Agenda Item: 16.3, 16.4
Source: Ericsson

**Title: Replacement of NBAP Procedures for Radio Resource
                 Management: Node B Restarted and RNC Restarted**

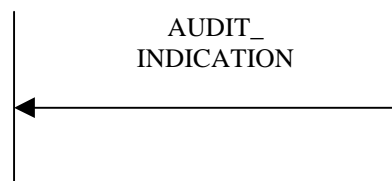**Document for: Decision**

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1.   INTRODUCTION

This contribution replaces the NBAP procedures Node B Restarted and RNC
Restarted with Audit of Logical Resources, i.e. configuration of cells and common
channels. The audit is to ensure that the configuration of the logical resources are the
same in the RNC and Node B, after a link failure, NBAP message timeout, NBAP
protocol reset, full or partial node restart.

2.   DESCRIPTION

2.1   Node B Restarted

If Node B restarts, gets a NBAP message timeout or detects a link failure, it can
indicate that it might have lost configuration data for the logical resources and/or that
it has been unable to receive configuration data for a while. It is done by sending the
NBAP common procedure AUDIT INDICATION from the Node B to the
Controlling RNC. The CRNC initiates an audit of the status of the configuration of
the logical resources by sending an AUDIT REQUEST message to Node B. See
chapter 8.1.2.3 RNC Restarted.

Node B initiated audit

The AUDIT INDICATION message contains the following mandatory information:

* Local Cell ID

2.2 RNC Restarted

The NBAP common procedure Audit Logical Resources is used by the Controlling RNC to perform an audit if the RNC has experienced any event which requires a check of the RNC-Node B relations, e.g. a restart in the RNC, an outage of the Iub link or a NBAP-message timeout.
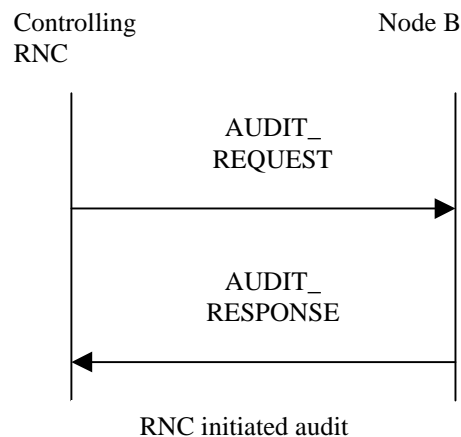
In order to minimize signalling, audit is performed on a Cell ID meaning that both the Cell and its connected common channels are treated as one auditable object. This is possible by introducing a Configuration Generation ID related to each Cell and its related common channels.

The RNC allocates a new Configuration Generation ID and includes it in messages each time when creating a cell, connecting common channels and changing attributes.

The Node B only saves the Configuration Generation ID after a successful procedure. The RNC shall save the new Configuration Generation ID when a successful response is received.

At audit, pairs of Cell Id and Configuration Generation ID sent by the RNC is compared with the Node B last stored Configuration Generation ID for the indicated Cell ID. Cell ID existing in Node B but not indicated in the audit request, shall be removed from the Node B including any related common channels. For each Cell ID where the Configuration Generation ID is matching, the Cell ID is included in the audit response message.

At audit response, the RNC compares the received Cell IDs with the its expected Cell IDs. Each missing Cell ID is marked as "configuration error" and proper recovery actions must be taken for the auditable object.

Controlling RNC   Node B

AUDIT_
REQUEST

AUDIT_
RESPONSE

RNC initiated audit

The AUDIT REQUEST message contains the following mandatory information:

- Cell Identity
- Configuration Generation Identity

The AUDIT RESPONSE message contains the following information:

- Cell Identity

2.3 Audit Indication

This message is sent to inform the RNC that an event has occurred in Node B that requires a consistency audit for the indicated resources. All locally in Node B configured Local Cell Ids shall be indicated in the message.

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
Transaction ID		M
Local Cell ID parameters		M
Local Cell ID		M

2.4 Audit Request

This message is sent to the Node B to perform a consistency audit of common resources related to the indicated Local Cell IDs.

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
Transaction ID		M
Cell ID parameters		O
Cell ID		M
Configuration Generation Identity		M

2.5 Audit Response

This message is sent to the RNC indicating which Cell IDs in Node B that have the same Configuration Generation ID as the RNC.

