TSG-RAN Working Group 1 meeting #11 **TSGR1#11(00)0288**

San Diego, USA, Feb.28 – March. 3 , 2000

Agenda Item:
Source: CWTS
To: TSG RAN WG1
Title: Random Access procedures for low chip rate TDD option
Document for: Approval

Introduction

The random access procedures and the collision problems are discussed in this document.

Random access procedures

Preparation of random access

When the UE is in Idle mode, it will keep the downlink synchronisation and read the cell broadcast information. From the cell broadcast information, the UE will get the code set assigned to UpPTS SYNC1 for random access, the number and position of the RACH channel, the number and position of the FACH channel, the operation mode (symmetric or asymmetric) of the cell, and other information related to random access. Also, the UE needs to estimate the timing and power level for the transmission of random access bursts according to the received DwPTS from Node B.

Random access procedures

The SYNC1 sequence in UpPTS following the guard time slot is used only for uplink synchronisation; it is a known orthogonal Gold code sequence. In this period, only the UEs (maximum 8 UEs) that want to establish the uplink synchronisation will transmit with random chose Gold code sequences with the estimated timing and power

. Once the Node B detects the transmission from one UE, or has found the correlated peak value exceeding the minimum threshold, the timing advance (TA) and uplink power control (PC) could be obtained by comparing the detected arrival time and power level of the SYNC1 with the expected arrival time and power level. The Node B will response to the UE by sending its control signalling over the chosen FACH in the following subframe.

Once the UE receives the above mentioned control signalling in the chose FACH, its access request has been accepted by the Node B. Then the UE will adjust it's timing and power level and send the RACH in the code channel corresponding to the FACH. In this step, the RACH sent to Node B by UE will have high synchronisation precision.

The UE and Node B will exchange the information and packets related to access in the FACH/RACH pair mentioned above and finish the random access procedure in physical layer.

Random access collisioin

When a collision happened or in bad propagation environment, the Node B can't receive SYNC1. In these cases, the UE will not get any useful response from the Node B in the FACH of next subframe, thus the UE will have to adjust it's Tx time and Tx power level based on the new SYNC and re-send the SYNC1 after a random delay.

Besides above detailed mentioned situations, all kinds of following procedures for the UE could be concluded as follows:

- ✓ If the UE has detected no answer or error answer in the control signalling packets in the FACH, it will abandon these packets. To avoid the risk of collision with other UEs, it will re-send the access request with the newly estimated Tx time and Tx power level based on new SYNC after a random delay.
- ✓ If the UE has correctly received the downlink control signalling packets in the FACH, but the in-band identification does not match, the UE will abandon these packets. To avoid the risk of collision with other UEs, it will re-send the access request with the newly estimated

Tx time and Tx power level based on new SYNC after a random delay.

- ✓ If the UE has correctly received the downlink control signalling packets in the FACH, but without in-band identification, the UE will abandon these packets. To avoid the risk of collision with other UEs, it will adjust its Tx time and Tx power level as the TA and PC information informed by the Node B and re-send the access request after a random delay.
- ✓ If the access request in RACH can be correctly received by the Node B, and the response from Node B in FACH is also correctly received by the UE with the in-band identification matched, the UE understands that the Node B has accepted its access request. Then the UE will adjust its Tx time and Tx power level as the TA and PC information informed by the Node B. And it will continue its access procedures in the same RACH/FACH pair of the next subframe

If the UE can not access the Node B as the above-described procedures within the fixed period, it will turn into stand-by state.

Conclusion

This document describes the Random Access procedure of low chip rate option,it's proposed to include this new feature for low chip rate TDD option in new clause 8.5 of TR 25.928.

---------- changes to 25.928 begin ----------

8.5 Random access procedures

8.5.1 Preparation of random access

When the UE is in Idle mode, it will keep the downlink synchronisation and read the cell broadcast information. From the cell broadcast information, the UE will get the code set assigned to UpPTS SYNC1 for random access, the number and position of the RACH channel, the number and position of the FACH channel, the operation mode (symmetric or asymmetric) of the cell, and other information related to random access. Also, the UE need to estimate the timing and power level for the transmission of random access bursts according to the received DwPTS from Node B.

8.5.2 Random access procedures

The SYNC1 sequence in UpPTS following the guard time slot is used only for uplink synchronisation; it is a known orthogonal Gold code sequence. In this period, only the UEs (maximum 8 UEs) that want to establish the uplink synchronisation will transmit with random chose Gold code sequences with the estimated timing and power

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The UE and Node B will exchange the information and packets related to access in the FACH/RACH pair mentioned above and finish the random access procedure in physical layer.

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If the UE can not access the Node B as the above-described procedures within the fixed period, it will turn into standby state.

---------- changes to 25.928 end ----------