3GPP TSG RAN WG1 Meeting #9
Dresden, Germany, 30 NOV 1999 - 03 DEC 1999

Document ***R1-99l37***
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.

25.222 CR **009r1**	Current Version:	V3.0.0

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

For submission to:	TSG RAN #6	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 :* 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, Siemens	**Date:**	2 Dec 1999
Subject:	Modified physical channel mapping scheme		
Work item:	TS25.222		

Category:	F	Correction		**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	X		Release 98	
with an X)	D	Editorial modification			Release 99	X
					Release 00	

Reason for change:	The current physical channel mapping scheme does not support the multi-code transmission optimally
Clauses affected:	6.2.11.1, 6.2.11.2

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:	

help.doc

<--------- double-click here for help and instructions on how to create a CR.

---starting section---

6.2.11 Physical channel mapping

The PhCH for both uplink and downlink is defined in [6]. The bits after physical channel mapping are denoted by $w_{p1}, w_{p2}, \dots, w_{pU_p}$, where p is the PhCH number and U_p is the number of bits in one radio frame for the respective PhCH. The bits w_{pk} are mapped to the PhCHs so that the bits for each PhCH are transmitted over the air in ascending order with respect to k. The mapping scheme depends on the applied 2nd interleaving scheme.

6.2.11.1 Mapping scheme after frame related 2nd interleaving

6.2.11.1.1 Mapping scheme after frame related 2nd interleaving in uplink

In uplink there are at most two codes allocated (P≤2). If there is only one code, the same mapping as for downlink is applied, see section 6.2.11.1.2. Denote SF1 and SF2 the spreading factors used for code 1 and 2, respectively. Then denote the inverse relation of the spreading factors s1: s2 = SF2: SF1, where the smallest possible integers are used for s1 and s2.

The following mapping rule is applied:

Bits are mapped on the first PhCH (in forward order) if *(k-1)mod(s1+s2) = 0, …,* s1-1~~after physical channel mapping~~:

~~$w_{1k} = v_k$ $k = 1, 2, \dots, U_1$~~

$w_{1,(k\,div(s1+s2))\cdot s1+k\,\mathrm{mod}(s1+s2)} = v_k$

else ~~B~~bits are mapped on the second PhCH (in reverse order)~~ after physical channel mapping~~:

~~$w_{2k} = v_{(k+U_1)}$ $k = U_2, U_2-1, \dots, 1$~~ ~~1, 2, …, U_2~~

$w_{2,U_2-(k\,div(s1+s2))\cdot s2+k\,\mathrm{mod}(s1+s2)-s1} = v_k$

~~…~~This formula is applied starting with k=1 and increasing k until one of the PhCH is completely filled. From then on, the remaining bits are mapped on the PhCH which has not been filled in the same order (forward or reverse depending on the PhCH) as used previously on that PhCH.

~~Bits on the odd numbered P^{th} PhCH after physical channel mapping (P = 1, 3, 5, …..):~~

~~$w_{Pk} = v_{(k+U_1+\dots+U_{P-1})}$ $k = 1, 2, \dots, U_P$~~

~~Bits on the even numbered P^{th} PhCH after physical channel mapping (P = 2, 4, 6, …..):~~

~~$w_{Pk} = v_{(k+U_1+\dots+U_{P-1})}$ $k = U_P-1, U_P-2, \dots, 1$~~

6.2.11.1.2 Mapping scheme after frame related 2nd interleaving in downlink

The mapping is equivalent to block interleaving, writing in colomns, but a PhCH with an odd number is filled in forward order, were as a PhCH with an even number is filled in reverse order.

