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Title: **TDD Parameters in NBAP Messages**

Source: **Italtel / Siemens**

Agenda Item: **16.4**

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Introduction

This contribution proposes the parameters to be included in NBAP specification (TS 25.433) in order to support TDD mode operation.
In section 1, new parameter definitions for section 9.2 of TS 25.433 are proposed, while in section 2 some revisions for the NBAP message content are given (to be included in section 9.1 of TS 25.433).

1. Information Element Functional Definition and Contents

The following definitions are used in section 2 of this contribution and should be added to section 9.2 (Information Element Functional Definition and Contents) 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.*

2. Message Functional Definition and Content

The following tables are proposed to replace the corresponding ones in section 9.1 (Message Functional Definition and Content) of TS 25.433.
In all the tables an additional column for TDD parameters has been added.
The parameters that are not used either by FDD or TDD have been marked as N.A. (Not Applicable).
It's FFS how to code the mode information, i.e. whether the radio mode shall be indicated per message, per IE, or derived by cell configuration settings.

RADIO LINK SETUP REQUEST

In the Radio Link Set-up Request message the following changes have been made:

- IE group **UL Channelisation Code** renamed into **UL DPCH Information**, since it contains other information about the UL Dedicated Physical Channel;
- **DPCH ID** added to the IE group **UL DPCH Info**;
- Several TDD parameters added into the IE group **UL DPCH Information**;
- IE group **DL Channelisation Code** renamed into **DL DPCH Information**, since it contains other information about the DL Dedicated Physical Channel;
- **DPCH ID** added to the IE group **DL DPCH Info**;
- Several TDD parameters added into the IE group **DL DPCH Information**;
- IE groups **UL CCTrCH Information** and **DL CCTrCH Information** added;
- **CCTrCH IDs** added to the IE groups **UL CCTrCH Information** and **DL CCTrCH Information.**

Information Element	Reference	Type (FDD)	Type (TDD)
Message Discriminator		M	M
Message Type		M	M
CRNC Communication Context ID		M	M
Transaction ID		M	M
UL Scrambling Code		M	N.A
UL DPCH Information		**M**	**M**
DPCH ID		M	M
Length of UL Channelization Code		M	N.A.
Channelization Code Number		N.A.	M
Midamble Type		N.A.	M
Midamble Shift		N.A.	M
Time Slot		N.A.	M
Superframe Offset		N.A.	O
Repetition Period		N.A.	M
Repetition Length		N.A.	O
TFCI Presence		N.A.	O
DCH Information		**M**	**M**
DCH ID		M	M
DCH Combination Ind		O	O
DCH Priority		FFS	FFS
UL Transport Format Set		M	M
DL Transport Format Set		M	M
UL CCTrCH Information		**M**	**M**
CCTrCH ID		M	M
UL Transport Format Combination Set		M	M
UL TFCI used flag		*(FFS)*	N.A.
DL CCTrCH Information		**M**	**M**
CCTrCH ID		M	M
DL Transport Format Combination Set		M	M
DL TFCI used Flag		*(FFS)*	N.A.
RL Information		**M**	**M**
RL ID		M	M
Cell ID		M	M
OFF		M	N.A.

Chip Offset (Td)		M	N.A.
Diversity Control Field		C[1]	N.A.
DL Scrambling Code		M	N.A.
DL DPCH information		**M**	**M**
DPCH ID		M	M
Channelization Code Number		M	M
Midamble Type		N.A.	M
Midamble Shift		N.A.	M
Time Slot		N.A.	M
Superframe Offset		N.A.	O
Repetition Period		N.A.	M
Repetition Length		N.A.	O
TFCI Presence		N.A.	O
(initial) DL transmission power		M	M
Maximum DL power		M	M
Minimum DL power		M	M
UL Eb/No Target		M	O
DL Reference Power		M	N.A.

RADIO LINK SETUP RESPONSE

In the Radio Link Set-up Response message parameters used in case of Diversity have been marked as N.A. for TDD.

Information Element	**Reference**	**Type (FDD)**	**Type (TDD)**
Message Discriminator		M	M
Message Type		M	M
CRNC Communication Context ID		M	M
Node B Communication Context ID		M	M
Communication Control Port ID		M	M
Transaction ID		M	M
RL Information Response		**M**	**M**
RL ID		M	M
Diversity Indication		C[2]	N.A.

[1] This Information Element is present for all the radio links except the first radio link in the Node B.

[2] This Information Element is present for all the radio links except the first radio link in the Node B.

Reference RL ID		C[3]	N.A.
DCH Information Response		**C[4]**	M
DCH ID		M	M
Binding ID		M	M
Transport Layer Address		FFS	FFS

RADIO LINK SETUP FAILURE

Since in TDD only one radio link per UE can be established, in the Radio Link Set-up Failure message the parameters belonging to the IE group **Successful RL Information Response** has been marked as N.A.

