Agenda Item: 14.4, RRC message parameters

Source: Motorola

Modifications to RRC messages and information elements required to support the DSCH

1.0 Introduction

This paper introduces three new information elements required to handle the DSCH transport channel. In addition two new RRC messages are proposed to be used in conjunction with the 'DSCH Handover' elementary procedure which was described in [1]. Some DSCH related modifications to existing bearer configuration and mobility handling messages are also proposed.

2.0 Overview of Modifications required to 25.331

There are three broad areas under which changes to 25.331 are required in order to support the DSCH. These are described in the following three sub-sections.

2.1   Configuration and reconfiguration of Layer 2/3

When establishing or making changes to radio access bearers there will sometimes be changes with regard to whether the DSCH is used or not and with regard to how it is used.

Changes to the following RRC messages will be required:

- Radio access bearer set-up

- Radio access bearer reconfiguration

- Radio access bearer release

- Transport channel reconfiguration

- Physical channel reconfiguration

2.2   Mobility

As a user's channel conditions change the optimum choice of cell from which the DSCH transmissions should be sent may change. There must be a mechanism by which the UE can be notified of the handover and any other changes which it must perform as a result. In [1] it was proposed that a new elementary procedure called 'DSCH Handover' be used. This procedure will require new DSCH HANDOVER and DSCH HANDOVER COMPLETE messages. A change to the 'ACTIVE SET UPDATE' message is also required.

2.3   New information elements

The following information needs to be incorporated in the DSCH related messages:

➢ Indication of the link from which the DSCH is to be scheduled (new IE parameter required)

➢ Mapping of TFCI (field 1) values onto channelisation codes (new IE required)

➢ Indication of which TFCI (field1) transmissions from the different BS's in the active set need to be soft combined (new IE parameters required).

> ➤ Changes to MAC layer processing, ie. changes to the number of transport blocks which can be transmitted in a TTI etc.   This may be required in the event, for example, that the maximum DSCH bit rate is different in the new cell compared to the old (existing IE's can be used for this purpose).

3.0 Specific Proposals

3.1   New information elements

Three new Physical CH information elements are required, it is proposed that the following should be inserted in 25.331 in new sections:

10.2.6.15 PDSCH code mapping

This indicates the association between PDSCH channelisation codes and each possible value of TFCI(field 1).

10.2.6.16 PDSCH Info

Information Element/Group name	Presence	Range	IE type and reference	Semantics description
DSCH cell identifier	M			This parameter indicates from which cell the user will be allocated resource on the DSCH.
TFCI Combining set				This is used to indicate which of the downlink TFCI(field 1) transmissions made on the DPCCH's within the active set should be soft combined on the physical layer.
Cell identity	C - Combset	1 to <maxCombineSet>		

Range Bound	Explanation
MaxCombineSet	Maximum number of BS's in the active set under the RNC from which the DSCH is being scheduled

Condition	Explanation
CombSet	This IE is only sent if the set of DPCCH TFCI (field 1) to be soft combined has either not yet been defined or has changed

[Note the exact way in which the cell is to be identified is FFS - it could for example be identified by the PCCPCH scrambling code]

10.2.6.17 TFCI Combining Indicator

This IE indicates whether the TFCI (field1) which will be transmitted on the DPCCH of a newly added radio link should be soft combined with the others in the TFCI (field 1) combining set.   This IE is only sent when the UE is in DCH/DCH+DSCH state.

Information Element/Group name	Presence	Range	IE type and reference	Semantics description
TFCI combining indicator	M		Boolean	

It is worth noting that the capability should be provided for modifying 'PDSCH code mapping' without changing the BS from which the DSCH is sent (ie without simultaneous modification of 'PDSCH Info'). For this reason the information elements are kept separate (and are not collapsed into a single information element).   As an example, this situation might occur when the UTRAN changes the DSCH channelisation codes in use for code management purposes whilst the leg on which the DSCH is sent does not change.

