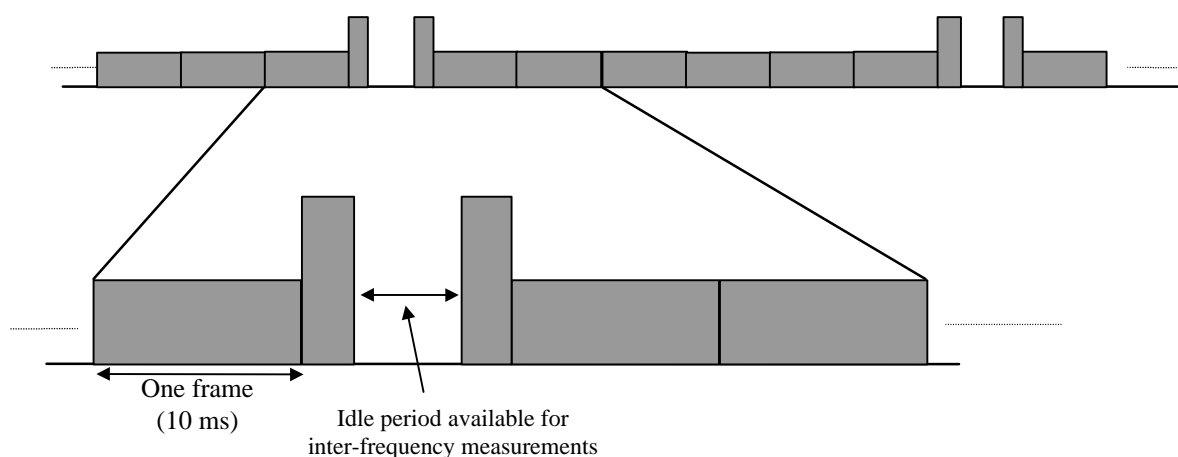


Agenda Item: 15.3, 16.2
Source: Nokia
Title: Support for Compressed Mode control in UTRAN interfaces
Document for: Approval

1 Introduction

In compressed mode (Ref. [25.212], chapter 4.4, [25.215], chapter 7.1.2) the data to be transmitted in one frame is compressed in such a way the transmission occurs in only part of the slots, allowing the mobile to perform interfrequency measurement during the idle period (gap).



The gap may be repeated in subsequent frames accordingly to defined patterns.

This feature is essential in order to support interfrequency, intermode (FDD->TDD) and intersystem handover, but it has not been considered so far in the specification of the UTRAN interfaces. This paper proposes the modification to the NBAP and RNSAP protocol in order to support the compressed mode.

2 Discussion

The switch into the compressed mode is activated by SRNC when it detects the need for the UE to perform interfrequency measurement. SRNC selects the most appropriate compressed mode pattern and beginning and end of the compressed mode period, and communicates this to the mobile (via RRC signalling) and to the L1 in Node B(s).

Since it is necessary that all the nodeBs and UE activate/deactivate the compressed mode transmission/reception at the same moment (frame), a synchronised L1 reconfiguration is needed. It is not proposed to use the existing synchronised RL reconfiguration procedure because of the following reasons:

- Synchronised RL Reconfiguration is an heavy procedure with a broad scope, and it is not efficient to add new functionality on this, neither to use such complex messages for the activation of the compressed mode.
- Synchronised RL Reconfiguration defines the initial time for the reconfiguration, while the activation of the compressed mode specify both the initial time AND the duration (the patterns currently defined for the compressed mode have a different duration up to 250 frames, 2,5 seconds). When the pattern expires, the compressed mode is deactivated without the need of an explicit signalling.

For this reason it is proposed to introduce new procedures in RNSAP and NBAP for the activation of the compressed mode (Compressed Mode Control) composed by COMPRESSED MODE PREPARE, COMPRESSED MODE READY, COMPRESSED MODE COMMIT messages, plus the failures messages.

3 NBAP and RNSAP Procedures

3.1 RNSAP Compressed mode control procedure

Compressed mode procedure is used to activate the compressed mode in the DRNS for one UE-UTRAN connection.

