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Title: **TDD Parameters in RNSAP Messages**

Source: **Italtel / Siemens**

Agenda Item: **15.3**

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Introduction

This contribution proposes the parameters to be included in RNSAP specification (TS 25.423) in order to support TDD mode operation.
In section 1, new parameter definitions for section 9.2 of TS 25.423 are proposed, while in section 2 some revisions for the RNSAPmessage content are given (to be included in section 9.1 of TS 25.423).

1. Information Element Functional Definition and Contents

The following definitions are used in section 2 of this contribution and are proposed to be added to section 9.2 (Information Element Functional Definition and Contents) of TS 25.423.

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 25.423.
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**;
- **DPCH ID** added to the IE group **UL DPCH Info**;
- 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 type		M	M
Transaction ID		M	M
S-RNTI		M	M
Uplink scrambling code		M	N.A.
DCH information		M	M
DCH ID		M	M
DCH Combination Indicator		O	O
DCH Priority		M	M
Transport format set (DL)		M	M
Transport format set (UL)		M	M
UL CCTrCH Information		**M**	**M**
CCTrCH ID		M	M
TFCS (UL)		M	M
DL CCTrCH Information		**M**	**M**
CCTrCH ID		M	M
TFCS (DL)		M	M
UL DPCH Information		**M**	**N.A.**
DPCH ID		M	N.A.
Channelisation code length (UL)		M	N.A.
DL DPCH Information		**M**	**N.A.**
DPCH ID		M	N.A.
Channelisation code length (DL)		M	N.A.
RL information		**M**	**M**
RL-ID		M	M
UTRAN Cell Identifier (UC-Id)		M	M
OFF		M	N.A.
Chip offset		M	N.A.
Diversity control field		C2	N.A.
Primary CCPCH Ec/Io		M	FFS
Uplink Eb/No Target		M	O
Maximum Uplink Eb/No		FFS	FFS
Minimum Uplink Eb/No		FFS	FFS
DL reference power		M	N.A.
DSCH Information		**O**	**O**
RL ID		M	M
MACd-MACsh Transport Format Set		M	M

C2=present only if *# of RL* >1

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. Furthermore the following changes have been made:

- IE group **DL Channelisation Code** renamed into **DL DPCH Information**;
- Several TDD parameters added into the IE group **DL DPCH Information**;
- IE group **UL DPCH Information** added;
- **DPCH ID** and some TDD parameters added to the IE group **UL DPCH Info**;
- Several TDD parameters added into the IE group **Primary CCPCH Radio Resource Information**.

Information Element	Reference	Type (FDD)	Type (TDD)
Message type		M	M
Transaction ID		M	M
D-RNTI		M	M
CN PS Domain Identifier		O	O
CN CS Domain Identifier		O	O
RL information response		**M**	**M**
RL-ID		M	M
Diversity Indication		C1	N.A.
Reference RL-ID		C2	N.A.
DL Scrambling code		M	N.A.
DL DPCH Information		**M**	**M**
DPCH ID		M	M
DL Channelisation 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
UL DPCH Information		**M**	**M**
DPCH ID		M	M
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 response		**C3**	**C3**
DCH ID		M	M
Binding ID		M	M
Transport Address		FFS	FFS
Neighbouring cell information		**O**	**FFS**
UTRAN Cell Identifier (UC-Id)		M	M
CN PS Domain Identifier		O	O
CN CS Domain Identifier		O	O
Primary CCPCH Radio Resource Information		**M**	**M**
UARFCN		M	M
Primary CCPCH scrambling code		M	N.A.
Primary CCPCH TX Power		O	FFS
Channelization Code Number		FFS	N.A.
Frame Offset		O	N.A.
Midamble Type		N.A.	M
Time Slot		N.A.	M
Superframe Offset		N.A.	O
Repetition Period		N.A.	M
Repetition Length		N.A.	O
DSCH Information Response		**O**	**O**
DSCH TFS		M	M
Binding ID		M	M

C1=present only if *# of RL* >1
C2=present only if *Diversity Indication* is 'ON'
C3= present only if *Diversity Indication* is 'OFF'

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. Furthermore the following changes have been made:

- IE group **DL Channelisation Code** renamed into **DL DPCH Information**;
- **DPCH ID** added to the IE group **DL DPCH Information.**

