3GPP TSG RAN WG1 Meeting #9
Dresden, Germany, Nov 30 – Dec 3, 1999

Document R1-99i39
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.

25.213	**CR**	**013**	Current Version:	3.0.0

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 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:**	24.11.99
Subject:	20 ms RACH message length		
Work item:			

Category:	F	Correction		**Release:**	Phase 2	
	A	Corresponds to a correction in an earlier release			Release 96	
(only one category	B	Addition of feature	X		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:	Addition of 20 ms RACH message length was agreed in RAN WG1#8 (New York 12.-15.10). See documents R1-99f58 and R1-99h72.
Clauses affected:	4.3.3.4

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:	

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

4.3.3 Random access codes

4.3.3.1 Preamble Codes

4.3.3.1.1 Preamble code construction

The random access preamble code $C_{pre,n,}$ is a complex valued sequence. It is built from a preamble scrambling code $S_{r\text{-}pre,n}$ and a preamble signature $C_{sig,s}$ as follows:

$$C_{pre,n,s}(k) = S_{r\text{-}pre,n}(k) \times C_{sig,s}(k) \times e^{j(\frac{\pi}{4}+\frac{\pi}{2}k)}, \; k = 0, 1, 2, 3, \ldots, 4095,$$

where k=0 corresponds to the chip transmitted first in time and $S_{r\text{-}pre,n}$ and $C_{sig,s}$ are defined in 4.3.3.1.2 and 4.3.3.2 below respectively.

4.3.3.1.2 Preamble scrambling code

The scrambling code for the preamble part is as follows.

The code generating method is the same as for the real part of the uplink long scrambling codes on dedicated channels, see 4.3.2.1 and 4.3.2.2. Only the first 4096 chips of the code are used for preamble scrambling.

The definition of the *n*:th code sequence follows (the left most index correspond to the chip transmitted first in each slot):

$$S_{r\text{-}pre,n} = \mathrm{Re}\{C_{scramb,n}\} \text{ ,for chip indexes } 0\ldots4095 \text{ of } C_{scramb,n}$$

4.3.3.2 Preamble signature

The preamble signature corresponding to a signature s consists of 256 repetitions of a length 16 signature $P_s(n)$, n=0…15. This is defined as follows:

$$C_{sig,s}(i) = P_s(i \text{ modulo } 16),\; i = 0, 1, \ldots, 4095.$$

The signature $P_s(n)$ is from the set of 16 Hadamard codes of length 16. These are listed in table 3.

Table 3: Preamble signatures

Preamble signature	Value of *n*															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$P_0(n)$	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$P_1(n)$	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1	1	-1
$P_2(n)$	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1
$P_3(n)$	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1	-1	1
$P_4(n)$	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1
$P_5(n)$	1	-1	1	-1	-1	1	-1	1	1	-1	1	-1	-1	1	-1	1
$P_6(n)$	1	1	-1	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	1
$P_7(n)$	1	-1	-1	1	-1	1	1	-1	1	-1	-1	1	-1	1	1	-1
$P_8(n)$	1	1	1	1	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1
$P_9(n)$	1	-1	1	-1	1	-1	1	-1	-1	1	-1	1	-1	1	-1	1
$P_{10}(n)$	1	1	-1	-1	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1
$P_{11}(n)$	1	-1	-1	1	1	-1	-1	1	-1	1	1	-1	-1	1	1	-1
$P_{12}(n)$	1	1	1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	1	1
$P_{13}(n)$	1	-1	1	-1	-1	1	-1	1	-1	1	-1	1	1	-1	1	-1
$P_{14}(n)$	1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	1	1	-1	-1
$P_{15}(n)$	1	-1	-1	1	-1	1	1	-1	-1	1	1	-1	1	-1	-1	1

4.3.3.3 Channelization codes for the message part

The preamble signature *s*, $1 \le s \le 16$, points to one of the 16 nodes in the code-tree that corresponds to channelization codes of length 16. The sub-tree below the specified node is used for spreading of the message part. The control part is spread with the channelization code c_c (as shown in section 4.2.2) of spreading factor 256 in the lowest branch of the sub-tree, i.e. $c_c = C_{ch,256,m}$ where m = 16(s – 1) + 15. The data part uses any of the channelization codes from spreading factor 32 to 256 in the upper-most branch of the sub-tree. To be exact, the data part is spread by channelization code $C_{ch,d}$, where $C_{ch,d} = c_{SF,m}$ and SF is the spreading factor used for the data part and m = SF×(s – 1)/16.

4.3.3.4 Scrambling code for the message part

In addition to spreading, the message part is also subject to scrambling with a 10 ms or 20 ms complex code, depending on the message length. The scrambling code is cell-specific and has a one-to-one correspondence to the scrambling code used for the preamble part.

$S_{r\text{-}msg,n} = C_{scramb,n}$,for chip indexes 4095…42495 of $C_{scramb,n}$ for 10 ms message length and for chip indexes 4095…76800 of $C_{scramb,n}$ for 20 ms message length.

The generation of these codes is explained in 4.3.2.2. The mapping of these codes to provide a complex scrambling code is also the same as for the dedicated uplink channels and is described in 4.3.2.1.