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
Transaction ID		M
Cell ID parameters		O
Cell ID		M

2.6 Configuration Generation ID

In order to minimise signalling, audit is performed on a Cell ID / Local Cell ID meaning that both the Cell and its connected common channels are treated as one auditable object. This is possible by introducing a Configuration Generation ID related to each Cell and its related common channels in the messages:

- CELL SETUP REQUEST,
- DL COMMON TRANSPORT CHANNEL SETUP REQUEST,

- DL COMMON TRANSPORT CHANNEL SETUP REQUEST,
- DL COMMON TRANSPORT CHANNEL RECONFIGURATION REQUEST,
- UL COMMON TRANSPORT CHANNEL SETUP REQUEST,
- UL COMMON TRANSPORT CHANNEL DELETE REQUEST,
- UL COMMON TRANSPORT CHANNEL RECONFIGURATION REQUEST.

If contribution R3-99927 Cell Reconfigure is approved, the same information element is to be included in the message CELL RECONFIGURATION REQUEST.

For each of the above messages, the CRNC sends a new Configuration Generation ID. For successful configuration, Node B stores the new Configuration Generation ID and sends the corresponding RESPONSE message to the RNC. RNC sets the new Configuration Generation ID for the configuration of that cell. For unsuccessful configuration, Node B keeps the old Configuration Generation ID and sends the corresponding FAILURE message to the RNC. Also the RNC keeps the old Configuration Generation ID.

2.7 Local Cell ID

The Local Cell ID is a representation of equipment in Node B that can support the logical resources Cell, Uplink Common Transport Channels and Downlink Common Transport Channels.

2.8 Configuration Generation ID

The Configuration Generation ID describes the generation of the configuration of logical resources in a cell.

3. PROPOSAL

Proposal 1

Replace the contents of chapters 8.1.2.2 Node B Restarted in 25.433 v1.1.1 NBAP Specification with the information in chapter 2.1 in this contribution.

Proposal 2

Replace the contents of chapters 8.1.2.3 RNC Restarted in 25.433 v1.1.1 NBAP Specification., with the information in chapter 2.2 in this.

Proposal 3

Add the contents of chapter 2.3 in this contribution to chapter 9.1.x Audit Indication in 25.433 v1.1.1 NBAP Specification.

Proposal 4

Add the contents of chapter 2.4 in this contribution to chapter 9.1.x+1 Audit Request in 25.433 v1.1.1 NBAP Specification.

Proposal 5

Add the contents of chapter 2.5 in this contribution to chapter 9.1.x+2 Audit Response in 25.433 v1.1.1 NBAP Specification.

Proposal 6

Add the mandatory information element 'Configuration Generation ID' in the messages that change the configuration of the logical resources, i.e.

- DL COMMON TRANSPORT CHANNEL SETUP REQUEST, chapter 9.1.25 in 25.433 v 1.1.1,

- DL COMMON TRANSPORT CHANNEL DELETION REQUEST, chapter 9.1.28 in 25.433 v 1.1.1,
- UL COMMON TRANSPORT CHANNEL SETUP REQUEST, chapter 9.1.30 in 25.433 v 1.1.1,
- UL COMMON TRANSPORT CHANNEL DELETE REQUEST, chapter 9.1.33 in 25.433 v 1.1.1,

If contribution R3-99926 Cell Setup is approved, the same information element is to be included in the message CELL SETUP REQUEST.

If contribution R3-99927 Cell Reconfigure is approved, the same information element is to be included in the message CELL RECONFIGURATION REQUEST.

Proposal 7

Add the contents of chapter 2.7 in this contribution to chapter 9.2.x Local Cell ID in 25.433 v1.1.1 NBAP Specification.

Proposal 8

Add the contents of chapter 2.8 in this contribution to chapter 9.2.x+1 Configuration Generation ID in 25.433 v1.1.1 NBAP Specification.

4. REFERENCES

[1]   TS 25.433 V1.1.1 - NBAP Specification
[2]   Contribution R3-99926 Refined NBAP Procedure for Cell Configuration Management: Cell Setup
[3]   Contribution R3-99927 Proposed NBAP Procedure for Cell Configuration Management: Cell Reconfiguration