service Impact Level (indicates the grade of the service degradation i.e. total loss or degradation, also may indicate whether the fault is permanent or temporary (FFS))~~

For the procedure to be executed successfully, the following is needed:

- ~~A configured cell exists in Node B. Downlink and uplink common channel(s) may or may not have been defined in the cell.~~
- A Node B control port is available for communication between the RNC and the Node B.

(1) : For explanation of states definition and use (Operational state and Availability status), and new logical objects (Node B , Node B Control Port and Communication Control Port) see [R3] and [R4].

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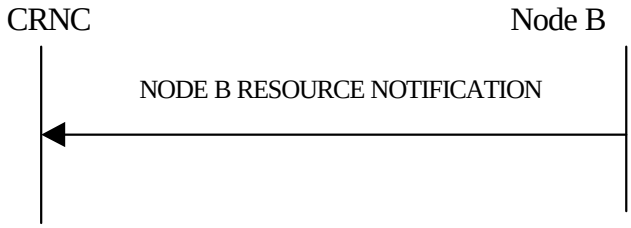
3.2.1.2 Node B Resource Notification

The Node B resource notification procedure provides the means for Node B to advise the RNC of it's high level resource capabilities~~. The ability for Node B to provide this information to the RNC is important particularly at initial cell configuration, where the status of the Node B following both Implementation Specific configuration and cell configuration should be provided to the RNC.~~ , following implementation specific configuration.

The Node B shall use the following procedure to provide resource notification to the RNC:



The NODE B RESOURCE NOTIFICATION message contains the following information:

- ~~Local Cell Id (a pre-configured cell identity local to Node B, known by both RNC and Node B)~~
- ~~Resources Supported (e.g. cell capacity, logical resources configured)~~
- Transaction Id (identifies the procedure)
- ~~Add/Delete Indicator (advises Node B if the resource identified is to be added or deleted from the current resource record)~~
- Resources Supported (e.g. cell capacity, logical resources configured):
  - Number of cells
  - For each cell:
    - Local cell id.
    - Add/Delete Indicator (advises RNC if the resource identified is to be added or deleted from the current resource record).
    - Maximum power.
    - Minimum spreading factor.
  - Number of Traffic Termination Points.
  - For each TTP:
    - TTP id.
    - Add/Delete Indicator (advises RNC if the resource identified is to be added or deleted from the current resource record).
    - Global credit.
    - Credit consumption law.

3.2.2 Message functional definition and contents

3.2.2.1 EMBEDEMBED**Resource Status Indication**

This message is sent from the Node B to the CRNC to notify the CRNC of the status of the resources at Node B.

Information Element	**Reference**	**Type**
Message Discriminator		M
Message Type		M
Indication Type		O
Resource Impact		**M**
Node B ID		**O**
Resource Operational State		M
Resource Availability Status		O[1]
Node B Control Port ID		**O**

[1] The availability status is optional when the resource works properly with its full nominal capacity (operational state = disabled)

Resource Operational State		M
Resource Availability Status		O
Cell ID		**O**
New Maximum Power		M
New Minimum Spreading Factor		M
Resource Operational State		M
Resource Availability Status		O
BCH ID		**O**
Cell ID		M
Resource Operational State		M
Resource Availability Status		O
PCH ID		**O**
Cell ID		M
Resource Operational State		M
Resource Availability Status		O
FACH ID		**O**
Cell ID		M
Resource Operational State		M
Resource Availability Status		O
RACH ID		**O**
Cell ID		M
Resource Operational State		M
Resource Availability Status		O
DSCH ID		**O**
Cell ID		M
Resource Operational State		M
Resource Availability Status		O
USCH ID		**O**
Cell ID		M
Resource Operational State		M
Resource Availability Status		O
Traffic Termination Point ID		**O**
New Global Credit		M
Resource Operational State		M
Resource Availability Status		O
Communication Control Port ID		**O**
Traffic Termination Point ID		M
Resource Operational State		M
Resource Availability Status		O

Transaction ID		M

3.2.2.2 Node B Resource Notification Indication

This message is sent from the Node B to inform the RNC about the abnormal condition of a logical resource that is the result of a temporary or permanent HW failure.
This message is sent from Node B to CRNC to notify the CRNC of the high level resource capabilities supported by Node B.

Information Element	**Reference**	**Type**
Message Discriminator		M
Message Type		M
Transaction ID		M
Cell Resource Notification		**O**
Local Cell ID or Global Cell ID		M
Add/Delete Indicator		M
Maximum Power		M
Minimum Spreading Factor		M
Traffic Termination Point Resource Notification		**O**
TTP ID		M
Add/Delete Indicator		M
Global Credit		M
Credit Consumption Law		**O**
Spreading Factor		M
Other Criteria (FFS)		M (FFS)
Credit Cost		M

4 Reference

- [R1] : TS 25.433 – NBAP Specification V.1.2.0, Source: Editor
- [R2] : TS 25.430 – Iub General Aspects and Principles V.0.1.5, Source: Editor
- [R3] : R3-99c69 – Addition of NodeB and NodeB Control Port objects in Resource Status Indication message, Source: Nortel Networks
- [R4] : R3-99c70 – Resource Status Indication message content refinement for NodeB logical resources availability management, Source: Nortel Networks

5 Proposal

- 3.2.2.1 content replaces section 9.1.30 of [R1]
- 3.2.2.2 content replaces section 9.1.31 of [R1]
- 3.2.1.1 content replaces 8.1.6.1 of [R1].
- 3.2.1.2 content replaces 8.1.6.2 of [R1].
- 3.1.1 content replaces 6.2.2.3 of [R2].

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