TSG-RAN Working Group 3 meeting ***TSGR3#6(99)B89***
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Sophia Antipolis, France

Title: **Report of the NBAP & RNSAP TDD Parameters Study Item: TDD parameters in NBAP**

Source: **Italtel / Siemens**

Agenda Item: **15.1**

Document for: **Approval**

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1. Introduction

This contribution presents the results of the study item on TDD parameters in NBAP protocol.
The following documents have been assumed as starting point for the discussion:

- #906: TDD Support of NRT Data Services with Dedicated Channels (InterDigital)
- #954: TDD Parameters in RNSAP (Italtel/Siemens): not discussed.
- #964: NBAP Messages for USCH/DSCH configuration (Siemens/Italtel)
- #A46: TDD Parameters in RNSAP and NBAP RADIO LINK ADDITION Messages (Italtel/Siemens)

Contributions to the discussion have arrived from the following companies:
- Italtel /Siemens
- Interdigital
- Vodafone
- CSELT

The content of this report is based on version 0.4 of the working document of the NBAP & RNSAP TDD Parameters Study Item.

Proposals for RNSAP Messages

Information Element Functional Definition and Contents

It is proposed to include the following definitions in section 9.2.3 of TS 25.433.

TIMESLOT
In TDD the Time Slot represents the minimum time interval inside a Radio Frame that can be assigned to a Physical Channel.
The range of this parameter is *0 .. 14*.

CHANNELISATION CODE NUMBER
The Channelisation Code Number indicates which Channelisation Code is used for a given Physical Channel. In TDD the Channelisation Code is an Orthogonal Variable Spreading Factor code, that can have a spreading factor of 1, 2, 4, 8 or 16.
The range of this parameter is *0 .. 30*.

MIDAMBLE TYPE
In TDD the midamble part of the burst can contain two different midamble types: a short one of length 256 chips, or a long one of 512 chips. The data rate of the physical channel is depending on the used midamble length.
The values of this parameter are *short* and *long*.

MIDAMBLE SHIFT
In TDD different bursts transmitted simultaneously using the same midamble code shall use different Midamble Shifts.
The 256 chip midamble supports 3 different time shifts, the 512 chips midamble may support 8 or even 16 time shifts.
The range of this parameter is *0 .. 15* for long midamble and *0 .. 2* for short midamble.

REPETITION PERIOD
In TDD the Repetition Period represents the number of consecutive Radio Frames after which the same assignment scheme of Time Slots to a Physical Channel is repeated. This means that if the Time Slot *K* is assigned to a physical channel in the Radio Frame *J*, it is assigned to the same physical channel also in all the Radio Frames *J+n*Repetition Period* (where *n* is an integer).
The Repetition Period is a submultiple of the Superframe length (72), i.e. 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36 or 72.

SUPERFRAME OFFSET
In TDD the Superframe Offset represents the number of the first Radio Frame inside a Superframe that is assigned to a Physical Channel.
The range of this parameter is *0 .. Repetition Period – 1*.

REPETITION LENGTH
In TDD the Repetition Length represents the number of consecutive Radio Frames inside a Repetition Period in which the same Time Slot is assigned to the same Physical Channel.
The values of this parameter are *1, 2, 4 and 8*.

TFCI PRESENCE
The TFCI PRESENCE parameter indicates whether the TFCI shall be included. This is important for CCTrCH, which have capacity on more than one physical channel.
The values of this parameter are *present* and *not present*.

CCTrCH ACTIVATION CFN
The CFN of the frame in which the physical layer starts transmitting a CCTrCH

CCTrCH DURATION
The CCTrCH Duration represents the number of frames for which the CCTrCH is activated.

Note: in case the Superframe Offset is not specified but only the CCTrCH Activation CFN, all DPCHs belonging to the same CCTrCH will start at the same time (i.e. at the CCTrCH Activation CFN).
In case neither the Superframe Offset nor the CCTrCH Activation CFN are specified, the Superframe Offset for all DPCHs belonging to the same CCTrCH is assumed to be 0.

