3GPP TSG RAN WG1 Meeting #14
Oulu, Finland, 4-7 July 2000

Document ***R1-000940***
e.g. for 3GPP use the format TP-99xxx
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CHANGE REQUEST

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25.221 CR 028 Current Version: 3.3.0

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

For submission to:	RAN#9	for approval	X	strategic	(for SMG use only)
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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: Siemens AG, Mitsubishi Electric **Date:** 00-07-04

Subject: Terminology regarding the beacon function

Work item:

Category:				**Release:**		
	F	Correction	X		Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature			Release 97	
shall be marked	C	Functional modification of feature			Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change:

Currently, there are different terms in connection with the beacon function that may lead to some misunderstanding:

- ‚Physical Channels providing the Beacon Function'
- ‚Physical Channels with Beacon Function'
- ‚Beacon Channels'

This CR tries to make the terminology more consistent in such a sense that

- Physical Channels have Beacon Characteristics
- Physical Channels with Beacon Characteristics are called Beacon Channels
- The ensemble of Beacon Channels provide the Beacon Function

Clauses affected: 5.5; 5.6.1

Other specs affected:				
	Other 3G core specifications	X	→ List of CRs:	CR224-025, CR225-015
	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:

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5.5 Beacon characteristics~~function~~ of physical channels

For the purpose of measurements, ~~a beacon function shall be provided by particular~~ physical channels at particular locations (time slot, code) shall have particular physical characteristics, called beacon characteristics. Physical channels with beacon characteristics are called beacon channels. The locations of the beacon channels are called beacon locations. The ensemble of beacon channels shall provide the beacon function, i.e. a reference power level at the beacon locations, regularly existing in each radio frame. Thus, beacon channels must be present in each radio frame.

5.5.1 Location of beacon ~~physical~~ channels ~~with beacon function~~

The beacon locations ~~of the physical channels with beacon function is~~are determined by the SCH and depend~~s~~ on the SCH allocation case, see 5.3.4:

Case 1) The beacon function shall be provided by the ~~All~~ physical channels that are allocated to channelisation code $c_{Q=16}^{(k=1)}$ and to ~~in~~ TS#k, k=0….14. ~~shall provide the beacon function~~.

Case 2) The beacon function shall be provided by the ~~All~~ physical channels that are allocated to channelisation code $c_{Q=16}^{(k=1)}$ and to ~~in~~ TS#k and TS#k+8, k=0…6~~,shall provide the beacon function~~.

Note that by this definition the P-CCPCH always has ~~provides the~~ beacon characteristics~~function~~.

5.5.2 Physical characteristics of ~~the~~ beacon channels~~function~~

The beacon ~~physical~~ channels shall have the following physical characteristics. They~~providing the beacon function~~:

- are transmitted with reference power;
- are transmitted without beamforming;
- use burst type 1;
- use midamble $m^{(1)}$ and $m^{(2)}$ exclusively in this time slot; and
- midambles $m^{(9)}$ and $m^{(10)}$ are always left unused in this time slot, if 16 midambles are allowed in that cell.

The reference power corresponds to the sum of the power allocated to both midambles $m^{(1)}$ and $m^{(2)}$. Two possibilities exist:

- If no Block STTD antenna diversity is applied to P-CCPCH, all the reference power of any beacon ~~physical~~ channel ~~providing the beacon function~~ is allocated to $m^{(1)}$.
- If Block STTD antenna diversity is applied to P-CCPCH, for any beacon~~physical~~ channel ~~providing the beacon function~~ midambles $m^{(1)}$ and $m^{(2)}$ are each allocated half of the reference power. Midamble $m^{(1)}$ is used for the first antenna and $m^{(2)}$ is used for the diversity antenna. Block STTD encoding is used for the data in P-CCPCH, see [9]; for all other beacon ~~physical~~ channels identical data sequences are transmitted on both antennas.

5.6 Midamble Allocation for Physical Channels

In general, midambles are part of the physical channel configuration which is performed by higher layers.

