3GPP TSG-R1#9
Dresden, Germany, 30 Oct – 3 Dec 1999

TSG RAN WG1 #9 (99) L08

Source: RAN WG1

To: RAN WG2

Cc:

Title: Answer to LS: clarification of UE measurement abilities

RAN WG1 would like to thank RAN WG2 for their liaison statement R2-99g63 about UE measurement abilities.

WG1 introduced at its ninth meeting the support of up to [8] parallel compressed mode patterns.. It is the understanding of RAN WG1 that the introduction of parallel compressed mode patterns can facilitate concurrent measurements. An example would be using one pattern for GSM cell synchronization and another parallel pattern for interfrequency FDD cell monitoring. RAN WG1 would like RAN WG2 to provide guidance on the maximum number of parallel compressed mode patterns.

RAN WG1 would like to inform RAN WG2 that the compressed mode patterns should be parametrised by the UTRAN in such a way that the combined result of the combination of parallel compressed mode patterns is in line with the physical layer restrictions of the compressed mode transmission. In particular, it is not possible to include more than one gap within a single radio frame. Additionally when gaps of different patterns overlap or are placed in a consecutive way across two frames, the total transmission gap length should not exceed 14 slots or a possibly lower number of slots depending on the UE's capability.

In addition, RAN WG1 has decided to assign a measurement purpose for compressed mode gaps in order to facilitate the task of the UE.

What is a measurement purpose needs further refinement. Examples for such measurement purpose could be:

- FDD measurements
- TDD measurements
- GSM measurements

WG1 would like to point out that the intended granularity of the measurement purpose should in any case not be the single measurement level as defined in TS 25.215. The granularity may be smaller though than the FDD, TDD or GSM measurements as indicated above and e.g. point to power/cell reconfirmation together with a possible sub-set of frequencies/cells to monitor. RAN WG1 would like to ask WG2 for assistance in specifying these measurement purposes in detail according to WG2's needs.

In addition to the granularity of the measurement purpose, another issue is whether a measurement purpose should be assigned:

per pattern,
per gap in TGP range (max. 2 gaps) or
per gap in PD range (gap 1..n).

WG1 would like to ask WG2 to provide feed-back on this .

Finally WG1 would like to inform WG2 that a complete list of all compressed mode parameters needed by the physical layer will be included in 25.215, section 6.1.1.2.

For the parameter "UL/DL compressed mode selection", it was noted that in some scenarios, e.g. when monitoring GSM900 and GSM1800 cells, it would be beneficial to have UL/DL compressed mode in some gaps and DL only compressed mode in the rest. As this needs to be signalled to the UE, some possibility to address certain gaps of a pattern would be necessary.

Attached is the agreed change request to TS 25.215.

6 Measurements for UTRA FDD

6.1 UE measurements

6.1.1 Compressed mode

6.1.1.1 Use of compressed mode/dual receiver for monitoring

A UE shall, on upper layers commands, monitor cells on other frequencies (FDD, TDD, GSM). To allow the UE to perform measurements, upper layers shall command that the UE enters in compressed mode, depending on the UE capabilities.

In case of compressed mode decision, UTRAN shall communicate to the UE the parameters of the compressed mode, described in reference [2], 25.212.

A UE with a single receiver shall support downlink compressed mode.

Every UE shall support uplink compressed mode, when monitoring frequencies which are close to the uplink transmission frequency (i.e. frequencies in the TDD or GSM 1800/1900 bands).

All fixed-duplex UE shall support both downlink and uplink compressed mode to allow inter-frequency handover within FDD and inter-mode handover from FDD to TDD.

< WG1's note : the use of uplink compressed mode for single receiver UE when monitoring frequencies outside TDD and GSM 1800/1900 bands is for further study >

UE with dual receivers can perform independent measurements, with the use of a "monitoring branch" receiver, that can operate independently from the UTRA FDD receiver branch. Such UE do not need to support downlink compressed mode.

The UE shall support one single measurement purpose within one compressed mode transmission gap. The measurement purpose of the gap is signalled by upper layers.

The following section provides rules to parametrise the compressed mode.

6.1.1.2 Parameterisation of the compressed mode

In response to a request from upper layers, the UTRAN shall signal to the UE the compressed mode parameters.

The following parameters characterize a transmission gap :

- TGL : Transmission Gap Length is the duration of no transmission, expressed in number of slots (e.g. used for switching frequency, monitoring).

- SFN : The system frame number when the transmission gap starts

- SN : The slot number when the transmission gap starts

With this definition, it is possible to have a flexible position of the transmission gap in the frame, as defined in [2].

The following parameters characterize a compressed mode pattern :

- TGP : Transmission Gap Period is the period of repetition of a set of consecutive frames containing up to 2 transmission gaps (*).

