TSG-RAN Working Group 1 meeting #16 **_TSGR1#16(00)087_**
Pusan, Korea
October 10 – 13, 2000

Agenda item:

Source: Nortel Networks

Title: CR 25.211-087: Corrections for RACH message part length

Document for: Decision

In TS 25.211 v3.4.0, it is written “The message part length can be determined from the used signature and/or access slot, as configured by higher layers.”. However, determination of the message length is not clear from this sentence and there may be some confusion on how this related to the TTI of the RACH transport channel mapped onto the selected PRACH. In fact, the message length is equal to the TTI length of the RACH Transport Channel in use. This TTI length is part of the PRACH information provided by RRC in System Information message. Thus, the following formulation is proposed instead of the current one.

“ The message part length is equal to the Transmission Time Interval of the RACH Transport channel in use. This TTI length is configured by higher layers.”

3GPP TSG RAN WG1#16
Pusan, Korea

Document R1-00-1289
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.

25.211 CR 087 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 — for information: — strategic: — non-strategic: — *(for SMG use only)*
list expected approval meeting # here ?

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: Nortel Networks **Date:** 2000-10

Subject: RACH message part length

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: Need to clarify relationship between PRACH message length and RACH TTI.

Clauses affected: 5.2.2.1.3

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:

5.2.2 Common uplink physical channels

5.2.2.1 Physical Random Access Channel (PRACH)

The Physical Random Access Channel (PRACH) is used to carry the RACH.

5.2.2.1.1 Overall structure of random-access transmission

The random-access transmission is based on a Slotted ALOHA approach with fast acquisition indication. The UE can start the random-access transmission at the beginning of a number of well-defined time intervals, denoted *access slots*. There are 15 access slots per two frames and they are spaced 5120 chips apart, see figure 3. The timing of the access slots and the acquisition indication is described in subclause 7.3. Information on what access slots are available for random-access transmission is given by higher layers.

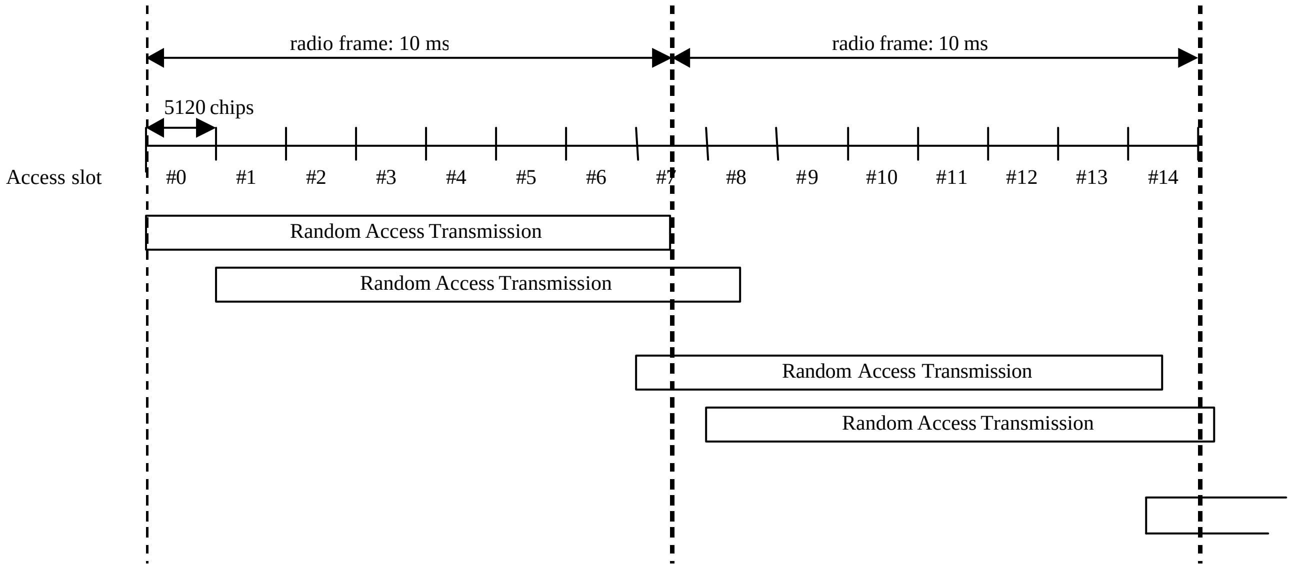

Figure 3: RACH access slot numbers and their spacing

The structure of the random-access transmission is shown in figure 4. The random-access transmission consists of one or several *preambles* of length 4096 chips and a *message* of length 10 ms or 20 ms.