CCTrCH ID
The CCTrCH ID identifies unambiguously a CCTrCH inside a Radio Link.

DPCH ID
The DPCH ID identifies unambiguously a DPCH inside a Radio Link.

Supporting CCTrCH ID
The Supporting CCTrCH ID indicates on which CCTrCH is mapped a DCH.

Measured UC-Id
The Measured UC-Id identifies the cell taken as reference to measure the relative frame timing difference.

Measured Chip Offset
The Measured Chip Offset represents the relative frame timing difference respect to the cell taken as reference (identified by the Measured UC-Id)

Measuring UC-Id
The Measuring UC-Id identifies the cell that performs the measurement of the relative frame timing difference respect to the cell taken as reference (identified by the Measured UC-Id).

Cell Parameter
The Cell Parameter identifies unambiguously the Code Groups, Scrambling Codes, Midambles and Toffset (see table 7 of TS25.223)
The range of this parameter is 0..127.

PSCH and PCCPCH Allocation

In TDD the PSCH and PCCPCH are mapped on one or two downlink slots per frame. There are three cases of PSCH and PCCPCH allocation as follows:

Case 1) PSCH and PCCPCH allocated in a single TS#k

Case 2) PSCH in two TS and PCCPCH in the same two TS: TS#k and TS#k+8

Case 3) PSCH in two TS, TS#k and TS#k+8, and the PCCPCH in TS#i, pointed by PSCH.

The range of this parameter is therefore 1..3.

PSCH & PCCPCH Time Slot Pointer (k)
When the value of *PSCH and PCCPCH Allocation* is:

- *Case 1*, then this parameters assume the value *k=0….14*
- *Case 2 and Case 3*, then this parameter assumes the value *k=0…6*

PCCPCH Time Slot Pointer (i)
This IE is present only if *PSCH & PCCPCH Allocation = Case 3.*
In that case this parameter assumes the value *k=0…14.*

Time Slot Status

This parameter indicates whether the TS in the cell is active or not.
The values of this parameter are *Active* and *Not Active*

Time Slot Direction

This parameters indicates whether the TS in the cell is used in Uplink or Downlink direction.
The values of this parameter are *UL* and *DL*.

NBAP Message Functional Definition and Content

It is proposed to include the following tables in section 9.1 of TS 25.433.

RADIO LINK SETUP REQUEST

[TDD]

Information Element	**Reference**	**Type**
Message Discriminator		M
Message Type		M
CRNC Communication Context ID		M
Transaction ID		M
RL ID		M
UC-Id		M
Frame Offset		M
UL CCTrCH Information		**M**
CCTrCH ID		M
CCTrCH Activation CFN		O
CCTrCH Duration		O
Transport Format Combination Set		M
UL DPCH Information		**M**
DPCH ID		M
Channelization Code Number		M
Midamble Type		M
Midamble Shift		M
Time Slot		M
Superframe Offset		O
Repetition Period		M
Repetition Length		O

TFCI Presence		O
DL CCTrCH Information		**M**
CCTrCH ID		M
CCTrCH Activation CFN		O
CCTrCH Duration		O
Transport Format Combination Set		M
DL DPCH information		**M**
DPCH ID		M
Channelization Code Number		M
Midamble Type		M
Midamble Shift		M
Time Slot		M
Superframe Offset		O
Repetition Period		M
Repetition Length		O
TFCI Presence		O
DCH Information		**M**
DCH ID		M
Supporting CCTrCH ID		M
DCH Combination Ind		O
DCH Allocation/Retention priority		O
DCH Frame Handling Priority		O
UL Transport Format Set		M
DL Transport Format Set		M
(initial) DL transmission power		M
Maximum DL power		M
Minimum DL power		M
UL Eb/No Target		O

RADIO LINK SETUP RESPONSE

[TDD]

Information Element	**Reference**	**Type**
Message Discriminator		M
Message Type		M
CRNC Communication Context ID		M
Node B Communication Context ID		M