Information Element	Reference	Type (FDD)	Type (TDD)
Message type		M	M
Transaction ID		M	M
CN PS Domain Identifier		C4	C4
CN CS Domain Identifier		C4	C4
RL not setup		**M**	**M**
RL ID		M	M
RL Failure Cause		M	M
RL information response (RL successfully setup)		**O**	**N.A.**
RL-ID		M	N.A.
Diversity Indication		C1	N.A.
Reference RL-ID		C2	N.A.
DL Scrambling code		M	N.A.
DL DPCH Information		**M**	**N.A.**
DPCH ID		M	N.A.
DL Channelisation code		M	N.A.
DCH successfully setup		**C3**	**N.A.**
DCH ID		M	N.A.
Binding ID		M	N.A.
Transport Address		O	N.A.
Neighbouring cell information		**O**	**N.A.**
UTRAN Cell Identifier (UC-Id)		M	N.A.
CN PS Domain Identifier		O	N.A.
CN CS Domain Identifier		O	N.A.
Primary CCPCH Radio Resource Information		**M**	**N.A.**
UARFCN		M	N.A.
Primary CCPCH scrambling code		M	N.A.
Primary CCPCH TX Power		O	N.A.
Channelization Code Number		FFS	N.A.

C1=present only if *# of RL* >1
C2=present only if *Diversity Indication* is 'ON'
C3= present only if *Diversity Indication* is 'OFF'
C4= the parameter **may** be present if there is any RL being successfully set-up.

[This message needs to be updated with the necessary DSCH information.]

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**.
- 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 type		M	M
Transaction ID		M	M
Uplink Scrambling code		O	N.A.
DCHs to modify		**O**	**O**
DCH ID		M	M
DCH Priority		O	O
Transport format set (DL)		O	O
Transport format set (UL)		O	O
DCHs to add		**O**	**O**
DCH ID		M	M
DCH Combination Indicator		O	O
DCH Priority		M	M
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		**M**	**M**
DPCH ID		M	M
Channelisation code		M	N.A.
Uplink Maximum Eb/No		FFS	FFS
Uplink Minimum Eb/No		FFS	FFS
DL reference power		FFS	N.A.
DSCH Information		**O**	**O**
RL ID		M	M
MACd-MACsh Transport Format Set		M	M

[This DSCH Information is agreed as a working assumption (RAN WG3 #5).]

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 type		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
Uplink Maximum Eb/No		FFS	FFS
Uplink Minimum Eb/No		FFS	FFS
DL reference power		FFS	N.A.
DSCH Information		**O**	**O**
RL ID		M	M
MACd-MACsh Transport Format Set		M	M

[This DSCH Information is agreed as a working assumption (RAN WG3 #5).]

PHYSICAL CHANNEL RECONFIGURATION REQUEST

In the Physical Channel Reconfiguration Request message the following changes have been made:

- IE group **DL DPCH Information** added;
- IE group **FDD Physical Channel Information** incorporated into IE group **DL DPCH Information**;
- Several TDD parameters added into the IE group **DL DPCH Information**;
- IE group **UL DPCH Information** added;
- Several TDD parameters added into the IE group **UL DPCH Information**.

Information Element	Reference	Type (FDD)	Type (TDD)
Message type		M	M
Transaction ID		M	M
RL ID		M	M
DL DPCH Information		**M**	**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
UL DPCH Information		**N.A.**	**O**
DPCH ID		N.A.	M
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

RNSAP 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

RNSAP messages unchanged in TDD

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

- RADIO LINK RECONFIGURATION READY
- RADIO LINK RECONFIGURATION COMMIT
- RADIO LINK RECONFIGURATION FAILURE
- RADIO LINK RECONFIGURATION CANCEL
- RADIO LINK RECONFIGURATION RESPONSE
- RADIO LINK DELETION REQUEST
- RADIO LINK DELETION RESPONSE
- DL POWER CONTROL
- PHYSICAL CHANNEL RECONFIGURATION COMMAND
- PHYSICAL CHANNEL RECONFIGURATION FAILURE
- UPLINK SIGNALLING TRANSFER
- DOWNLINK SIGNALLING TRANSFER
- SRNS RELOCATION COMMIT
- PAGING REQUEST
- DEDICATED MEASUREMENT INITIATION REQUEST
- DEDICATED MEASUREMENT INITIATION RESPONSE
- DEDICATED MEASUREMENT INITIATION FAILURE
- DEDICATED MEASUREMENT REPORT
- DEDICATED MEASUREMENT TERMINATION REQUEST
- DEDICATED MEASUREMENT FAILURE INDICATION
- COMMON TRANSPORT CHANNEL RELEASE
- LOAD INFORMATION REQUEST
- LOAD INFORMATION
- COMMON TRANSPORT CHANNEL REQUEST
- COMMON TRANSPORT CHANNEL RESPONSE

References

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

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