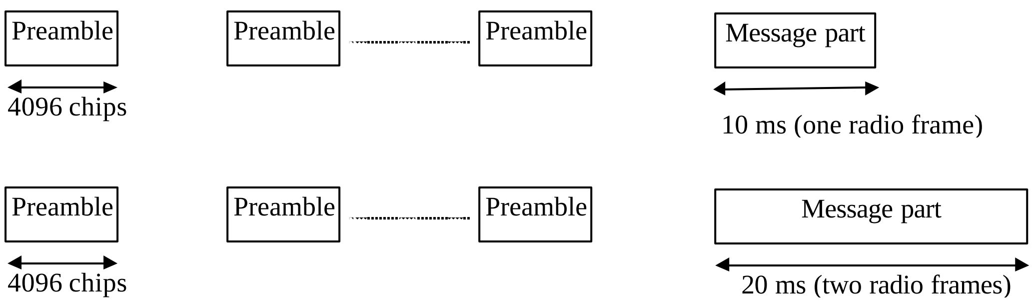

Figure 4: Structure of the random-access transmission

5.2.2.1.2 RACH preamble part

Each preamble is of length 4096 chips and consists of 256 repetitions of a signature of length 16 chips. There are a maximum of 16 available signatures, see [4] for more details.

5.2.2.1.3 RACH message part

Figure 5 shows the structure of the random-access message part radio frame. The 10 ms message part radio frame is split into 15 slots, each of length T_{slot} = 2560 chips. Each slot consists of two parts, a data part to which the RACH transport channel is mapped and a control part that carries Layer 1 control information. The data and control parts are transmitted in parallel. A 10 ms message part consists of one message part radio frame, while a 20 ms message part consists of two consecutive 10 ms message part radio frames. The message part length is equal to the Transmission Time Interval of the RACH Transport channel in use. This TTI length is ~~can be determined from the used signature and/or access slot, as~~ configured by higher layers.

The data part consists of $10*2^k$ bits, where k=0,1,2,3. This corresponds to a spreading factor of 256, 128, 64, and 32 respectively for the message data part.

The control part consists of 8 known pilot bits to support channel estimation for coherent detection and 2 TFCI bits. This corresponds to a spreading factor of 256 for the message control part. The pilot bit pattern is described in table 8. The total number of TFCI bits in the random-access message is 15*2 = 30. The TFCI of a radio frame indicates the transport format of the RACH transport channel mapped to the simultaneously transmitted message part radio frame. In case of a 20 ms PRACH message part, the TFCI is repeated in the second radio frame.

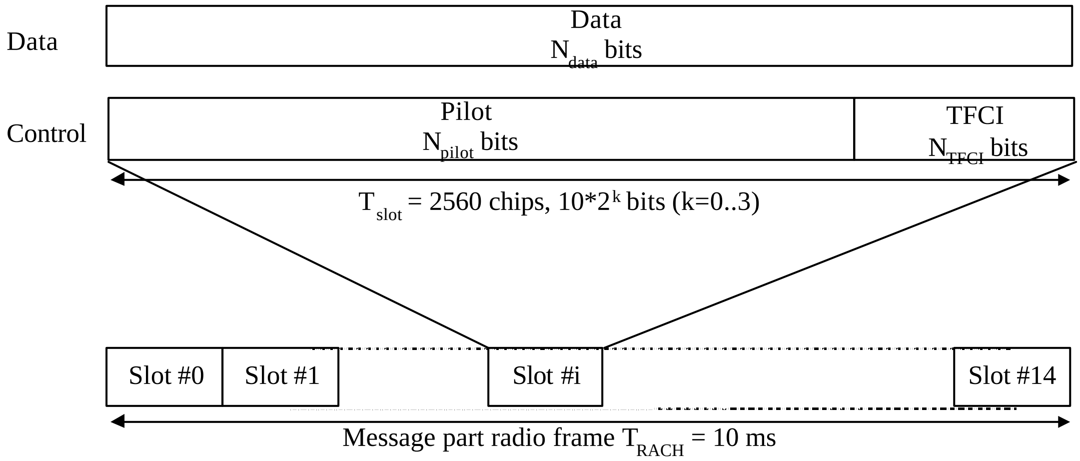

Figure 5: Structure of the random-access message part radio frame

Table 6: Random-access message data fields

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{data}
0	15	15	256	150	10	10
1	30	30	128	300	20	20
2	60	60	64	600	40	40
3	120	120	32	1200	80	80

Table 7: Random-access message control fields

Slot Format #i	Channel Bit Rate (kbps)	Channel Symbol Rate (ksps)	SF	Bits/ Frame	Bits/ Slot	N_{pilot}	N_{TFCI}
0	15	15	256	150	10	8	2

Table 8: Pilot bit patterns for RACH message part with N_{pilot} = 8

	N_{pilot} = 8							
Bit #	0	1	2	3	4	5	6	7
Slot #0	1	1	1	1	1	1	1	0
1	1	0	1	0	1	1	1	0
2	1	0	1	1	1	0	1	1
3	1	0	1	0	1	0	1	0
4	1	1	1	0	1	0	1	1
5	1	1	1	1	1	1	1	0
6	1	1	1	1	1	0	1	0
7	1	1	1	0	1	0	1	0
8	1	0	1	1	1	1	1	0
9	1	1	1	1	1	1	1	1
10	1	0	1	1	1	0	1	1
11	1	1	1	0	1	1	1	1
12	1	1	1	0	1	0	1	0
13	1	0	1	0	1	1	1	1
14	1	0	1	0	1	1	1	1