TSG-RAN Working Group1 meeting #16 **TSGR1#16(00)1276**

Pusan, South Korea, 10th – 13th October 2000

Agenda Item:	**AH99**
Source:	**Nokia**
Title:	**Proposed clarification of the phase reference for some downlink common channels**
Document for:	**Decision**

1. Introduction

Nokia presented earlier a discussion paper [1] where the use of the primary CPICH as phase reference for S-CCPCH carrying PCH was proposed. This simplification of the specification got support and the attached CR clarifies that the primary CPICH is the phase reference for S-CCPCH carrying PCH. In addition, the same simplification is extended to CPCH indicator channels AP-AICH, CD/CA-ICH and CSICH.

2. References

[1] R1-00-1230, " Clarifications for system options with AICH and PICH", Nokia

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Document R1-00-1276
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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25.211	**CR**	**086**	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	for approval	X	strategic		*(for SMG*
list expected approval meeting # here ?		for information		non-strategic		*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: Nokia **Date:** 10.10.2000

Subject: Proposed clarification of the phase reference for some downlink common channels

Work item:

Category:	F	Correction	X	**Release:**	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: It is unclear what are allowed possibilities for the phase reference for S-CCPCH carrying PCH

Clauses affected: 5.3.3.1.1

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:

The DL DPCCH power control preamble for CPCH shall take the same slot format as afterwards, as given in Table 15. The length of the power control preamble is a higher-layer parameter, $L_{pc\text{-}preamble}$ (see [5], section 6.2), signalled by the network. When $L_{pc\text{-}preamble} > 0$, the pilot patterns from slot #($15 - N_{pcp}$) to slot #14 of table 12 shall be used for the power control preamble pilot patterns. The TFCI field is filled with "1" bits.

CCC field in figure 12 is used for the transmission of CPCH control command. On CPCH control command transmission request from higher layer, a certain pattern is mapped onto CCC field, otherwise nothing is transmitted in CCC field. There is one to one mapping between the CPCH control command and the pattern. In case of Emergency Stop of CPCH transmission, [1111] pattern is mapped onto CCC field. The Emergency Stop command shall not be transmitted during the first $N_{Start\_Message}$ frames of DL DPCCH after Power Control preamble.

Start of Message Indicator shall be transmitted during the first $N_{Start\_Message}$ frames of DL DPCCH after Power Control preamble. [1010] pattern is mapped onto CCC field for Start of Message Indicator. The value of $N_{Start\_Message}$ shall be provided by higher layers.

5.3.3 Common downlink physical channels

5.3.3.1 Common Pilot Channel (CPICH)

The CPICH is a fixed rate (30 kbps, SF=256) downlink physical channel that carries a pre-defined bit/symbol sequence. Figure 13 shows the frame structure of the CPICH.

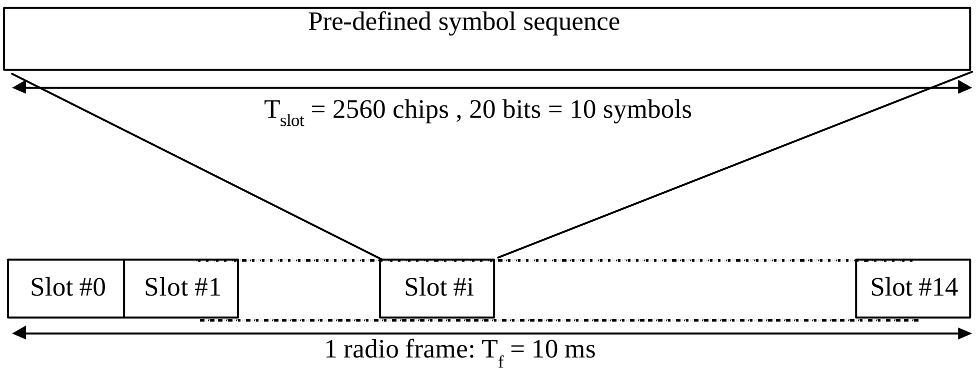

Figure 13: Frame structure for Common Pilot Channel

In case transmit diversity (open or closed loop) is used on any downlink channel in the cell, the CPICH shall be transmitted from both antennas using the same channelization and scrambling code. In this case, the pre-defined symbol sequence of the CPICH is different for Antenna 1 and Antenna 2, see figure 14. In case of no transmit diversity, the symbol sequence of Antenna 1 in figure 14 is used.