Information Element	**Reference**	**Type (FDD)**	**Type (TDD)**
Message Discriminator		M	M
Message Type		M	M
CRNC Communication Context ID		M	M
Node B Communication Context ID		M	M
Communication Control Port ID		O	O
Transaction ID		M	M
Successful RL Information Response		**O**	**N.A.**
RL ID		M	N.A.
Diversity Indication		C[5]	N.A.
Reference RL ID		C[6]	N.A.
DCH Information Response		**C[7]**	**N.A.**
DCH ID		M	N.A.
Binding ID		M	N.A.
Transport Layer Address		FFS	N.A.
Unsuccessful RL Information Response		**M**	**M**
RL ID		M	M
RL Failure Cause		M	M

[3] This Information Element is present when the Diversity Indication Information Element indicates combining.

[4] This Information Element is present when the Diversity Indication Information Element indicates non-combining.

[5] This Information Element is present for all the radio links except the first radio link in the Node B.

[6] This Information Element is present when the Diversity Indication Information Element indicates combining.

[7] This Information Element is present when the Diversity Indication Information Element indicates non-combining.

RADIO LINK RECONFIGURATION PREPARE

In the Radio Link Reconfiguration Prepare message the following changes have been made:

- IE group **UL Channelisation Code** renamed into **UL DPCH Information**, since it contains other information about the UL Dedicated Physical Channel;
- **DPCH ID** added to the IE group **UL DPCH Info**;
- Several TDD parameters added into the IE group **UL DPCH Information**;
- IE group **DL Channelisation Code** renamed into **DL DPCH Information**, since it contains other information about the DL Dedicated Physical Channel;
- **DPCH ID** added to the IE group **DL DPCH Info**;
- Several TDD parameters added into the IE group **DL DPCH Information**;
- IE groups **UL CCTrCH Information** and **DL CCTrCH Information** added;
- **CCTrCH IDs** added to the IE groups **UL CCTrCH Information** and **DL CCTrCH Information.**

Information element	**Reference**	**Type (FDD)**	**Type (TDD)**
Message Discriminator		M	M
Message type		M	M
Node B Communication Context ID		M	M
Transaction ID		M	M
Uplink Scrambling code		O	N.A.
DCHs to modify		**O**	**O**
DCH ID		M	M
DCH Priority		FFS	FFS
Transport format set (DL)		O	O
Transport format set (UL)		O	O
DCHs to add		**O**	**O**
DCH ID		M	M
DCH Combination Ind		O	O
DCH Priority		FFS	FFS
Transport format set (DL)		M	M
Transport format set (UL)		M	M
DCHs to delete		**O**	**O**
DCH ID		M	M
DL CCTrCH Information		**M**	**O**
CCTrCH ID		M	M
TFCS (DL)		M	M
UL CCTrCH Information		**M**	**O**
CCTrCH ID		M	M
TFCS (UL)		M	M
UL DPCH Information		**O**	**O**
DPCH ID		M	M
Channelisation Code		M	N.A.
Channelization Code Number		N.A.	O

Midamble Type		N.A.	O
Midamble Shift		N.A.	O
Time Slot		N.A.	O
Superframe Offset		N.A.	O
Repetition Period		N.A.	O
Repetition Length		N.A.	O
TFCI Presence		N.A.	O
RL Information		**O**	**O**
RL ID		M	M
DL Scrambling Code		M	N.A.
DL DPCH Information		**M**	**M**
DPCH ID		M	M
Channelisation Code Number		M	O
Midamble Type		N.A.	O
Midamble Shift		N.A.	O
Time Slot		N.A.	O
Superframe Offset		N.A.	O
Repetition Period		N.A.	O
Repetition Length		N.A.	O
TFCI Presence		N.A.	O
DL reference power		FFS	N.A.

RADIO LINK RECONFIGURATION REQUEST

In the Radio Link Reconfiguration Request message the following changes have been made:

- IE groups **UL CCTrCH Information** and **DL CCTrCH Information** added;
- CCTrCH IDs added to the IE groups **UL CCTrCH Information** and **DL CCTrCH Information.**

Information element	Reference	Type (FDD)	Type (TDD)
Message Discriminator		M	M
Message type		M	M
Node B Communication Context ID		M	M
Transaction ID		M	M
DCHs to modify		**O**	**O**
DCH ID		M	M
DCH Priority		FFS	FFS
Transport format set (DL)		O	O

Transport format set (UL)		O	O
DCHs to add		**O**	**O**
DCH ID		M	M
DCH Combination Ind		O	O
DCH Priority		FFS	FFS
Transport format set (DL)		M	M
Transport format set (UL)		M	M
DCHs to delete		**O**	**O**
DCH ID		M	M
DL CCTrCH Information		**M**	**O**
CCTrCH ID		M	M
TFCS (DL)		M	M
UL CCTrCH Information		**M**	**O**
CCTrCH ID		M	M
TFCS (UL)		M	M
DL reference power		FFS	N.A.

