TSG-RAN Working Group 1 meeting #16
Pusan, Korea
October 10th – 13th, 2000

TSGR1#16(00)1280

Agenda item: AH 99

Source: Ericsson

Title: CR 25.215-069r2: Support of parallel compressed mode patterns

Document for: Decision

Background

In TS 25.215 the restrictions on how many simultaneous compressed mode patterns the UE needs to support is specified, with different minimum requirements depending on what systems and modes that are supported by the UE.

In the CR from WG1#12 [1] introducing these values the following rationale was given for the values now in the specification:

------ Start of quote from [1] ------

The following measurements that have different timing alignment requirements and therefore might need separate compressed mode pattern sequences can be required simultaneously:

- ?? GSM RSSI measurements
- ?? GSM cell search for synchronisation
- ?? GSM cell synchronisation refreshing
- ?? FDD inter-frequency measurements
- ?? TDD measurements

With the addition of one pattern sequence reserved for the measurement purpose "other measurements" of TS 25.331, this leads to these total numbers of parallel compressed mode pattern sequences:

Supported modes/systems	Maximum number of parallel CM pattern sequences supported by the UE
FDD	2
FDD+TDD	3
FDD+GSM	5
FDD+TDD+GSM	6

------ End of quote from [1] ------

Discussion

Measurement purpose “other measurements”

The values indicated for the different modes and systems all include one pattern used for the "other measurements purpose".

It is unclear to us what the measurement purpose "other measurements" is used for.

Does this mean other systems, e.g. cdma2000? In that case, what is the relevance of defining the "other" purpose and imposing support for this additional compressed mode pattern on R99 UEs when the actual measurement to be done in the compressed frames is not specified?

Further, what information does the "other" purpose bring to the UE? How is it going to use the fact that some transmission gaps are to be used for "other", unspecified measurements?

It should be noted that supporting more patterns in parallel will lead to increased network and UE complexity. This was the motivation for introducing the changes in [1] in the first place.

The original CR [2] was discussed at WG1#14 and WG1#15, where it was understood by Qualcomm that the “other purpose” was initially meant to be used for GPS measurements. An LS [3] was sent to WG2 with copy to WG3 and WG4. The CR [2] was postponed until an answer would be received from WG2.

At RAN#9 the issue was discussed and it was concluded that compressed mode shall not be introduced for LCS measurements in Release 99 and that the “other purpose” shall be removed from the Release 99 specifications.

Breakdown of GSM measurement purposes

At RAN4 is has been discussed to break down the GSM measurement purposes to the specific measurements. A first CR [5] has been approved at RAN4#13 which reflects the current assumption of RAN4. RAN4 has asked RAN2 in [6] to assign for each compressed mode pattern sequence separately one of the following GSM measurement purposes to the UE:

?? GSM carrier measurement

?? Initial BSIC identification

?? BSIC re-confirmation.

Proposal

Since the purpose and meaning of the "other measurement purpose" is unclear, it is proposed that the values defining how many parallel compressed mode patterns the UEs need to support shall not include the additional spare pattern corresponding to the "other" purpose. This means that the values in the table in TS 25.215 should be reduced by one.

It is further proposed to align the specification text in 25.215 with the assumption of RAN4, i.e. to break down the GSM measurement purposes. Further improvements of the specification text that have been proposed in [4] have been included in this revision.

The corresponding CR for TS 25.215 is attached.

References

[1] R1-00-0548, CR 25.215-050r1, “Maximum number of simultaneous compressed mode pattern sequences”, Nokia

[2] R1-00-0951, CR 25.215-069, “Support of parallel compressed mode patterns”, Ericsson

[3] R1-00-1128, LS on compressed mode for measurement purpose “other”, WG1#15

[4] R1-00-1108, CR 25.215-073, “Inclusion of compressed mode in support for LCS related measurement”, Qualcomm

[5] R4-00-0783, CR 24.133-040, “Proposal for new section 8”, WG4#13

[6] R4-00-0750, LS on GSM measurement purposes in TS 25.331 (to RAN2), WG4#13

3GPP TSG RAN WG1#16
Pusan, Korea, October 10 – 13 2000

Document R1-00-1280
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.215	CR	69r2	Current Version:	3.4.0

GSM (AA.BB) or 3G (AA.BBB) specification number ? *? CR number as allocated by MCC support team*

For submission to: RAN#10 *list expected approval meeting # here ?*

for approval [X]
for information [ ]

strategic [ ]
non-strategic [ ]
(for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]

Source: Ericsson **Date:** 2000-10-11

Subject: Support of parallel compressed mode patterns

Work item:

Category: *(only one category Shall be marked With an X)*

F	Correction	[X]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[ ]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change: Since the purpose and meaning of the "other measurement purpose" is unclear, it is proposed that the values defining how many parallel compressed mode patterns the UEs need to support shall not include the additional spare pattern corresponding to the "other" purpose. It is further proposed to align the specification text with the assumptions from RAN4, i.e. to break down the GSM measurement purposes.