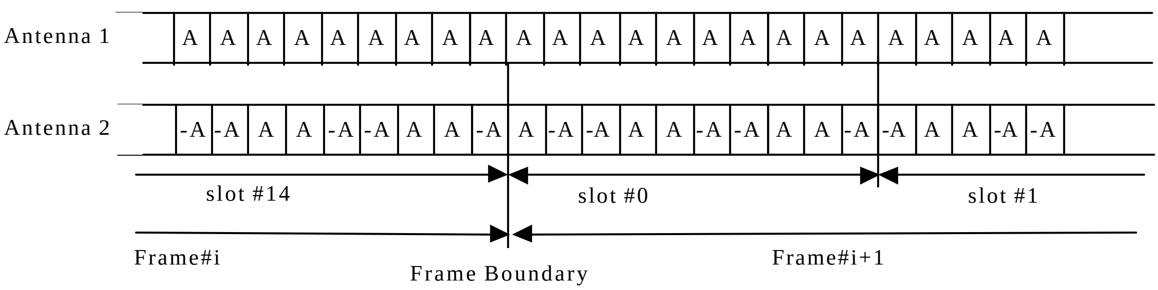

Figure 14: Modulation pattern for Common Pilot Channel (with A = 1+j)

There are two types of Common pilot channels, the Primary and Secondary CPICH. They differ in their use and the limitations placed on their physical features.

5.3.3.1.1 Primary Common Pilot Channel (P-CPICH)

The Primary Common Pilot Channel (P-CPICH) has the following characteristics:

- The same channelization code is always used for the P-CPICH, see [4];
- The P-CPICH is scrambled by the primary scrambling code, see [4];
- There is one and only one P-CPICH per cell;
- The P-CPICH is broadcast over the entire cell.

The Primary CPICH is the phase reference for the following downlink channels: SCH, Primary CCPCH, AICH, PICH, AP-AICH, CD/CA-ICH, CSICH and the S-CCPCH carrying PCH. The Primary CPICH is also the *default* phase reference for all other downlink physical channels.

5.3.3.1.2 Secondary Common Pilot Channel (S-CPICH)

A Secondary Common Pilot Channel (S-CPICH) has the following characteristics:

- An arbitrary channelization code of SF=256 is used for the S-CPICH, see [4];
- A S-CPICH is scrambled by either the primary or a secondary scrambling code, see [4];
- There may be zero, one, or several S-CPICH per cell;
- A S-CPICH may be transmitted over the entire cell or only over a part of the cell;
- A Secondary CPICH may be the reference for the Secondary CCPCH and the downlink DPCH. If this is the case, the UE is informed about this by higher-layer signalling.

5.3.3.2 Primary Common Control Physical Channel (P-CCPCH)

The Primary CCPCH is a fixed rate (30 kbps, SF=256) downlink physical channels used to carry the BCH transport channel.

Figure 15 shows the frame structure of the Primary CCPCH. The frame structure differs from the downlink DPCH in that no TPC commands, no TFCI and no pilot bits are transmitted. The Primary CCPCH is not transmitted during the first 256 chips of each slot. Instead, Primary SCH and Secondary SCH are transmitted during this period (see subclause 5.3.3.4).

