

Title: NBAP Messages for USCH/DSCH configuration

Source: Siemens, Italtel

Agenda Item: 16.4

Document for: Approval, amendment of 25.433

Introduction

This contribution proposes the parameters to be included in NBAP specification (TS 25.433 [1]) in order to support the Shared Transport Channels DSCH (FDD and TDD), and USCH (TDD only).

1. DSCH for FDD

In the FDD mode, the DSCH is a *Common Transport Channel* in the sense that its Transport Format Set and its Physical Resources are configured by the Common Transport Channel Management procedures according [1], chapter 8.1.1, i.e. independent of a Radio Link being setup to a specific UE.

This is true although the TFCI for DSCH is transmitted within a Dedicated Physical Channel (DPCH) allocated to the respective UE which means that the DSCH information must be included in the NBAP Radio Link Setup message for the UE.

2. DSCH for TDD

In the TDD mode, the DSCH is – like in FDD - a *Common Transport Channel* in the sense that its Transport Format Set and its Physical Resources are configured by the Common Transport Channel Management procedures according [1], chapter 8.1.1, i.e. independent of a Radio Link being setup to a specific UE.

In contrast to FDD, the TFCI for the DSCH in TDD is transmitted inband, within the PDSCH resources – no DPCH is required in addition to the PDSCH.

Of course, the inband transmission of the TFCI in the PDSCH channel itself means that the TFCI transmission to a specific UE stops whenever the PDSCH resources are no longer allocated to that UE. Therefore the resuming of the DSCH service for a specific UE is signalled to the UE via the FACH. Fortunately, this dynamic process of assigning PDSCH resources to a UE via FACH message is invisible to the NodeB and to the NBAP protocol.

So for the DSCH for TDD, *only the Common Transport Channel Management messages* of the NBAP protocol must be suitably adapted.

3. USCH for TDD

In the TDD mode, both the DSCH and the Uplink Shared Channel (USCH) have been defined. The modelling of the USCH is very similar to the DSCH: The TFCI for the USCH is transmitted inband, within the PUSCH resources; and the dynamic PUSCH allocation is signalled to the UE via the FACH.

The main difference between USCH and DSCH is that for USCH, the UE must send USCH capacity requests uplink via the radio interface, i.e. via the RACH or the USCH itself, depending on the UE state [3]. However, this is not visible in the NBAP protocol. Therefore also for USCH, the *Common Transport Channel Management messages* of the NBAP protocol are the only ones which need adaptation.

4. TDD specific Information Elements for PUSCH/PDSCH

For PUSCH and PDSCH specification TDD, the Information Elements for Physical Channel Parameters as defined in [2] are used (see also [5], [6]):

1) TIMESLOT

The range of this parameter is $0 \dots 14$.

2) CHANNELISATION CODE NUMBER

The range of this parameter is $0 \dots 30$.

3) MIDAMBLE TYPE

The values of this parameter are *short* and *long*.

4) MIDAMBLE SHIFT

The range of this parameter is $0 \dots 15$ for long midamble and $0 \dots 2$ for short midamble.

5) REPETITION PERIOD

The Repetition Period is a submultiple of the Superframe length (72).

6) SUPERFRAME OFFSET

The range of this parameter is $0 \dots \text{Repetition Period} - 1$.

7) REPETITION LENGTH

The values of this parameter are $1, 2, 4$ and 8 .

8) TFCI PRESENCE

The values of this parameter are *present* and *not present*.

For USCH/DSCH configuration, i.e. specification of PUSCH and PDSCH Physical Channels, the parameters 5 to 7 have their default values (Repetition Period = 1 Radio Frame, Offset=0). So in the Channel Setup Request, these optional parameters can be omitted.

5. Message Functional Definition and Content

The following Common Transport Channel Management messages should be changed to take into account the DSCH (for FDD and TDD) and the USCH:

- 1) DL Common Transport Channel Setup Request
- 2) UL Common Transport Channel Setup Request

The remaining Common Transport Channel messages defined in [1], ch. 9.1.25 to 9.1.34 are not affected by the USCH/DSCH channels.

The starting point for the following message parameter tables are the ones proposed in [2] which already cover the FDD and TDD parameters for the Common Channels, but without USCH/DSCH. Compared to [2], **only the DSCH parameter group** has been added.

DL COMMON TRANSPORT CHANNEL SETUP REQUEST

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
< Info elements as proposed in [2] >			
BCH parameters		O	O
< Info elements as proposed in [2] >			
PCH parameters		FFS	FFS
< Info elements as proposed in [2] >			
PICH parameters		FFS	N.A.
< Info elements as proposed in [2] >			
DSCH parameters		O	O
DSCH ID		M	M
DSCH Transport Format Set		M	M
DSCH Transport Format Combination Set		M	M
PDSCH parameters		M	M
PDSCH ID		M	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
TFCI Presence		N.A.	O

Note: As stated in [1], ch. 9.1.25, only one downlink common transport channel at a time can be setup using this procedure; so if more than one DSCH shall be set-up in a cell (which is possible for TDD, see [4], then the procedure is applied several times. Each DSCH has one TFS (and one TFCS), and the TFCI is used for TF signalling. The DSCH can be mapped to more than one PDSCH, where the “TFCI Presence” IE (for TDD) indicates in which PDSCH the TFCI is transported.

UL COMMON TRANSPORT CHANNEL SETUP REQUEST

The starting point for the following message parameter tables are the ones proposed in [2] which already cover the FDD and TDD parameters for the Common Channels, but without USCH/DSCH. Compared to [2], **only the USCH parameter group** has been added.

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
< Info elements as proposed in [2] >			
AICH parameters		FFS	N.A.
< Info elements as proposed in [2] >			
USCH parameters		O	O
USCH ID		M	M
USCH Transport Format Set		M	M
USCH Transport Format Combination Set		M	M
PUSCH parameters		M	M
PUSCH ID		M	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
TFCI Presence		N.A.	O

Note: As stated in [1], ch. 9.1.25, only one uplink common transport channel at a time can be setup using this procedure; so if more than one USCH shall be set-up in a cell (which is possible for TDD, see [4], then the procedure is applied several times. Each USCH has one TFS (and one TFCS), and the TFCI is used for TF signalling. The USCH can be mapped to more than one PUSCH, where the “TFCI Presence” IE (for TDD) indicates in which PUSCH the TFCI is transported.

6. Proposal

It is proposed to include the DSCH parameter group from the above Table “DL Common Transport Channel Setup Request” into the Table in ch. 9.1.25 of [1], and the USCH parameter group from the Table “UL Common Transport Channel Setup Request” into the Table in ch. 9.1.30 of [1],:

References

- [1] TS 25.433 v.1.1.2 (R3-99813): NBAP specification
- [2] TSGR3#6(99)954: TDD parameters in NBAP messages (source: Italtel, Siemens)
- [3] TSGR2#6(99)915: UE states in TDD (source: Siemens)
- [4] TSGR3#6(99)958: Amendments to 25.430 in support of "Standalone" USCH/DSCH (source: Siemens, Italtel)
- [5] R2-99860: TDD: Physical Channel Information Elements (Siemens)
- [6] R2-99861: TDD: Transport Channel Information Elements (Siemens)