TSG-RAN Working Group 1 meeting #3
Nynäshamn, March 22-25, 1999

TSGR1#3(99)169

Agenda item:

Source: **Siemens**

Title: **Text proposal for S1.21 document concerning RACH**
Document for:

Abstract

In a companion paper [1], it is shown how the current RACH concept can be enhanced for accommodating large cells. This contribution proposes a flexible concept for inclusion into the "S1.21 document" [2]. E.g. the proposed text allows a second basic periodic midamble code to be used on the RACH and the spreading factor can be 16 or 8. The concept of a "RACH configuration broadcasted on the BCH" is aligned with Refs. [3,4].

Text proposal

- concerning "**6.1.2** Common transport channels", item 4 "Random Access Channel(s) ..." on page 8:
    1. *add new bullet point* "no timing advance control" (*similar to ORACH description*)
    2. *delete* "The exact number of allowed bits is FFS" (*part of second bullet point*)

- concerning "**7.2.3.1 Example Midamble Code Set for Burst Type 1**".
  add new text just above Table 5: "For cells with small radius, the midambles are generated from the basic periodic midamble code *for all* k=1,2,...,K. For cells with large radius, the midambles are generated from the basic periodic midamble codes *for uneven* k=1,3,5,...≤ K only."

- concerning "**7.3.2** The physical random access channel (PRACH)" on page 17:
    1. *in last sentence before 7.3.2.1: replace* "adopted" *by* "flexibly scaled"
    2. *add new sentence at the end of existing text*: "This description of the physical properties of the PRACH also applies to bursts carrying other signaling or user traffic if they are scheduled on a time slot which is (partly) allocated to the RACH or ORACH.

- concerning "**7.3.2.1** Spreading codes" on page 17:
  replace the existing sentence in the body by: "The uplink PRACH uses fixed spreading with spreading factors SF=16 or SF=8 as described in section **7.2.1.1**. The set of admissible spreading codes for use on the PRACH and the associated spreading factors are broadcasted on the BCH (within the RACH configuration parameters on the BCH, see also Ref. [3])."

- concerning "**7.3.2.2** Burst types" on page 17/18:
  replace the existing two paragraphs of text by the following single paragraph:
  "The mobile stations send the uplink access bursts randomly in the PRACH. Two distinct access bursts are defined which effectively divide a 625µs ("full") time-slot into two 312.5µs ("half") slots. The access bursts 1 and 2 occupy the first and second half slot, respectively. The access bursts of type 1 and 2 coexist in a full time-slot: they never collide with each other. Depending of the RACH configuration broadcasted on the BCH, up to 8 different mobile stations can access on the same half slot simultaneously without colliding. The precise number of collision groups depends on the set of admissible midambles and spreading codes (i.e. the selected RACH configuration, see also Ref. [3]). The access bursts are depicted in Figs. 10 and 11 and the contents of the access burst fields are listed in Tables 7 and 8."

- concerning "**7.3.2.3** Training sequences for access bursts"

replace the existing sentence in the body by: "The training sequences, i.e. midambles, of different users active in the same half time slot are time shifted versions of a small set of periodic basic codes (in cells with small radius, a single periodic code can be used). The necessary time shifts are obtained by choosing either *all* k=1,2,3...,K (for cells with small radius) or *uneven* k=1,3,5,...≤K (for cells with large radius, as explained in Sect. **7.2.3.1**). Different cells use different periodic basic codes, i.e. different midamble sets. In this way, a joint channel estimation for the channel impulse responses of all active users within one half time slot can be performed by a small number of cyclic correlations (in cells with small radius, a single cyclic correlator suffices). The different user specific channel impulse response estimates are obtained sequentially in time at the output of the cyclic correlators.".

- concerning "**8.2.4** The Random Access Channel (RACH)" on page 21:
  replace the existing text by: "To accommodate RACH a single uplink slot is subdivided into two half slots (cf. the special burst structure as defined in section **7.3.2.2**). Each is capable of supporting independent transmissions. The RACH has an interleaving period of one frame. The same slot may be used for RACH by more than one cell. Multiple transmissions using different spreading codes may be received in parallel. More than one slot per frame may be administered for the RACH. The location of slots allocated to RACH is broadcasted on the BCH. The RACH uses open loop power control. The details of the employed open loop power control algorithm may be different from the corresponding algorithm on other channels.

References

[1] *Dimensioning of RACH Capacity for UTRA TDD Mode: Packet Delay, Large Cell Radius, Capacity Requirements*, 3GPP TSG-RAN WG1 meeting #3, Tdoc TSG RAN WG1 xxx/99, March 22-25, 1999.

[2] *TDD, Transport channels and physical channels description*, 3GPP RAN WG1 (S1.21), v 0.1.1, 1999-02.

[3] *Comments to Random Access Procedure and Change Request to S2.21 Document*, 3GPP TSG-RAN WG2 meeting #2, Tdoc TSG RAN WG2 xxx/99, Stockholm, Sweden, March 8-11, 1999.

[4] *MAC protocol specification*, 3GPP S2.21 V0.0.1, 1999-01.