TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3)   ***TSGR2#6 (99) 795***
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Agenda Item: 14.4

Source: Alcatel

Title: Proposal for signalling parameters of the downlink compressed mode control

Document for: Decision

1   Introduction

This document addresses the signalling of parameters for the downlink compressed mode, used for inter-frequency handover. The compressed mode has been extensively studied in WG1 and parameters have been defined in TS 25.231, with some notes saying that they should be signalled by UTRAN to UE through upper layer signalling. This document proposes a way to handle this at the RRC layer, and provides text proposal for TS 25.331.

2   Proposal

The downlink compressed mode has to be used in order to allow the UE to perform measurements on other frequencies as a preparation of inter-frequency or inter-system handover. The compressed mode parameters defined in TS 25.231 mainly give the repetition period for the transmission gaps, the duration of transmission gaps, and the time when to start the first gap. Additional parameters have been defined to control the downlink outer loop power control during and after a compressed frame (see LS WG1 Tdoc 736/99 and Tdoc WG2 806/99).

The parameters need to be defined according to the number of frequencies to measure, and to the required speed to acquire these measurements. For instance a UE approaching the border of a UMTS coverage area may need to perform many inter-frequency measurements on frequency bands of other systems (e.g. GSM) in order to prepare fall back handover to other systems. However a UE being in the 'middle' of a UMTS coverage area will not need so many measurements.

Also it may be wise not to schedule downlink transmission gaps for all UEs at the same frame, in order to avoid too large variations in downlink transmission power.

Based on these considerations, it is proposed to signal the parameters for the compressed mode for each UE independently. These parameters are affecting the physical channel configuration and shall be provided with any RRC message that permit to set up or reconfigure a physical channel, i.e. RRC connection setup, RAB set up, RAB reconfiguration, Transport channel reconfiguration and Physical channel reconfiguration.

It is stated in TS25.302 that the compressed mode can be either cyclic or a-periodic. However, an a-periodic mode would require some fast signalling to indicate to each UE when is the next compressed frame. This fast signalling can not be done via the TFCI because the UE needs to know in advance that the next frame is going to be compressed, so that it can perform some measurements on other frequencies. There is also no particular interest in doing a-periodic compressed mode because there should be a given number of compressed frames required to perform all inter-frequency measurements, independently of the type of service (RT or NRT) and doing the measurements regularly or not should not affect the end result. Furthermore NRT services should be able to handle cyclic mode (probably more easily than RT services as discussed below). Therefore only the signalling for the cyclic compressed mode is proposed.

3   Change proposal in TS 25.331

A new set of parameters called Downlink Compressed Mode parameters is proposed as an optional PhyCH information element in the following messages : RRC connection setup, RAB setup, RAB reconfiguration, Transport channel reconfiguration and physical channel reconfiguration. Its definition is proposed to be added in section 10.2.6.16 :

10.2.6.15 Downlink compressed mode information

This information element indicates the parameters of the downlink compressed mode to be used by the UE in order to perform inter-frequency measurements.

Parameters	REFERENCE	TYPE	NOTE
TGL		M	Transmission Gap length expressed in number of slots
CFN		M	Connection Frame Number when the first compressed frame starts
SN		M	Slot number when the transmission gap starts (within the CFN)
TGP		M	Transmission Gap Period indicates the number fo frames between two sets of consecutive compressed frames containing up to 2 transmission gaps
TGD		M	Transmission Gap distance indicates the number of frames between two consecutive transmission gaps within a transmission gap period.
PD		M	Total number of TGPs expressed in number of frames
PCM		M	Power control mode during the frame after the compressed frame. Indicates whether normal PC mode or compressed PC mode is applied
DeltaEb/No		M	Increase in DL Eb/No target value to be set in the UE during the compressed frames
DeltaEb/Noafter		M	Increase in DL Eb/No target value to be set in the UE one frame after the compressed frames

An example of its definition in the above listed messages is presented below. It should of course be duplicated to each of the messages.

10.1.4.7 RRC CONNECTION SETUP

This message is used by the network to accept the establishment of an RRC connection for an UE, including assignment of signalling link information, transport channel information and optionally physical channel information.
RLC-SAP: t.b.d.
Logical channel: CCCH
Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
UE information elements	Initial UE identity		M	FFS whether conveyed on RRC or MAC.	
	S-RNTI		M		
	SRNC identity		M		
	C-RNTI		O	Only if assigned to a common transport channel	
	Activation time		O		
RAB information elements	RAB identity		M	Indicates the signalling link	
	Signalling link type		M		
	RAB multiplexing info		M	For the signalling link	
TrCH information elements	TFCS		O	Uplink TFCS	
	TFCS		O	Downlink TFCS	
	TFC subset		O		
	Transport channel identity		M	For each new transport channel	Uplink transport channels
	TFS		M		
	Transport channel identity		M	For each new transport channel	Downlink transport channels
	TFS		M		
PhyCH information elements	Frequency info		O		
	Uplink DPCH power control info		O		
	Uplink DPCH info		O	Maximum one of these	Uplink radio resources
	PRACH info		O		
	Uplink timeslot info		O		
	Primary CCPCH info		O	For each radio link	Downlink radio resources
	Downlink DPCH info		O		
	Downlink DPCH compressed mode info		O		
	Secondary CCPCH info		O		
	Downlink timeslot info		O	Note 1	
	SSDT indicator		O	Necessity is FFS	
	Gated Transmission Control info		O	FFS	
	Default DPCH Offset Value		O		

Note 1: It is assumed that the DL timeslot configuration is the same for all radio links, whether or not macro-diversity is supported for TDD.