

Agenda Item: Ad Hoc 1

Source: Siemens

Out-of-sync Procedure for TDD

1. Introduction

This contribution proposes to clarify the out-of-sync handling for the TDD mode because in the current scheme DTX means to switch off the used physical resource for a non limited time period, where no data has to be transmitted and therefore the receiver in the NodeB can not distinguish whether DTX is applied in the UE or the connection is out-of-sync due to fading or other effects.

It is proposed that the Layer 1 is configured by means of higher layer with the out-of-sync parameter "N_out_sync_frames". The parameter "N_out_sync_frames" (16, 32, 64, 128 frames) defines after how many frames of being out of synch, the layer 1 indicates out-of-sync to higher layers. When a UE applies DTX then once after "N_out_sync_frames"/2-1 silent frames it shall send a dummy burst in the next possible frame if no data have to be transmitted in that frame. The transmission in every "N_out_sync_frames"/2 frame is for protection against single transmission errors: Even if one dummy burst is lost, this would result in less than "N_out_sync_frames" "silent" frames at the NodeB and so the NodeB would not misinterpret this as out-of-sync.

The RNC finally decides whether to release the connection in dependence on consecutive out-of-sync commands by layer 1.

This dummy burst has the same slot format as the normal burst where DTX is used on. The dummy burst is filled with an arbitrary bit pattern and contains a TFCI and TPC bits if inner loop PC is applied. The TFCI of the dummy burst is generated straightforward because DTX only occurs if all TrCH of the CCTrCH have zero length.

2. UE operation

When the UE applies DTX it is forced to transmit at least once after "N_out_sync_frames"/2-1 "silent" frames, where the value of "N_out_sync_frames" is indicated by means of higher layer. If after "N_out_sync_frames"/2-1 silent frames no data have to be transmitted, then a dummy burst shall be generated and transmitted in the next possible frame by layer 1. This dummy burst contains a TFCI that is indicating that there were no data to be transmitted.

A UE shall monitor the active link, e.g. by monitoring the P-CCPCH, the DL-DPCH or a combination of both to determine the synchronisation status. If "N_out_sync_frames" consecutive frames have been found to be out-of-sync, the UE shall indicate out-of-sync to higher layers and turn off the uplink transmission. The RRC in the UE decides whether to go into idle mode and start a cell selection or reselection.

3. Node B operation

The Node B operation is different to that of the UE because the Node B transmits on a regular basis (e.g. P-CCPCH). Therefore no dummy burst has to be generated in downlink.

If a Node B does not receive any dedicated channel from a UE within a time interval "N_out_sync_frames" then it shall signal out-of-sync to higher layers. The RNC then decides on releasing the connection in dependence on number of consecutive out-of-sync messages.

4. Text Proposal for TS25.224

4.4 Synchronisation and Cell Search Procedures

4.4.1 Cell Search

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4.4.2 Out of Synchronisation

4.4.2.1 UE operation

A UE shall monitor the active link, e.g. by monitoring the P-CCPCH, the DL-DPCH or a combination of both to determine the synchronisation status. If “N_out_synch_frames” consecutive frames have been found to be out-of-sync, the UE shall indicate out-of-sync to higher layers and turn off the uplink transmission. The value for “N_out_synch_frames” is given by means of higher layers.

4.4.2.2. Node B operation

If a Node B does not receive any DPCH from a UE within a time interval of “N_out_synch_frames” frames, it shall signal out-of-sync to higher layer. The RNC then decides on releasing the connection in dependence on number of consecutive out-of-sync messages.

4.6 Discontinuous transmission (DTX) of Radio Frames

Discontinuous transmission (DTX) is applied in up- and downlink when the total bit rate after transport channel multiplexing differs from the total channel bit rate of the allocated dedicated physical channels.

Rate matching is used in order to fill resource units completely, that are only partially filled with data. In the case that after rate matching and multiplexing no data at all is to be transmitted in a resource unit the complete resource unit is discarded from transmission. This applies also to the case where only one resource unit is allocated and no data has to be transmitted.

When a UE applies DTX it is forced to transmit at least once after “N_out_synch_frames”/2-1 silent frames, where the value of “N_out_synch_frames” is indicated by means of higher layers. If after “N_out_synch_frames”/2-1 silent frames no data have to be transmitted, then a dummy burst shall be generated and transmitted in the next possible frame by layer 1.

This dummy burst has the same slot format as the normal burst where DTX is used on. The dummy burst is filled with an arbitrary bit pattern, contains a TFCI and TPC bits if inner loop PC is applied. The TFCI of the dummy burst indicates that there were no data to be transmitted.