It is initiated by the SRNC by sending the COMPRESSED MODE PREPARE message to the DRNC. The message is sent using the relevant signalling connection.

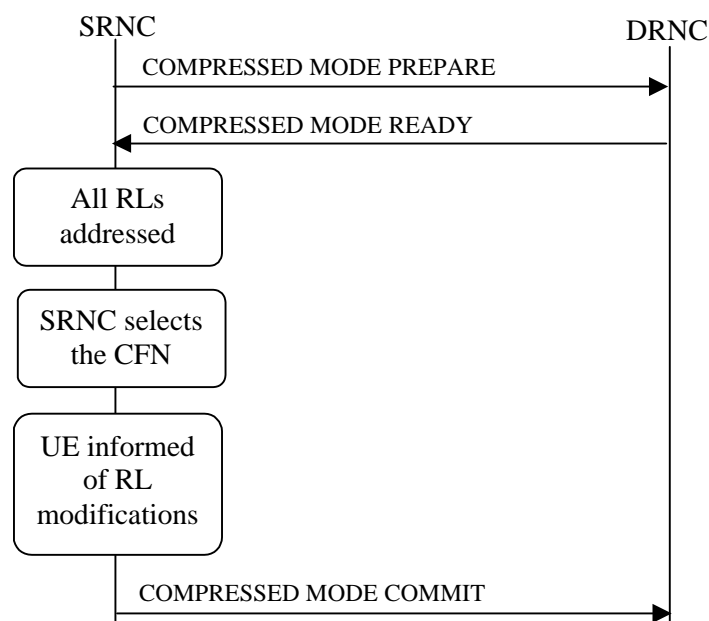
The message contains: the length of the gap and the position in the frame, the compressed mode pattern type and ID. The message is targeted to all the RLs supported by that DRNS.

Successful operation

If the proposed modifications are allowed by the DRNS resource management algorithms, and the DRNC has successfully initialised the required resources it responds to the SRNC with COMPRESSED MODE READY message.

Upon the reception of the COMPRESSED MODE READY from all the RL under its control, the SRNC selects the most suitable time for the beginning of the compressed mode, informs the UE about the compressed mode period with the relevant RRC message and sends the COMPRESSED MODE COMMIT message to DRNCs. The COMPRESSED MODE COMMIT message contains the CFN indicating the beginning of the compressed mode.

The procedure can be used also to terminate the compressed mode before the end of the compressed mode period, by setting the pattern type to 'None'.

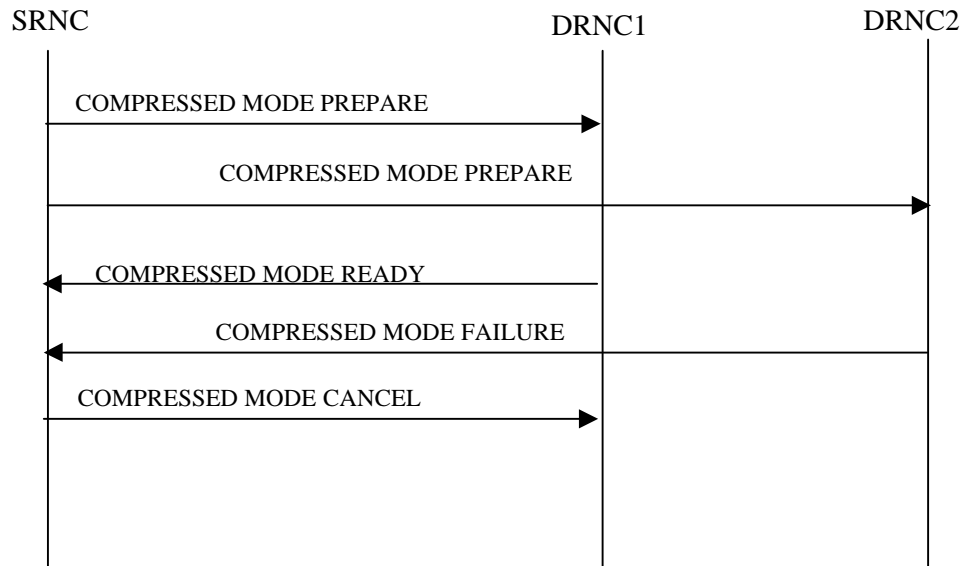


(Successful case)

Unsuccessful operation

If the requested reconfiguration fails for one or more RLs the DRNC aborts the procedure and sends the RNSAP message COMPRESSED MODE FAILURE to the SRNC, indicating the reason for failure.