Optionally, if no midamble is allocated by higher layers, a default midamble allocation shall be used. This default midamble allocation is given by a fixed association between midambles and channelisation codes, see clause A.3, and shall be applied individually to all channelisation codes within one time slot. Different associations apply for different burst types and cell configurations with respect to the maximum number of midambles.

5.6.1 Midamble Allocation for DL Physical Channels

Beacon~~Physical~~ channels ~~providing the beacon function~~ shall always use the reserved midambles, see 5.4. For all other DL physical channels the midamble allocation is signalled or given by default.

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25.224 CR 025 Current Version: 3.3.0

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

For submission to:	RAN#9	for approval	X	strategic	
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Proposed change affects: (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: Siemens AG **Date:** 00-07-04

Subject: Terminology regarding the beacon function

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X
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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:

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- Physical Channels have Beacon Characteristics
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- The ensemble of Beacon Channels provide the Beacon Function

Clauses affected: 4.2.2.3; 4.4; Annex C

Other specs affected:

Other 3G core specifications	X	→ List of CRs:	CR221-028, CR225-015
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: This CR supersedes CR224-024.

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4.2.2.3 DPCH, PUSCH

After the synchronisation between UTRAN and UE is established, the UE transits into open-loop transmitter power control (TPC).

The transmitter power of UE shall be calculated by the following equation:

$P_{UE} = \alpha L_{P\text{-}CCPCH}+(1-\alpha)L_0 + I_{BTS} + SIR_{TARGET}+$ Constant value

where

P_{UE}: Transmitter power level in dBm.

$L_{P\text{-}CCPCH}$: Measure representing path loss in dB (reference transmit power is broadcast on BCH).

L_0: Long term average of path loss in dB.

I_{BTS}: Interference signal power level at cell's receiver in dBm, which is broadcast on BCH.

α: α is a weighting parameter which represents the quality of path loss measurements. α may be a function of the time delay between the uplink time slot and the most recent down link time slot containing a beacon~~physical~~ channel~~ that provides the beacon function~~, see [8]. α is calculated at the UE. An example for calculating α as a function of the time delay is given in annex A.1.

SIR_{TARGET}: Target SNR in dB. A higher layer outer loop adjusts the target SIR.

Constant value: This value shall be set by higher Layer (operator matter). and is broadcast on BCH.

If the midamble is used in the evaluation of $L_{P\text{-}CCPCH}$ and L_0, and the Tx diversity scheme used for the P-CCPCH involves the transmission of different midambles from the diversity antennas, the received power of the different midambles from the different antennas shall be combined prior to evaluation of these variables.

4.4 Synchronisation ~~and Cell Search P~~procedures

4.4.1 Cell Search

During the ~~initial~~ cell search, the UE searches for a cell~~. It then~~ and determines the ~~midamble, the~~ downlink scrambling code, basic midamble code and frame synchronisation of that cell. ~~The initial cell search uses the Synchronisation Channel (SCH) described in [8]. The generation of synchronisation codes is described in [10].~~How cell search is typically done is described in Annex C.

~~This initial cell search is carried out in three steps:~~

~~Step 1: Slot synchronisation~~

~~During the first step of the initial cell search procedure the UE uses the primary synchronisation code c_p to acquire slot synchronisation to the strongest cell. Furthermore, frame synchronisation with the uncertainty of 1 out of 2 is obtained in this step. A single matched filter (or any similar device) is used for this purpose, that is matched to the primary synchronisation code which is common to all cells.~~

~~Step 2: Frame synchronisation and code-group identification~~

~~During the second step of the initial cell search procedure, the UE uses the modulated Secondary Synchronisation Codes to find frame synchronisation and identify one out of 32 code groups. Each code group is linked to a specific t_{Offset}, thus to a specific frame timing, and is containing 4 specific scrambling codes. Each scrambling code is associated with a specific short and long basic midamble code.~~

~~In Case 2 it is required to detect the position of the next synchronization slots. To detect the position of the next synchronization slots, the primary synchronization code is correlated with the received signal at offsets of 7 and 8 time slots from the position of the primary code that was detected in Step 1.~~