Communication Control Port ID		M
Transaction ID		M
RL ID		M
UL interference level		M
DCH Information Response		M
DCH ID		M
Binding ID		M
Transport Layer Address		FFS

RADIO LINK SETUP FAILURE

[TDD]

Information Element	**Reference**	**Type**
Message Discriminator		M
Message Type		M
CRNC Communication Context ID		M
Node B Communication Context ID		M
Communication Control Port ID		O
Transaction ID		M
RL ID		M
RL Failure Cause		M

RADIO LINK ADDITION REQUEST

[TDD]

Information Element	**Reference**	**Type**
Message discriminator		M
Message type		M
Node B communication context ID		M
Transaction ID		M
RL-ID		M
UC-Id		M
Frame Offset		M
UL DPCH Information		**M**
DPCH ID		M
Channelization Code Number		M
Midamble Type		M

Midamble Shift		M
Time Slot		M
Superframe Offset		O
Repetition Period		M
Repetition Length		O
TFCI Presence		O
DL DPCH Information		**M**
DPCH ID		M
Channelization Code Number		M
Midamble Type		M
Midamble Shift		M
Time Slot		M
Superframe Offset		O
Repetition Period		M
Repetition Length		O
TFCI Presence		O
Uplink Eb/No Target		O
Maximum Downlink power		O
Minimum Downlink power		O

RADIO LINK ADDITION RESPONSE

[TDD]

Information Element	**Reference**	**Type**
Message discriminator		M
Message type		M
CRNC Communication Context ID		M
Transaction ID		M
UL interference level		M

RADIO LINK ADDITION FAILURE

[TDD]

Information Element	Reference	Type
Message discriminator		M
Message type		M
CRNC Communication Context ID		M
Transaction ID		M
RL Failure Cause		M

RADIO LINK RECONFIGURATION PREPARE

[TDD]

Information element	Reference	Type
Message Discriminator		M
Message type		M
Node B Communication Context ID		M
Transaction ID		M
RL ID		M
Maximum Downlink power		O
Minimum Downlink power		O
UL CCTrCH Information		**O**
CCTrCH ID		M
CCTrCH Duration		O
Transport Format Combination Set		M
UL DPCH Information		**O**
DPCH ID		M
Channelization Code Number		O
Midamble Type		O
Midamble Shift		O
Time Slot		O
Superframe Offset		O
Repetition Period		O
Repetition Length		O
TFCI Presence		O
DL CCTrCH Information		**O**
CCTrCH ID		M
CCTrCH Duration		O
Transport Format Combination Set		M
DL DPCH Information		**M**
DPCH ID		M

Channelisation Code Number		O
Midamble Type		O
Midamble Shift		O
Time Slot		O
Superframe Offset		O
Repetition Period		O
Repetition Length		O
TFCI Presence		O
DCHs to modify		**O**
DCH ID		M
DCH Allocation/Retention Priority		O
DCH Frame Handling Priority		O
Transport format set (DL)		O
Transport format set (UL)		O
DCHs to add		**O**
DCH ID		M
Supporting CCTrCH ID		M
DCH Combination Ind		O
DCH Allocation/Retention Priority		O
DCH Frame Handling Priority		O
Transport format set (DL)		M
Transport format set (UL)		M
DCHs to delete		**O**
DCH ID		M

RADIO LINK RECONFIGURATION COMMIT

[TDD]

Information element	**Reference**	**Type**
Message Discriminator		M
Message type		M
Node B Communication Context ID		M
Transaction ID		M
UL CCTrCH Information		**M**
CCTrCH Activation CFN		M
DL CCTrCH Information		**M**
CCTrCH Activation CFN		M

RADIO LINK RECONFIGURATION REQUEST

[TDD]