After sending the COMPRESSED MODE PREPARE message to the DRNC, SRNC may abort the procedure sending the COMPRESSED MODE CANCEL message instead of the COMPRESSED MODE COMMIT.



(Unsuccessful case)

3.2 NBAP Compressed mode control procedure

Compressed mode procedure is used to activate the compressed mode in the Node B for one UE-UTRAN connection.

It is initiated by the CRNC by sending the COMPRESSED MODE PREPARE message to the NodeB.

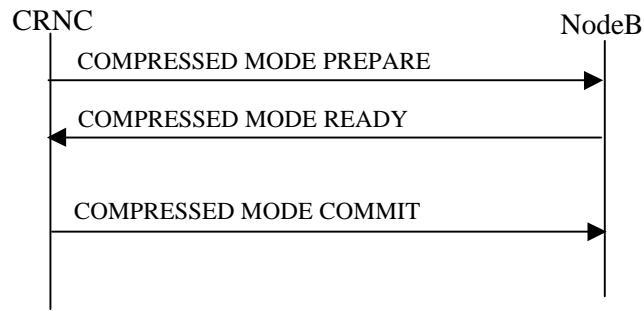
The message contains: the length of the gap and the position in the frame, the compressed mode pattern type and ID. The message is targeted to all the RLs supported by that NodeB.

Successful operation

If the proposed modifications are allowed by the NodeB resource management algorithms, and the NodeB has successfully initialised the required resources it responds to the CRNC with COMPRESSED MODE READY message.

Subsequent to the reception of the COMPRESSED MODE READY messages addressing all the RL, CRNC sends the COMPRESSED MODE COMMIT message to Node B. The COMPRESSED MODE COMMIT message contains the CFN indicating the beginning of the compressed mode.

The procedure can be used also to terminate the compressed mode before the end of the compressed mode period, by setting the pattern type to 'None'.

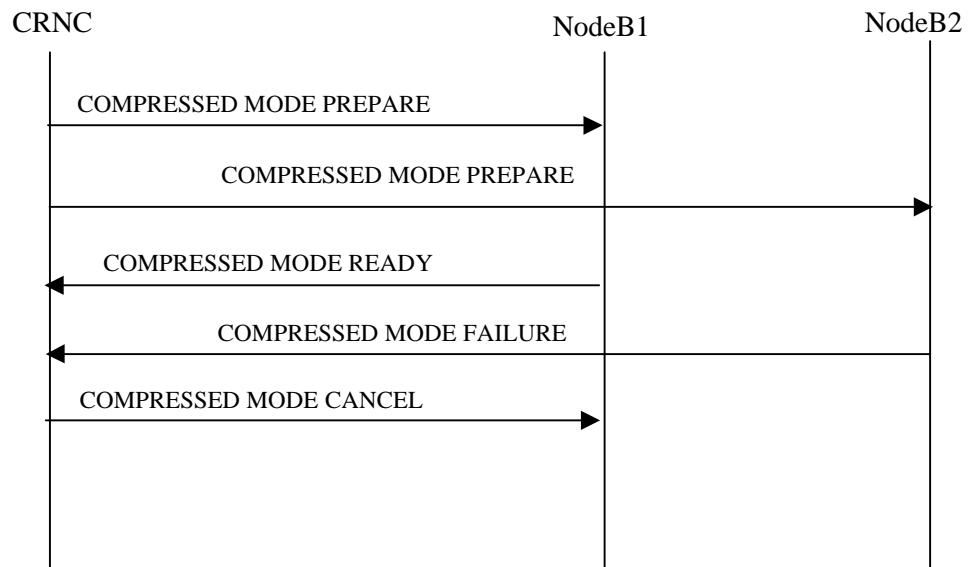


(Successful case)

Unsuccessful operation

If the requested reconfiguration fails for one or more RLS, the NodeB aborts the procedure and sends the NBAP message COMPRESSED MODE FAILURE to the CRNC, indicating the reason for failure.