3.2   New RRC messages

3.2.1   DSCH Handover

The following RRC message should be inserted in section 10.1.1.   The option of transport channel reconfiguration is included in the message since the bit rates supported on the PDSCH in one cell may differ from those in another such that for example the number of transport blocks which can be delivered within a TTI can be changed.

10.1.1.13 DSCH HANDOVER

This message is used to instigate a handover of the DSCH

RLC-SAP: t.b.d

Logical channel: DCCH

Direction: UTRAN$\rightarrow$ UE

Information Element	Presence	Range	IE type and reference	Semantics description
Message Type	M			
Transport Channel Information Elements				
TFCS	O			FFS (Note 1)
Reconfigured TrCH information	O	0 to <MaxReconTrCH>		FFS (Note 1)
Transport channel identity				
TFS				
Phy CH information elements				
PDSCH Info	M			
PDSCH code mapping	C - CodeMapChange			

Range Bound	Explanation
MaxReconTrch	Maximum number of DSCH transport channels assigned to a user (see Note 1).

Condition	Explanation
CodeMapChange	This IE is only sent if there has been a change in the mapping between any value of TFCI (field 1) and PDSCH channelisation code

[Note 1: It is FFS whether a user could have multiple DSCH transport channels mapped onto a single PDSCH]

3.2.2   DSCH Handover Complete

The following RRC message should also be inserted in section 10.1.1.

10.1.1.14 DSCH HANDOVER COMPLETE

This message is used by the UE to confirm completion of the DSCH handover procedure

RLC-SAP: t.b.d

Logical channel: DCCH

Direction: UE→ UTRAN

Information Element	Presence	Range	IE type and reference	Semantics description
Message Type	M			

3.3 Modifications to existing Messages

3.3.1 Radio access bearer set-up, reconfiguration and release

When setting up a new RAB, reconfiguring a RAB or releasing a RAB the DSCH may have to be set up or modified. The Radio Access Bearer Setup message, RAB reconfiguration and RAB release messages should be modified as follows:

Information Element	Presence	Range	IE type and reference	Semantics description
: :				: :
Physical Channel information elements				
: :				: :
PDSCH Info	C -DSCHsetup			
PDSCH code mapping	C -DSCH			

Condition	Explanation
DSCHsetup	This IE is only sent if a DSCH transport channel is to be set-up (none being existent beforehand).
DSCH	This IE is only sent if the UTRAN sets up a DSCH (none being existent beforehand) or when it changes the mapping between any value of TFCI(field1) and PDSCH channelisation code of an existing DSCH.

Table 1) Required modification to RRC message

3.3.2 Transport channel and physical channel reconfiguration

The transport channel and physical channel reconfiguration procedures may also both result in a change of transport channel. The transport channel reconfiguration and physical channel reconfiguration messages should also be updated according to Table 1.

3.3.3 Active set update

When adding an associated DCH radio link for users in DCH/DCH+DSCH substate it is necessary to indicate whether the UE should soft-combine TFCI (field 1) of the new radio link with the other TFCI (field 1) which are in the TFCI(field1) combining set. The modification to the ACTIVE SET UPDATE command is as follows:

Information Element	Presence	Range	IE type and reference	Semantics description
Message Type	M			
UE information elements				
Activation time	O			
Phy CH information elements				
Radio link addition information		0 to <MaxAddRLcount>		Radio link addition information required for each RL to add
Primary CCPCH info	M			Note 1
SSDT cell identity	C - ifSSDT			
Downlink DPCH info	M			
TFCI combining indicator	C - DSCH			
Radio link removal information		0 to <MaxDelRLcount>		Radio link removal information required for each RL to remove
Primary CCPCH info	M			Note 1
SSDT indicator	O			

Condition	Explanation
DSCH	This IE is only sent when the user has a DSCH transport channel active and a new radio link is being added
ifSSDT	This IE is only sent when SSDT is being used and a new radio link is added

4.0 References

[1] Motorola , TSGR#6(99)840 'Modifications to RRC required to support mobility of users on the DSCH'