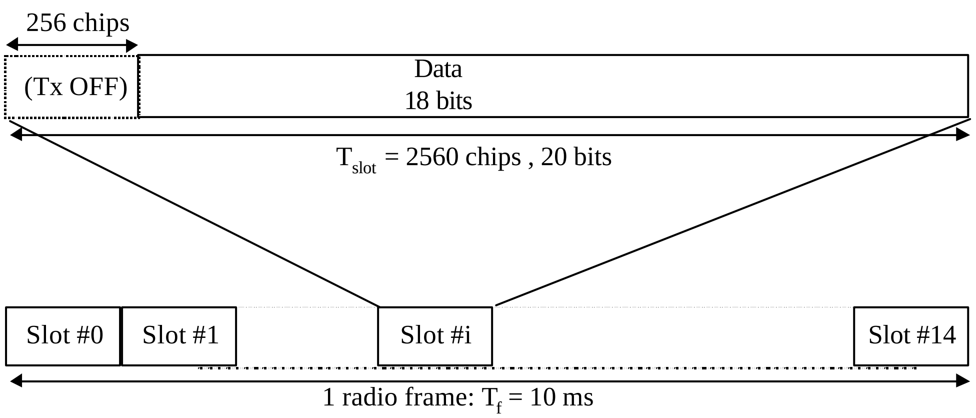

Figure 15: Frame structure for Primary Common Control Physical Channel

5.3.3.2.1 Primary CCPCH structure with STTD encoding

In case the diversity antenna is present in UTRAN and the P-CCPCH is to be transmitted using open loop transmit diversity, the data bits of the P-CCPCH are STTD encoded as given in subclause 5.3.1.1.1. The last two data bits in even numbered slots are STTD encoded together with the first two data bits in the following slot, except for slot #14 where the two last data bits are not STTD encoded and instead transmitted with equal power from both the antennas, see figure 16. Higher layers signal whether STTD encoding is used for the P-CCPCH or not. In addition the presence/absence of STTD encoding on P-CCPCH is indicated by modulating the SCH, see 5.3.3.4. During power on and hand over between cells the UE can determine the presence of STTD encoding on the P-CCPCH, by either receiving the higher layer message, by demodulating the SCH channel, or by a combination of the above two schemes.

TSG-RAN Working Group1 meeting #16 TSGR1#16(00)1276

Pusan, South Korea, 10th – 13th October 2000

Agenda Item: AH99
Source: Nokia
Title: Proposed removal of the option of secondary scrambling code for some downlink common channels
Document for: Decision

1. Introduction

Nokia presented earlier a discussion paper [1] where the removal of the possible use secondary scrambling codes for PICH, AICH and S-CCPCH carrying PCH was proposed. This simplification of the specification got support and the attached CR clarifies that only the primary scrambling code is used with the above mentioned physical channels. In addition, the same simplification is extended to CPCH indicator channels AP-AICH, CD/CA-ICH and CSICH.

2. References

[1] R1-00-1230, " Clarifications for system options with AICH and PICH", Nokia

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25.213 CR 037 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 for approval [X] strategic [ ] (for SMG use only)
list expected approval meeting # here ? for information [ ] non-strategic [ ]

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

Source: Nokia **Date:** 10.10.2000

Subject: Proposed removal of the option of secondary scrambling code for some downlink common channels

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: Removal of the unnecessary option of using secondary scrambling code for PICH, AICH and S-CCPCH carrying PCH

Clauses affected: 5.2.2

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:

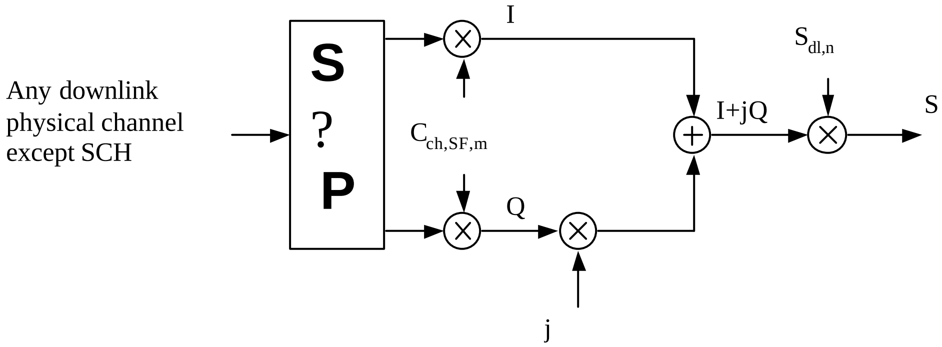

Figure 8: Spreading for all downlink physical channels except SCH

Figure 9 illustrates how different downlink channels are combined. Each complex-valued spread channel, corresponding to point S in Figure 8, is separately weighted by a weight factor G_i. The complex-valued P-SCH and S-SCH, as described in [1], section 5.3.3.4, are separately weighted by weight factors G_p and G_s. All downlink physical channels are then combined using complex addition.

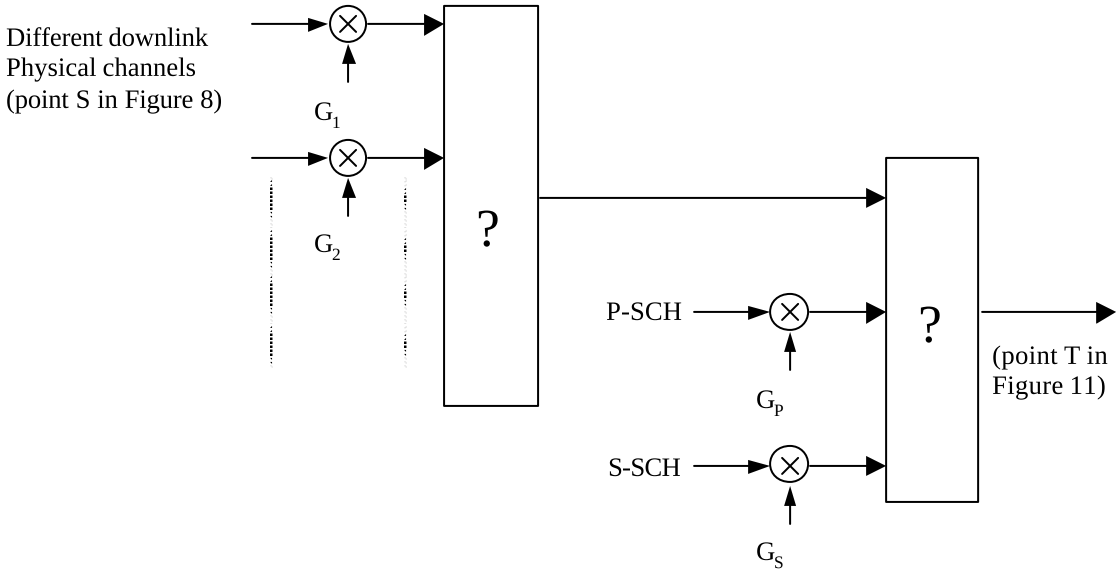

Figure 9: Spreading and modulation for SCH and P-CCPCH

5.2 Code generation and allocation

5.2.1 Channelization codes

The channelization codes of figure 8 are the same codes as used in the uplink, namely Orthogonal Variable Spreading Factor (OVSF) codes that preserve the orthogonality between downlink channels of different rates and spreading factors. The OVSF codes are defined in figure 4 in section 4.3.1.

The channelization code for the Primary CPICH is fixed to $C_{ch,256,0}$ and the channelization code for the Primary CCPCH is fixed to $C_{ch,256,1}$ .The channelization codes for all other physical channels are assigned by UTRAN.

With the spreading factor 512 a specific restriction is applied. When the code word $C_{ch,512,n}$, with n=0,2,4….510, is used in soft handover, then the code word $C_{ch,512,n+1}$ is not allocated in the Node Bs where timing adjustment is to be used. Respectively if $C_{ch,512,n}$, with n=1,3,5….511 is used, then the code word $C_{ch,512,n-1}$ is not allocated in the Node B where timing adjustment is to be used. This restriction shall not apply for the softer handover operation or in case UTRAN is synchronised to such a level that timing adjustments in soft handover are not used with spreading factor 512.