Information element	Reference	Type
Message Discriminator		M
Message type		M
Node B Communication Context ID		M
Transaction ID		M
RL ID		M
Maximum Downlink power		O
Minimum Downlink power		O
UL CCTrCH Information		**O**
CCTrCH ID		M
TFCS		M
DL CCTrCH Information		**O**
CCTrCH ID		M
TFCS		M
DCHs to modify		**O**
DCH ID		M
DCH Allocation/Retention Priority		O
DCH Frame Handling Priority		O
Transport format set (DL)		O
Transport format set (UL)		O
DCHs to add		**O**
DCH ID		M
DCH Combination Ind		O
DCH Allocation/Retention Priority		O
DCH Frame Handling Priority		O
Transport format set (DL)		M
Transport format set (UL)		M
DCHs to delete		**O**
DCH ID		M

COMMON TRANSPORT CHANNEL SETUP REQUEST

[TDD]

Note that it's assumed that in TDD the FACH and PCH are mapped on the Secondary CCPCH (this assumption should be confirmed by WG1), while the BCH is mapped on the Primary CCPCH.

Information Element	Reference	Type
Message Discriminator		M

Message Type		M
Transaction ID		M
UC-Id		M
Cell carrier ID		M
Common transport channel ID		M
Common transport channel type		M
Transmit Offset		M
FACH parameters		**O**
Channelisation Code Number		M
Time Slot		M
Midamble Type		M
Midamble Shift		M
Superframe Offset		O
Repetition Period		M
Repetition Length		O
DL Transport Format Set		M
DL Transport Format Combination Set		M
ToAWS		M
ToAWE		M
FACH Power		M
BCH parameters		**O**
Time Slot		M
Midamble Type		M
Superframe Offset		O
Repetition Period		M
Repetition Length		O
BCH power		M
PCH parameters		**O**
Channelisation Code Number		M
Time Slot		M
Midamble Type		M
Midamble Shift		M
Superframe Offset		O
Repetition Period		M
Repetition Length		O
DL Transport Format Set		M
DL Transport Format Set		M

ToAWS		M
ToAWE		M
PCH power		M
RACH parameters		**M**
Allowed spreading factors for the message part		M
Timeslots		M
Channelisation Codes Number		M
Midamble Type		M
DSCH parameters		**O**
DSCH ID		M
Transport Format Combination Set		M
PDSCH parameters		**M**
PDSCH ID		O
Channelisation Code Number		M
Time Slot		M
Midamble Type		M
Midamble Shift		M
Superframe Offset		O
Repetition Period		M
Repetition Length		O
TFCI Presence		O
USCH parameters		**O**
USCH ID		M
Transport Format Combination Set		M
PUSCH parameters		**M**
PUSCH ID		O
Channelisation Code Number		M
Time Slot		M
Midamble Type		M
Midamble Shift		M
Superframe Offset		O
Repetition Period		M
Repetition Length		O
TFCI Presence		O

COMMON TRANSPORT CHANNEL RECONFIGURATION REQUEST

[TDD]

Information Element	**Reference**	**Type**
Message Discriminator		M
Message Type		M
Transaction ID		M
Cell ID		M
FACH Parameters		**O**
FACH Power		C
BCH Parameters		**O**
BCH Power		C
PCH Parameters		**O**
PCH Power		C
DSCH Parameters		**O**
DSCH Power		C
USCH Parameters		**O**
USCH Power		C

CELL SETUP REQUEST

[TDD]

Information Element	**Reference**	**Type**
Message Discriminator		M
Message Type		M
Transaction ID		M
Local UC-Id		M
UC-Id		M
UARFCN		M
Cell Parameter		M
PSCH & PCCPCH Allocation		M
PSCH & PCCPCH Time Slot Pointer (k)		M
PCCPCH Time Slot Pointer (i)		C1
PSCH Power		M
Max transmission power		M
Time Slot Configuration		M
Time Slot		M
Time Slot Status		M
Time Slot Direction		M

C1: this IE is present only if *PSCH & PCCPCH Allocation=Case 3*

NBAP messages not used in TDD

The DL POWER CONTROL is not used in TDD; therefore it shall be tagged as FDD only.