The following mapping rule is applied:

Bits are mapped on an odd numbered PhCH (in forward order) according to the following rule, if (k mod P)+1 is odd:

$w_{k\,\mathrm{mod}\,P+1,k\,div\,P} = v_k$

Bits are mapped on an even numbered PhCH (in reverse order) according to the following rule, if (k mod P)+1 is even:

$w_{k\,\mathrm{mod}\,P+1,U_p-1-k\,div\,P} = v_k$

This formula is applied starting with k=1 and increasing k until all the PhCHs which carry TFCI are completely filled. From then on, the remaining bits are mapped on the remaining PhCHs in the same order (forward or reverse depending on the PhCH) as previously on these PhCHs.

6.2.11.2 Mapping scheme after timeslot related 2nd interleaving

For each timeslot only those physical channels with $p = 1, 2, \dots, P_t$ are considered respectively, which are transmitted in that timeslot, and the following mapping scheme is applied:

---**starting section**---

6.2.11.2.1 Mapping scheme after timeslot related 2nd interleaving in uplink

In uplink there are at most two codes allocated (P≤2). If there is only one code, the same mapping as for downlink is applied, see section 6.2.11.1.2. Denote SF1 and SF2 the spreading factors used for code 1 and 2, respectively. Then denote the inverse relation of the spreading factors s1: s2 = SF2: SF1, where the smallest possible integers are used for s1 and s2.

The following mapping rule is applied:

Bits are mapped on the first PhCH (in forward order) if $(k\text{-}1) mod(s1+s2) = 0, \ldots, s1\text{-}1$:

$$w_{1,(k\,div(s1+s2))\cdot s1+k\bmod(s1+s2)} = v_{tk}$$

else bits are mapped on the second PhCH (in reverse order):

$$w_{2,U_2-(k\,div(s1+s2))\cdot s2+k\bmod(s1+s2)-s1} = v_{tk}$$

This formula is applied starting with k=1 and increasing k until one of the PhCH is completely filled. From then on, the remaining bits are mapped on the PhCH which has not been filled in the same order (forward or reverse depending on the PhCH) as used previously on that PhCH.

6.2.11.2.2 Mapping scheme after timeslot related 2nd interleaving in downlink

The mapping is equivalent to block interleaving, writing in colomns, but a PhCH with an odd number is filled in forward order, were as a PhCH with an even number is filled in reverse order.

The following mapping rule is applied:

Bits are mapped on an odd numbered PhCH (in forward order) according to the following rule, if (k mod P_t)+1 is odd:

$$w_{k\bmod P_t+1,\,k\,div\,P_t} = v_{tk}$$

Bits are mapped on an even numbered PhCH (in reverse order) according to the following rule, if (k mod P_t)+1 is even:

$$w_{k\bmod P_t+1,\,U_{P_t}-1-k\,div\,P_t} = v_{tk}$$

This formula is applied starting with k=1 and increasing k until all the PhCHs which carry TFCI are completely filled. From then on, the remaining bits are mapped on the remaining PhCHs in the same order (forward or reverse depending on the PhCH) as previously on these PhCHs.

~~Bits on first PhCH in timeslot *t* after physical channel mapping:~~

~~$w_{1k} = v_{tk}$ $k = 1, 2, \ldots, U_1$~~

~~Bits on second PhCH in timeslot *t* after physical channel mapping:~~

~~$w_{2k} = v_{t(k+U_1)}$ $k = U_2, U_2\text{-}1, \ldots\ldots 1$ $1, 2, \ldots, U_2$~~

~~…~~

~~Bits on the odd numbered PhCH P_t in timeslot *t* after physical channel mapping (P = 1, 3, 5, …..)::~~

~~$w_{P_t k} = v_{t(k+U_1+\ldots+U_{P_t-1})}$ $k = 1, 2, \ldots, U_{P_t}$~~

~~Bits on the even numbered P^{th} PhCH P_t in timeslot *t* after physical channel mapping (P = 2, 4, 6, …..):~~

~~$w_{Pk} = v_{t(k+U_1+\ldots+U_{P-1})}$ $k = U_P\text{-}1, U_P\text{-}2, \ldots, 1$~~