After sending the COMPRESSED MODE PREPARE message to the NodeB, CRNC may abort the procedure sending to the Node B the COMPRESSED MODE CANCEL message instead of the COMPRESSED MODE COMMIT.



(Unsuccessful case)

4 RNSAP and NBAP messages

4.1 RNSAP COMPRESSED MODE PREPARE message

Information Element	Reference	Type
Message Type		M
Transaction ID		M
Slot Number		M
Pattern Type		M
Pattern ID		C1
Gap length		C2
Frame Type		M
Power control mode		M

C1: Present if Pattern type <> 'single gap'

C2: Present if Pattern type = 'single gap'

4.2 RNSAP COMPRESSED MODE READY message

Information Element	Reference	Type
Message Type		M
Transaction ID		M

4.3 RNSAP COMPRESSED MODE COMMIT message

Information Element	Reference	Type
Message Type		M
Transaction ID		M
CFN		M

4.4 RNSAP COMPRESSED MODE FAILURE message

Information Element	Reference	Type
Message Type		M
Transaction ID		M
Cause		M

4.5 RNSAP COMPRESSED MODE CANCEL message

Information Element	Reference	Type
Message Type		M
Transaction ID		M

4.6 NBAP COMPRESSED MODE PREPARE message

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
Node B communication context ID		M
Transaction ID		M
Slot Number		M
Pattern Type		M
Pattern ID		C1
Gap length		C2
Frame Type		M
Power control mode		M

C1: Present if Pattern type <> 'single gap'

C2: Present if Pattern type = 'single gap'

4.7 NBAP COMPRESSED MODE READY message

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
CRNC communication context ID		M
Transaction ID		M

4.8 NBAP COMPRESSED MODE COMMIT message

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
Node B communication context ID		M
Transaction ID		M
CFN		M

4.9 NBAP COMPRESSED MODE FAILURE message

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
CRNC communication context ID		M
Transaction ID		M
Cause		M

4.10 NBAP COMPRESSED MODE CANCEL message

Information Element	Reference	Type
Message Discriminator		M
Message Type		M
Node B communication context ID		M
Transaction ID		M

5 Description of new information elements

Slot Number

This parameter defines the slot number when the transmission gap for compressed mode measurement starts. Values are from 0 to 14.

Pattern Type

Type of pattern to be used for compressed mode measurements. Values are: 'None', 'Single Gap', 'TDD measurement', 'GSM power measurement', 'GSM synchronisation'. To be confirmed by WG1.

Pattern ID

This parameter identifies the pattern for the repetition of the gaps in compressed mode measurement.

Gap Length

Length of the gap (in slots) for 'single gap' compress mode measurement.

Frame type

This parameter defines if frame type 'A' or 'B' shall be used in compressed mode.

Power control mode

This parameter defines which power control algorithm shall be used during the compressed mode. Values are 'algorithm1' or 'algorithm2'.

6 Proposals

- Include section 3.1 of this paper in [25.423], section 8.2 (DCH procedures).
- Include section 3.2 of this paper in [25.433], section 8.2 (Dedicated NBAP procedures).
- Include sections 4.1 to 4.5 of this paper in [25.423], section 9.1.
- Include sections 4.6 to 4.10 of this paper in [25.433], section 9.1.
- Include the parameters defined in section 5 of this paper in [25.423], section 9.2.2 (FDD specific parameters) and in [25.433], section 9.2.2 (FDD specific parameters)

7 References

- [25.212] *Multiplexing and Channel Coding (FDD)*
- [25.215] *Physical Layer Measurements (FDD) v.0.1.0*
- [25.423] *RNSAP specification v.1.3.1*
- [25.433] *NBAP specification v.1.2.1*