Clauses affected: 6.1.1

Other specs Affected:

Other 3G core specifications	[ ]	?	List of CRs:
Other GSM core specifications	[ ]	?	List of CRs:
MS test specifications	[ ]	?	List of CRs:
BSS test specifications	[ ]	?	List of CRs:
O&M specifications	[ ]	?	List of CRs:

Other comments:

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 higher layers commands, monitor cells on other frequencies (FDD, TDD, GSM). To allow the UE to perform measurements, higher 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.

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.

Monitoring frequencies outside TDD and GSM 1800/1900 bands without uplink compressed mode is a UE capability.

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 higher layers.

The following subclause provides rules to ~~parametrise~~ parameterise the compressed mode.

6.1.1.2 Parameterisation of the compressed mode

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

A transmission gap pattern sequence consists of alternating transmission gap patterns 1 and 2, each of these patterns in turn consists of one or two transmission gaps. See figure 1.

The following parameters ~~characterize~~ characterise a transmission gap pattern:

- TGSN (Transmission Gap Starting Slot Number): A transmission gap pattern begins in a radio frame, henceforward called first radio frame of the transmission gap pattern, containing at least one transmission gap slot. TGSN is the slot number of the first transmission gap slot within the first radio frame of the transmission gap pattern;

- TGL1 (Transmission Gap Length 1): This is the duration of the first transmission gap within the transmission gap pattern, expressed in number of slots;

- TGL2 (Transmission Gap Length 2): This is the duration of the second transmission gap within the transmission gap pattern, expressed in number of slots. If this parameter is not explicitly set by higher layers, then TGL2 = TGL1;

- TGD (Transmission Gap start Distance): This is the duration between the starting slots of two consecutive transmission gaps within a transmission gap pattern, expressed in number of slots. The resulting position of the second transmission gap within its radio frame(s) shall comply with the limitations of [2]. If this parameter is not set by higher layers, then there is only one transmission gap in the transmission gap pattern;

- TGPL1 (Transmission Gap Pattern Length): This is the duration of transmission gap pattern 1, expressed in number of frames;

- TGPL2 (Transmission Gap Pattern Length): This is the duration of transmission gap pattern 2, expressed in number of frames. If this parameter is not explicitly set by higher layers, then TGPL2 = TGPL1.

The following parameters control the transmission gap pattern sequence start and repetition:

- TGPRC (Transmission Gap Pattern Repetition Count): This is the number of transmission gap patterns within the transmission gap pattern sequence;

- TGCFN (Transmission Gap Connection Frame Number): This is the CFN of the first radio frame of the first pattern 1 within the transmission gap pattern sequence.

In addition to the parameters defining the positions of transmission gaps, each transmission gap pattern sequence is ~~characterized~~ characterised by:

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

- UL compressed mode method: The methods for generating the uplink compressed mode gap are spreading factor division by two or higher layer scheduling and are described in [2];

- DL compressed mode method: The methods for generating the downlink compressed mode gap are puncturing, spreading factor division by two or higher layer scheduling and are described in [2];

- downlink frame type: This parameter defines if frame structure type 'A' or 'B' shall be used in downlink compressed mode. The frame structures are 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];

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

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

The UE shall support simultaneous compressed mode pattern sequences which can be used for different measurements. The following measurement purposes can be signalled from higher layers:

- FDD

- TDD

- GSM carrier RSSI measurement

- Initial BSIC identification

- BSIC re-confirmation.

The UE shall support one compressed mode pattern sequence for each measurement purpose while operating in FDD mode, assuming the UE needs compressed mode to perform the respective measurement. In case the UE supports several of the measurement purposes, it shall support in parallel one compressed mode pattern sequence for each supported measurement purpose where the UE needs compressed mode to perform the measurement. The capability of the UE to operate in compressed mode in uplink and downlink is given from the UE capabilities.

~~The maximum number of simultaneous compressed mode pattern sequences depends on the supported modes and systems and is defined in the table below.~~

Supported modes/systems	Maximum number of parallel CM pattern sequences supported by the UE
FDD	2
FDD+TDD	3
FDD+GSM	5
FDD+TDD+GSM	6

Higher layers will ensure that the compressed mode gaps do not overlap and are not scheduled to overlap the same frame. The behaviour when an overlap occurs is described in TS 25.302[11].

In all cases, higher layers have control of individual UE parameters. Any pattern sequence can be stopped on higher layers' command.