~~Then, the received signal at the positions of the synchronization codes is correlated with the primary synchronization Code C_p and the secondary synchronization codes $\{C_0,\ldots,C_{15}\}$. Note that the correlations can be performed coherently over M time slots, where at each slot a phase correction is provided by the correlation with the primary code. The minimal number of time slots is M=1, and the performance improves with increasing M.~~

~~Step 3: Scrambling code identification~~

~~During the third and last step of the initial cell-search procedure, the UE determines the exact basic midamble code and the accompanying scrambling code used by the found cell. They are identified through correlation over the P-CCPCH with all four midambles of the code group identified in the second step . Thus the third step is a one out of four decision. This step is taking into account that the P-CCPCH containing the BCH is transmitted using the first channelization code ($c_{Q=16}^{(h=1)}$ in [10]) and using the first midamble $\mathbf{m}^{(1)}$ (derived from basic midamble code $\mathbf{m}_P$ in [8]). Thus P-CCPCH code and midamble can be immediately derived when knowing scrambling code and basic midamble code.~~

~~NOTE: The cell parameters change from frame to frame, cf. "Table 7 Alignment of cell parameter cycling and SFN" in [10].~~

Annex C (informative): Cell search procedure

During the cell search, the UE searches for a cell and determines the downlink scrambling code, basic midamble code and frame synchronisation of that cell. The cell search is typically carried out in three steps:

Step 1: Primary synchronisation code acquisition

During the first step of the cell search procedure, the UE uses the SCH's primary synchronisation code to find a cell. This is typically done with a single matched filter (or any similar device) matched to the primary synchronisation code which is common to all cells. A cell can be found by detecting peaks in the matched filter output.

Note that for a cell of SCH slot configuration case 1, the SCH can be received periodically every 15 slots. In case of a cell of SCH slot configuration case 2, the following SCH slot can be received at offsets of either 7 or 8 slots from the previous SCH slot.

Step 2: Code group identification and slot synchronisation

During the second step of the cell search procedure, the UE uses the SCH's secondary synchronisation codes to identify 1 out of 32 code groups for the cell found in the first step. This is typically done by correlating the received signal with the secondary synchronisation codes at the detected peak positions of the first step. The primary synchronisation code provides the phase reference for coherent detection of the secondary synchronisation codes. The code group can then uniquely be identified by detection of the maximum correlation values.

Each code group indicates a different t_{offset} parameter and 4 specific cell parameters. Each of the cell parameters is associated with one particular downlink scrambling code and one particular long and short basic midamble code. When the UE has determined the code group, it can unambiguously derive the slot timing of the found cell from the detected peak position in the first step and the t_{offset} parameter of the found code group in the second step.

Note that the modulation of the secondary synchronisation codes also indicates the position of the SCH slot within a 2 frames period, e.g. a frame with even or odd SFN. Additionally, in the case of SCH slot configuration following case 2, the SCH slot position within one frame, e.g. first or last SCH slot, can be derived from the modulation of the secondary synchronisation codes.

Step 3: Downlink scrambling code, basic midamble code identification and frame synchronisation

During the third and last step of the cell search procedure, the UE determines the exact downlink scrambling code, basic midamble code and frame timing used by the found cell. The long basic midamble code can be identified by correlation over the P-CCPCH (or any other beacon channel) with the 4 possible long basic midamble codes of the code group found in the second step. A P-CCPCH (or any other beacon channel) always uses the midamble $m^{(1)}$ (and in case of Block-STTD also midamble $m^{(2)}$) derived from the long basic midamble code and always uses a fixed and pre-assigned channelisation code.

When the long basic midamble code has been identified, downlink scrambling code and cell parameter are also known. The UE can read system and cell specific BCH information and acquire frame synchronisation.

Note that even for an initial cell parameter assignment, a cell cycles through a set composed of 2 different cell parameters according to the SFN of a frame, e.g. the downlink scrambling code and the basic midamble code of a cell alternate for frames with even and odd SFN. Cell parameter cycling leaves the code group of a cell unchanged.