When compressed mode is implemented by reducing the spreading factor by 2, the OVSF code used for compressed frames is:

- $C_{ch,SF/2,?n/2?}$ if ordinary scrambling code is used.
- $C_{ch,SF/2,n \bmod SF/2}$ if alternative scrambling code is used (see section 5.2.2);

where $C_{ch,SF,n}$ is the channelization code used for non-compressed frames.

In case the OVSF code on the PDSCH varies from frame to frame, the OVSF codes shall be allocated such a way that the OVSF code(s) below the smallest spreading factor will be from the branch of the code tree pointed by the smallest spreading factor used for the connection. This means that all the codes for UE for the PDSCH connection can be generated according to the OVSF code generation principle from smallest spreading factor code used by the UE on PDSCH.

In case of mapping the DSCH to multiple parallel PDSCHs, the same rule applies, but all of the branches identified by the multiple codes, corresponding to the smallest spreading factor, may be used for higher spreading factor allocation.

5.2.2 Scrambling code

A total of 2^{18}-1 = 262,143 scrambling codes, numbered 0…262,142 can be generated. However not all the scrambling codes are used. The scrambling codes are divided into 512 sets each of a primary scrambling code and 15 secondary scrambling codes.

The primary scrambling codes consist of scrambling codes n=16*i where i=0…511. The i:th set of secondary scrambling codes consists of scrambling codes 16*i+k, where k=1…15.

There is a one-to-one mapping between each primary scrambling code and 15 secondary scrambling codes in a set such that i:th primary scrambling code corresponds to i:th set of secondary scrambling codes.

Hence, according to the above, scrambling codes k = 0, 1, …, 8191 are used. Each of these codes are associated with a left alternative scrambling code and a right alternative scrambling code, that may be used for compressed frames. The left alternative scrambling code corresponding to scrambling code k is scrambling code number k + 8192, while the right alternative scrambling code corresponding to scrambling code k is scrambling code number k + 16384. The alternative scrambling codes can be used for compressed frames. In this case, the left alternative scrambling code is used if n<SF/2 and the right alternative scrambling code is used if n?SF/2, where $c_{ch,SF,n}$ is the channelization code used for non-compressed frames. The usage of alternative scrambling code for compressed frames is signalled by higher layers for each physical channel respectively.

The set of primary scrambling codes is further divided into 64 scrambling code groups, each consisting of 8 primary scrambling codes. The j:th scrambling code group consists of primary scrambling codes 16*8*j+16*k, where j=0..63 and k=0..7.

Each cell is allocated one and only one primary scrambling code. The primary CCPCH~~, and~~ primary CPICH, PICH, AICH, CD-AICH, CD/CA-ICH, CSICH and S-CCPCH carrying PCH are always transmitted using the primary scrambling code. The other downlink physical channels can be transmitted with either the primary scrambling code or a secondary scrambling code from the set associated with the primary scrambling code of the cell.

The mixture of primary scrambling code and secondary scrambling code for one CCTrCH is allowable. However, in the case of the CCTrCH of type DSCH then all the PDSCH channelisation codes that a single UE may receive shall be under a single scrambling code (either the primary or a secondary scrambling code).

The scrambling code sequences are constructed by combining two real sequences into a complex sequence. Each of the two real sequences are constructed as the position wise modulo 2 sum of 38400 chip segments of two binary *m*-sequences generated by means of two generator polynomials of degree 18. The resulting sequences thus constitute segments of a set of Gold sequences. The scrambling codes are repeated for every 10 ms radio frame. Let x and y be the two sequences respectively. The x sequence is constructed using the primitive (over GF(2)) polynomial $1+X^7+X^{18}$. The y sequence is constructed using the polynomial $1+X^5+X^7+X^{10}+X^{18}$.

The sequence depending on the chosen scrambling code number n is denoted z_n, in the sequel. Furthermore, let $x(i)$, $y(i)$ and $z_n(i)$ denote the i:th symbol of the sequence x, y, and z_n, respectively.