The parameters TGSN, TGL1, TGL2, TGD, TGPL1, TGPL2, TGPRC and TGCFN shall all be integers.

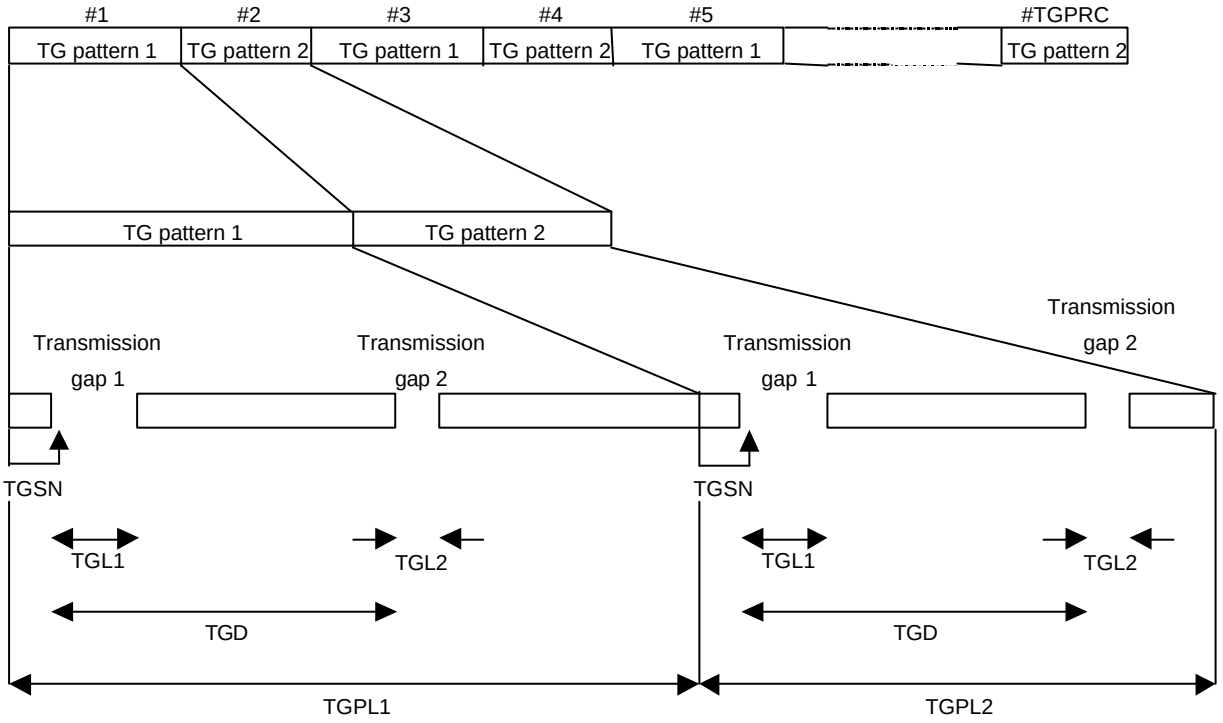

Figure 1: Illustration of compressed mode pattern parameters

6.1.1.3 Parameterisation limitations

In the table below the supported values for the TGL1 and TGL2 parameters are shown.

Measurements performed on	Supported TGL1 values, when TGL2 is not set	Supported TGL1 and TGL2 values when both are set (TGL1, TGL2)
FDD inter-frequency cell	7, 14	(10, 5)
TDD cell	4	-
GSM cell	3, 4, 7, 10, 14	-

Multi-mode terminals UEs supporting modes that require several measurement purposes shall support all TGL1 and TGL2 values for the each supported modes measurement purpose, if the UE needs compressed mode to perform the respective measurements.

Depending on the starting slot and length of the gap, it can be placed within one single frame (single-frame method) or it can overlap two frames (double-frame method). The following tTable 1 shows the combinations which shall be supported in the UE for each supported TGL value. That are supported:

Table 1: Single-frame and double-frame configurations

TGL	Idle frame combining
3	(S) (D) = (1,2) or (2,1)
4	(S) (D) = (1,3), (2,2) or (3,1)
5	(S) (D) = (1,4), (2,3), (3, 2) or (4,1)
7	(S) (D) = (1,6), (2,5), (3,4), (4,3), (5,2) or (6,1)
10	(D) = (3,7), (4,6), (5,5), (6,4) or (7,3)
14	(D) = (7,7)

The notation used within the table 1 is:

(S): Single-frame method as specified in ~~TS 25.212~~[2]

(D): Double-frame method as specified in ~~TS 25.212~~[2]: (x,y) indicates x: the number of idle slots in the first frame, y: the number of idle slots in the second frame.

Further limitations on the transmission gap position within its frame(s) are given in ~~TS 25.212~~[2].