If the UE has received information about which cell parameters or SCH configurations to search for, cell search can be simplified.

Annex ~~C~~ D (informative): Change history

Change history								
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
14/01/00	RAN_05	RP-99594	-		Approved at TSG RAN #5 and placed under Change Control	-	3.0.0
14/01/00	RAN_06	RP-99698	001	01	Primary and Secondary CCPCH in TDD	3.0.0	3.1.0
14/01/00	RAN_06	RP-99698	002	-	Measurement procedure of received reference power for OL-TPC in TDD	3.0.0	3.1.0
14/01/00	RAN_06	RP-99699	004	1	STTD capability for P-CCPCH, TDD component	3.0.0	3.1.0
14/01/00	RAN_06	RP-99697	005	1	Alignment of Terminology Regarding Spreading for TDD Mode	3.0.0	3.1.0
14/01/00	-	-	-		Change history was added by the editor	3.1.0	3.1.1
31/03/00	RAN_07	RP-000070	003	2	Cycling of cell parameters	3.1.1	3.2.0
31/03/00	RAN_07	RP-000070	007	2	Clarifications on the UL synchronisation and Timing advance	3.1.1	3.2.0
31/03/00	RAN_07	RP-000070	008	-	Modification of SIR threshold on setting TPC	3.1.1	3.2.0
31/03/00	RAN_07	RP-000070	009	1	New section describing the random access procedure	3.1.1	3.2.0
31/03/00	RAN_07	RP-000070	011	-	Removal of Synchronisation Case 3 in TDD	3.1.1	3.2.0
31/03/00	RAN_07	RP-000070	012	1	Clarifications on power control procedures	3.1.1	3.2.0
31/03/00	RAN_07	RP-000070	013	-	Signal Point Constellation	3.1.1	3.2.0
31/03/00	RAN_07	RP-000070	014	2	Out-of-sync handling for UTRA TDD	3.1.1	3.2.0
31/03/00	RAN_07	RP-000070	015	-	Removal of ODMA from the TDD specifications	3.1.1	3.2.0
26/06/00	RAN_08	RP-000274	016	-	Editorial correction for the power control section in 25.224	3.2.0	3.3.0
26/06/00	RAN_08	RP-000274	017	-	Power control for TDD during DTX	3.2.0	3.3.0
26/06/00	RAN_08	RP-000274	018	1	Power Control for PDSCH	3.2.0	3.3.0
26/06/00	RAN_08	RP-000274	020	1	Editorial modification of 25.224	3.2.0	3.3.0
26/06/00	RAN_08	RP-000274	021	-	Clarifications on TxDiversity for UTRA TDD	3.2.0	3.3.0
26/06/00	RAN_08	RP-000274	022	1	Introduction of the TDD DSCH detection procedure in TS 25.224	3.2.0	3.3.0
26/06/00	RAN_08	RP-000274	023	-	Downlink power control on timeslot basis	3.2.0	3.3.0

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25.225 CR 015 Current Version: 3.3.0

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

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Release 96	
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Clauses affected: 5.1

Other specs affected:

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BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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5.1 UE measurement abilities

NOTE 1: Measurements for TDD which are specified on the Primary CCPCH (P-CCPCH) are carried out on the P-CCPCH or on any other beacon ~~physical~~ channel~~s with beacon function~~, see [6].

NOTE 2: For th~~os~~e beacon channels ~~providing beacon function~~ [6], the received power measurements shall be based on the sum of the received powers for midambles $m^{(1)}$ and $m^{(2)}$ if Block-STTD is applied to the P-CCPCH.

NOTE 3: The UTRAN has to take into account the UE capabilities when specifying the timeslots to be measured in the measurement control message.

NOTE 4: The RSCP can either be measured on the data part or the midamble of a burst, since there is no power offset between both. However, in order to have a common reference, the measurement on the midamble is assumed.

NOTE 5: The line ‘applicable for’ indicates whether the measurement is applicable for inter-frequency and/or intra-frequency and furthermore for idle and/or connected mode.