- TGL : As defined above

- TGD : Transmission Gap Distance is the duration of transmission between two consecutive transmission gaps

within a transmission gap period, expressed in number of frames. In case there is only one transmission gap in the transmission gap period, this parameter shall be set to zero.

- PD: Pattern duration is the total time of all TGPs expressed in number of frames.

- SFN : The system frame number when the first transmission gap starts

- UL/DL compressed mode selection: This parameter specifies whether compressed mode is used in UL only, DL only or both UL and DL.

- Compressed mode method: The method for generating the downlink compressed mode gap can be puncturing, reducing the spreading factor or upper layer scheduling and is described in [2].

- Transmit gap position mode: The gap position can be fixed or adjustable. This is defined in [2].

- Downlink frame type: This parameter defines if frame structure type 'A' or 'B' shall be used in downlink compressed mode. This is defined in [2].

- Scrambling code change: This parameter indicates whether the alternative scrambling code is used for compressed mode method 'SF/2'. Alternative scrambling codes are described in [3].

- PCM: Power Control Mode specifies the uplink power control algorithm mode applied during recovery period after each transmission gap in compressed mode. PCM can take 2 values (0 or 1). The different power control modes are described in [4]TS 25.214.

- PRM: Power Resume Mode selects the uplink power control method to calculate the initial transmit power after the gap. PRM can take two values (0 or 1) and is described in [4].

In a compressed mode pattern, the first transmission gap starts in the first frame of the pattern. The gaps have a fixed position in the frames, and start in the slot position defined in [2].

(*) : Optionally, the set of parameters may contain 2 values TGP1 and TGP2, where TGP1 is used for the 1st and the consecutive odd gap periods and TGP2 is used for the even ones. Note if TGP1=TGP2 this is equivalent to using only one TGP value.

In all cases, upper layers has control of individual UE parameters. The repetition of any pattern can be stopped on upper layers command.

The UE shall support [8] simultaneous compressed mode patterns which can be used for different measurements. Upper layers will ensure that the compressed mode gaps do not overlap and are not scheduled within the same frame. Patterns causing an overlap or too long gaps will not be processed by the UE and interpreted as a faulty message.
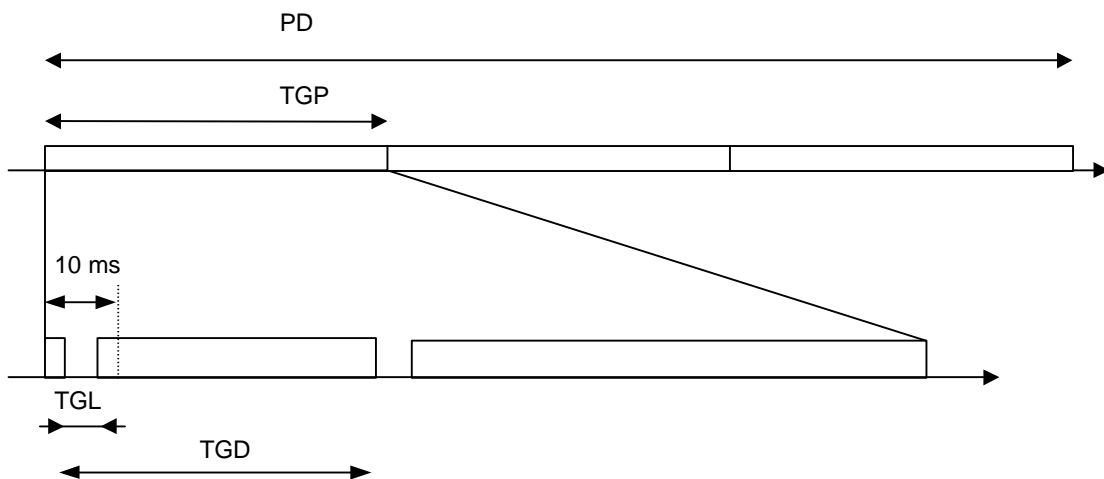
Figure 1 : illustration of compressed mode pattern parameters

6.1.1.3   Parameterisation limitations

In the table below the supported values for the TGL parameter is shown.

Measurements performed on	Supported TGL values
FDD inter-frequency cell	7, 14
TDD cell	4
GSM cell	3, 4, 7, 10, 14

Multi-mode terminals shall support the union of TGL values for the supported modes.

Further limitations on transmission gap position is given in TS 25.212.

Compressed mode patterns for handover monitoring are recommended in "Annex A: Measurements for Handover (Informative)".

A.   Annex A: Measurements for Handover (Informative)

A.1   Monitoring of FDD cells on the same frequency