DL COMMON TRANSPORT CHANNEL SETUP REQUEST

In the DL Common Transport Channel Set-up Request message the following changes have been made:

- Several TDD parameters added into the IE group **FACH parameters**;
- Several TDD parameters added into the IE group **BCH parameters**;
- Several TDD parameters added into the IE group **PCH parameters**.

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 after next meeting), while the BCH is mapped on the Primary CCPCH.

Information Element	**Reference**	**Type (FDD)**	**Type (TDD)**
Message Discriminator		M	M
Message Type		M	M
Transaction ID		M	M
Cell ID		M	M
Cell carrier ID		M	M
DL scrambling code ID		FFS	N.A.
DL common transport channel ID		M	M
DL common transport channel type		M	M
FACH parameters		**O**	**O**
DL channelisation code number		M	N.A.

DL channelisation code spreading factor		M	N.A.
Channelisation Code Number		N.A.	M
Time Slot		N.A.	M
Midamble Type		N.A.	M
Midamble Shift		N.A.	M
Superframe Offset		N.A.	O
Repetition Period		N.A.	M
Repetition Length		N.A.	O
BCH parameters		**O**	**O**
DL channelisation code number		M	N.A.
DL channelisation code spreading factor		M	N.A.
Time Slot		N.A.	M
Midamble Type		N.A.	M
Superframe Offset		N.A.	O
Repetition Period		N.A.	M
Repetition Length		N.A.	O
BCH power		M	M
PCH parameters		**FFS**	**FFS**
DL channelisation code number		M	N.A.
DL channelisation code spreading factor		M	N.A.
Channelisation Code Number		N.A.	M
Time Slot		N.A.	M
Midamble Type		N.A.	M
Midamble Shift		N.A.	M
Superframe Offset		N.A.	O
Repetition Period		N.A.	M
Repetition Length		N.A.	O
PCH power		M	M
PICH parameters		**FFS**	**N.A.**
DL channelisation code		M	N.A.
PICH power		M	N.A.

UL COMMON TRANSPORT CHANNEL SETUP REQUEST

In the UL Common Transport Channel Set-up Request message several TDD parameters have been added into the IE group **RACH parameters**.

Information Element	**Reference**	**Type (FDD)**	**Type (TDD)**
Message Discriminator		M	M
Message Type		M	M
Transaction ID		M	M
Cell ID		M	M
Cell carrier ID		M	M
UL common transport channel ID		M	M
UL common transport channel type		M	M
RACH parameters		**M**	**M**
Preamble spreading code		M	N.A.
Allowed preamble signatures		M	N.A.
Allowed spreading factors for the message part		M	M
Allowed access slots		M	N.A.
Preamble to preamble timing		M	N.A.
Timeslots		N.A.	M
Channelisation Codes Number		N.A.	M
Midamble Type		N.A.	M
AICH parameters		**FFS**	**N.A.**
DL channelisation code		M	N.A.
AICH power		M	N.A.

NBAP messages not used in TDD

The following messages are not use in TDD:

- RADIO LINK ADDITION REQUEST
- RADIO LINK ADDITION RESPONSE
- RADIO LINK ADDITION FAILURE
- DL POWER CONTROL

NBAP messages unchanged in TDD

No differences have been currently identified between FDD and TDD in the following messages:

- RADIO LINK DELETION REQUEST
- RADIO LINK DELETION RESPONSE
- RADIO LINK RECONFIGURATION READY
- RADIO LINK RECONFIGURATION COMMIT
- RADIO LINK RECONFIGURATION FAILURE
- RADIO LINK RECONFIGURATION CANCEL
- RADIO LINK RECONFIGURATION RESPONSE
- COMMON MEASUREMENT INITIATION REQUEST
- COMMON MEASUREMENT INITIATION RESPONSE
- COMMON MEASUREMENT INITIATION FAILURE
- COMMON MEASUREMENT TERMINATION REQUEST
- COMMON MEASUREMENT FAILURE INDICATION
- COMMON MEASUREMENT REPORT
- DL COMMON TRANSPORT CHANNEL SETUP RESPONSE
- DL COMMON TRANSPORT CHANNEL SETUP FAILURE
- DL COMMON TRANSPORT CHANNEL DELETION REQUEST
- DL COMMON TRANSPORT CHANNEL DELETION RESPONSE
- UL COMMON TRANSPORT CHANNEL SETUP RESPONSE
- UL COMMON TRANSPORT CHANNEL SETUP FAILURE
- UL COMMON TRANSPORT CHANNEL DELETION REQUEST
- UL COMMON TRANSPORT CHANNEL DELETION RESPONSE

References

[1] R2-99860 TDD: Physical Channel Information Elements (Siemens)

[2] R2-99861 TDD: Transport Channel Information Elements (Siemens)